Saving collections: taxonomic revision of the herpetological collection of the Instituto de Investigação Científica Tropical, Lisbon (Portugal) with a protocol to rescue abandoned collections

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Abstract
The herpetological collections of the Instituto de Investigação Científica Tropical, Lisbon, are amongst the most important collections from the former Portuguese territories in Africa and Asia. The collection comprises more than 5000 preserved specimens, including type specimens of nine taxa, *Trachylepis adamastor*, *Trachypelis thomensis*, *Panaspis thomensis*, *Naja peroescobari*, *Dalophia angolensis*, *Hemidactylus nzingae*, *Boaedon fradei*, *Platysaurus maculatus maculatus*, and *Platysaurus maculatus lineicauda*. The collection was abandoned in the early years of 2000s and was at risk of being lost. In this paper the entire collection is reviewed, a catalogue provided of the extant specimens, and a brief account of the history of herpetological research at IIICT given. Details are also provided on the recovery of the collection and a protocol to rescue abandoned collections.

Keywords
Angola, Cabo Verde, East Timor, Goa, Guinea-Bissau, herpetofauna, Macau, Mozambique, Natural History Collections, São Tomé & Príncipe
Introduction

The zoological collections of the Instituto de Investigação Científica Tropical (IICT), Lisbon (Portugal), are amongst the largest and most important biological collections in Portugal. Spanning all major zoological groups, the IICT collections are mostly focused on the fauna of the former Portuguese colonial territories in Africa and Asia. The collection’s geographical coverage is of interest, as they cover areas from where collections are relatively scarce and countries for which the current faunal knowledge is still deficient. While part of the IICT zoological collections have been catalogued and digitised recently (see Monteiro et al. 2014, 2016, 2017), a considerable part was neglected for years. This was the case of the herpetological collections. With approximately 5000 specimens from Angola, Mozambique, Guinea-Bissau, Cabo Verde, São Tomé & Príncipe, East Timor, Macau (China), Goa (Portuguese India), and Portugal, the IICT herpetological collections are the largest of their kind in the country. These collections are also amongst the largest available collections of amphibians and reptiles in the world for some of the countries covered (e.g., Guinea-Bissau, Cabo Verde). These collections were built from the 1930s to the 1990s, during several expeditions and field surveys conducted by IICT researchers and staff, but also by donations and contributions from several Portuguese colonial officers and landowners in these former territories.

Despite its importance, the IICT herpetological collections were abandoned in the late 1990s. Without a fully dedicated curator or collection manager, the collection became degraded and almost completely inaccessible for researchers. Besides the original field books and an incomplete manuscript catalogue, the collections were never fully catalogued or digitised. In 2015 we started a cataloguing and digitisation project for the IICT herpetological collections. This process was followed by a complete evaluation of the conservation status of the collections, the recovery of the specimens that were in critical condition, and the transfer of the entire collection to the Museu Nacional de História Natural e da Ciência, Lisbon. In this paper we provide a comprehensive review of the taxonomic diversity and importance of the IICT herpetological collections, report on the collection recuperation process, and propose a protocol to recover abandoned natural history collections.

Brief history of the IICT and its herpetological collections

Dating back to the second half of the nineteenth century, IICT’s institutional history has been particularly complex, even in the bureaucracy-prone context of Portuguese scientific institutions. Its origins are related to the foundation of the ‘Comissão de Cartografia’ in 1883, but only in 1936 did the institution become more active, when it was renamed ‘Junta das Missões Geográficas e de Investigações Coloniais’. This would not be the last name change of the institution, as it would be renamed ‘Junta de Investigações do Ultramar’ in 1945, ‘Junta de Investigações Científicas do Ultramar’ in 1973, ‘Laboratório Nacional de Investigação Científica Tropical’ in 1979, and finally ‘Instituto de Investigação Científica Tropical’ in 1982 (Anonymous 1983). The reform
of the institution in 1936 and the publication of the National Plan for the Scientific Occupation of the Portuguese Overseas in 1945 (Anonymous 1945) established the internal organisation of the institution, namely its departments and branches. Subsequently, the institution established a centre for zoological research, commonly known as “Centro de Zoologia” [also known by the acronym CZL – Centro de Zoologia de Lisboa, see Sabaj (2020)]. The Centro de Zoologia was housed in an adapted mansion in Rua da Junqueira 14, Alcântara neighborhood, near the Tagus river, Lisbon. This centre was the main entity responsible for conducting zoological research in the Portuguese overseas territories, building, and maintaining collections and providing zoological expertise to other fields related to the colonial enterprise.

The leadership of the Centro de Zoologia was appointed to the Portuguese zoologist Fernando Frade Viegas da Costa (1898–1983), commonly known as Fernando Frade (Fig. 1). Besides being the director of the CZL, Frade also had the responsibility for
leading most of the so-called “Missões Zoológicas” (Zoological Missions) to the Portuguese overseas territories. The objective of these missions was to catalogue the fauna of those territories, study their ecological relationships, and understand the potential use or threats that native fauna could pose to the colonial enterprise (Anonymous 1945). During Frade’s direction the CZL led several zoological missions, namely to Guinea-Bissau, São Tomé & Príncipe, Cabo Verde, Angola, Mozambique, Portuguese India (Goa) and East Timor. Herpetological specimens were collected in the course of all these missions, as well as on other missions, as was the case for the Apiary Mission to Angola (1957–1959).

The study of the herpetological collections was entrusted to the Portuguese herpetologist Sara Maria Bárbara Marques Manaças (1896–date of death unknown; Fig. 2). Manaças published 20 papers in which she identified and catalogued specimens, reported morphological data, and provided taxonomic and distribution comments. Although she worked with both amphibians and reptiles, the majority of her papers were focused on reptiles (7 vs. 13 publications, respectively). Her papers covered the herpetofauna of Guinea-Bissau (Manaças 1947, 1949, 1950a, 1951a, b, 1955, 1982), Mozambique (Manaças 1950b, 1952, 1954, 1959, 1961a, 1982), Portuguese Timor (currently East Timor) (Manaças 1955, 1972), São Tomé & Príncipe (Manaças 1958, 1973), Portuguese India – Goa (Manaças 1961b), and Angola (Manaças 1963, 1973 “1974”, 1982). All of these papers were single-authored by Manaças, with the exception of one, co-authored with Fernando Frade, on the venomous snakes of the Portuguese overseas territories (Frade and Manaças 1955; Fig. 3). The last paper of her career, also dedicated to the venomous snakes of Guinea-Bissau, São Tomé & Príncipe, Angola, and Mozambique (Manaças 1982), was published posthumously with some additions and corrections by the Portuguese herpetologist Margarida Pinheiro (date of

Figure 2. Portrait of Sara Manaças (A), and her herpetological laboratory (date unknown; B). Photograph credits: A courtesy of Luis Mendes B ULisboa – Col.Fotografia IICT-ZOO 21688.
birth unknown—to date). During the time Manaças curated the herpetological collections, the English-born Zimbabwean herpetologist Donald G. Broadley (1932–2016) visited and consulted the collections in August 1968 (Broadley 2018).

Following the passing of Manaças in the early 1980s, Pinheiro was entrusted with the herpetological collections (Fig. 4). With the independence of the former Portuguese territories (with the exception of Macau) in 1975, fieldwork almost halted, and the activity of the herpetology department slowed down considerably. Pinheiro focused mostly on the study of Cabo Verde’s herpetofauna (Pinheiro 1986, 1990), but also participated in a field survey to the then Portuguese territory of Macau (currently a special administrative region of the People’s Republic of China; Dias et al. 1994). From this latter survey, Pinheiro published a brief note on the distribution of the Agamid *Leiolepis belliana* (Hardwicke & Gray, 1827) in the region (Pinheiro 1994) and participated as a co-author, together with the herpetologist Clara Ruas (date of birth unknown—to date) and the entomologist Luís Mendes (1946—to date), on two notes on the diet of local amphibians (Mendes et al. 1994a, b). During the 1990’s, Clara Ruas became assistant researcher in the herpetological department. Ruas focused almost exclusively on the study of amphibians, and besides the aforementioned publications, she published two papers regarding the amphibians of Angola (Ruas 1996, 2002a) and one on the amphibians of Mozambique (Ruas 2002b).
During the first decades of the twenty-first century, the Centro de Zoologia became increasingly understaffed and research in the collections diminished considerably. This contributed to the degradation of the herpetological collections. Without constant supervision, lacking proper collection management, and housed in two rooms in the basement of the Centro de Zoologia building, which suffered from the lack of climate control, high humidity levels, and no security, the herpetological collections reached a critical situation and were at risk of being irreplaceably lost (Fig. 5).

After years of uncertainty regarding its future, IICT was formally closed by the Portuguese government on 31 July 2015 (Decreto-Lei 141/2015). With this closure, all the responsibilities of the institution, namely those of research and development, were transferred from the mansion in Rua da Junqueira to the University of Lisbon and its natural history collections were subsequently deposited in the Museu Nacional de História Natural e da Ciência (MUHNAC), Lisbon. The transfer of the collections from Centro de Zoologia to MUHNAC took place between 2015 and 2018. Despite sharing the same spaces and curatorial team, the IICT collections remain independent from the rest of MUHNAC collections, i.e., they maintain their former catalogue numbers and have not been catalogued as MUHNAC collections. The IICT herpetological collection is also considered a “closed” collection, in the sense that it is not accepting additional specimens, and therefore constitutes a closed set. In January 2018, the first author of this paper (LMPC) was appointed as External Curator of the IICT herpetological collections, while the third author (MPM) is the acting Assistant Curator.
Materials and methods

During an initial survey, all the available catalogues, field notebooks, and documentation associated with the collections were located, compiled, and digitised. The available field notebooks (one per major expedition), provided locality data, collecting dates, names of the collectors and/or identification of the expedition, and an assortment of natural history data and observations (Fig. 6A). Contrary to the catalogue numbers, the numbers in the field notebooks (i.e., the field numbers)
were the same as those physically associated to the specimen. This number, comprising a serial number and the collecting year (e.g., 161/1959) was the same number used in all of the publications referable to the specimen, and therefore should be considered the de facto catalogue number. Manuscript documentation associated with the collection provided measurements, scale counts, and observations made
by Sara Manaças for individual specimens (Fig. 6B, C). The available catalogue was organised by subcollection, with one entry per specimen, providing their taxonomic identity, collecting date, and locality (Fig. 6D). Each specimen also had a catalogue number, but this number was not physically associated with the specimen, nor was the respective field number, rendering it impossible to link the entry for the catalogue number and the specimen.

List of institute acronyms (abbreviations follow Sabaj 2020)

- **AMNH**: American Museum of Natural History, New York, USA;
- **BPBM**: Bernice Pauahi Bishop Museum, Department of Zoology, Honolulu;
- **CAS**: California Academy of Sciences, San Francisco, USA;
- **CM**: Carnegie Museum, Pittsburgh, USA;
- **CZL**: Centro de Zoologia de Lisboa [extinct, now part of IICT, see below], Lisbon, Portugal;
- **DiSSCO**: Distributed System of Scientific Collections;
- **GBIF**: Global Biodiversity Information Facility;
- **iDigBio**: Integrated Digitized Biocollections;
- **IICT**: Instituto de Investigação Científica Tropical, Lisboa, Portugal;
- **INBAC**: Instituto Nacional da Biodiversidade e Áreas de Conservação, Luanda, Angola;
- **ISCED**: Instituto Superior de Ciências da Educação, Lubango, Angola;
- **MCNB**: Museu de Ciências Naturals de Barcelona, Barcelona, Spain;
- **MCUC**: Museu da Ciência da Universidade de Coimbra, Coimbra, Portugal;
- **MD**: Museu Regional do Dundo, Dundo, Angola;
- **MCZ**: Museum of Comparative Zoology, Harvard University, Cambridge, USA;
- **MHNC**: Musée d’Histoire Naturelle, la Chaux-de-Fonds, Switzerland;
- **MHNC-UP**: Museu de História Natural e da Ciência da Universidade do Porto, Porto, Portugal;
- **MNHN**: Muséum National d’Histoire Naturelle, Paris, France;
- **MUHNAC**: Museu Nacional de História Natural e da Ciência, Lisbon, Portugal;
- **MVZ**: Museum of Vertebrate Zoology, University of California, Berkeley, USA;
- **NCSM**: North Carolina Museum of Natural Sciences, Raleigh, USA;
- **NHMUK**: Natural History Museum, London, UK;
- **PEM**: Port Elizabeth Museum, Port Elizabeth, South Africa;
- **TCWC**: Biodiversity Research and Teaching Collections, Department of Wildlife and Fisheries Sciences, Texas A&M University, College Station, USA;
- **TM**: Ditsong National Museum of Natural History, Pretoria, South Africa;
- **UMMZ**: University of Michigan Museum of Zoology, Ann Arbor, USA;
- **USNM**: National Museum of Natural History, Smithsonian Institution, Washington D.C., USA;
- **YPM**: Yale University, Peabody Museum of Natural History, New Haven, USA;
- **ZFMK**: Zoologisches Forschungsmuseum Alexander Koenig, Bonn, Germany;
- **ZSI**: Zoological Society of India, India.
All herpetological specimens were located in the CZL reserves, and after a brief initial identification and listing (Fig. 7A), were transported to the Wet Laboratory of MUHNAC. Specimens were distributed in different types of glass jars, with most of the specimens in glass-top, wire-bail jars with rubber gaskets, although some specimens were in glass jars with Bakelite or metal lids. None of the jars was in optimal condition, ranging from dirty to broken. Almost all the specimens were preserved in formaldehyde, as inferred based on the examination. Once in the laboratory, jars and other containers were cleaned in order to retrieve the available data from the existing external labels (Fig. 7B). These data were confirmed against the contents of the jar/container as well as with any existing specimen tags or internal labels (either attached to the specimens or in the bottom of the jar; Fig. 7C). Data on the jars and specimens were cross-referenced to data available in scientific publications that cited IICT specimens to confirm the presence of individual specimens in the collections and compare the published data to the data on the label/tags (Manaças 1947, 1949, 1950a, b, 1951a, b, 1952, 1954, 1955, 1956, 1958, 1959, 1961a, b, 1972, 1973, 1973 “1974”, 1982; Pinheiro 1986, 1990, 1994; Mendes et al. 1994a, b; Ruas 1996, 2002a, b; Ceríaco 2015; Ceríaco et al. 2016, 2017, 2020a, b, 2021; Soares et al. 2018; Hallermann et al. 2020). All specimens, whenever possible, were identified to species level. For this we followed the most updated checklists, guides, and identification keys to the groups and geographical regions covered in the collection.

As the majority of the jars presented structural deficiencies (cracks, melted or embrittled gaskets, rusty/oxidised metal stoppers and/or lids, etc.; Fig. 7D) they were discarded. Original external labels were retrieved whenever possible. Following a similar procedure to that suggested by Simmons (2014), specimens that were originally preserved in formaldehyde (the vast majority) were rinsed in distilled water for a few minutes, then underwent steps of 20% increase in concentration of ethanol (20% for 30 minutes, 40% for 30 minutes, 60% for 30 minutes, 70% for final preservation). All the specimens were placed in 70% ethanol. In those cases in which the original jar/container had been discarded, specimens were placed in new jars. Original tags and/or internal labels were kept inside the new jars and, whenever possible, original external labels were reattached to the exterior. A new standardised, typewritten label was printed on ResistAll paper and placed inside each jar, presenting the basic data its content (Fig. 7E). After this, specimens were deposited in MUHNAC’s Wet Collections reserves, placed in compactor cabinets, and arranged by country of origin (sub-collection) and then taxonomically (Fig. 7F).

Some specimens presented critical conservation issues such as being dehydrated due to evaporation of the preservative fluid (Fig. 8A), fungal and bacterial growth (Fig. 8B), deposits of formaldehyde crystals, loss of proteins and lipids (Fig. 8C), or decomposition of the specimens (Fig. 8D, E). For dehydrated specimens we attempted a slow rehydration through the placement of the specimen in a humid atmosphere and staging in water overnight. Specimens with fungal and bacterial growth were washed in 70% ethanol and the growth carefully removed with cotton swabs. Specimens with deposits of formaldehyde crystals were washed with water then a series of steps of 20% increase in concentration of ethanol (20% for 30
Figure 7. Rehabilitation and revision of the IICT herpetological collections A initial listing of the specimens to be transported B cleaning of the external label C example of internal label, usually attached to individual specimens D general view of the different types of jars and respective conservation issues associated—embrittled and or melted rubber gaskets, oxidized metal stoppers, cracked jars, etc E new standardized ResistAll internal label F IICT herpetology collection after the intervention in the MUHNAC reserves. Photographs by Luis M. P. Cerfáco.
Figure 8. Examples of problems associated with the IICT herpetological collections A a dehydrated specimen of *Gerrhosaurus multilineatus* from Angola B a jar with extensive fungal growth on the inside and outside C lipid loss on a snake specimen from Macau D jar in which the preservative fluid has evaporated and the specimen was attacked by insect pests E rotten specimen of *Leptopelis* due to poor initial fixation and evaporation of the ethanol preservative. Photographs by Mariana P. Marques.
minutes, 40% for 30 minutes, 60% for 30 minutes, 70% for final preservation); the few specimens that showed loss of proteins and lipids underwent similar treatment. Specimens that were soft due to problems during the fixation process were injected and immersed with formaldehyde for one to two days, depending on the size of the specimen. Specimens that were beyond salvation were discarded, but each was photographed for archival purposes and their associated data was collected whenever possible.

All specimens with locality data were georeferenced. Locality data are reported in the form of decimal degrees and use the WGS 84 map datum. Older (non-GPS) records were georeferenced using the GEOLocate web application (https://www.geolocate.org). Whenever possible original maps, field books or collectors’ notes were consulted. Elevations are all reported as meters above sea level.

Results

The collections are divided into eight sub-collections, respectively the Cabo Verde collection, the Guinea-Bissau collection, the São Tomé & Príncipe collection, the Angola collection, the Mozambique collection, the Portuguese India collection, the Macau collection, and the East Timor collection. Some specimens from Portugal and other African countries also exist in the collections, but represent a diminutive subset, mostly originating from occasional collecting events by I ICT researchers or external donations. Combined, the eight sub-collections hold a total of 5173 specimens (3048 reptiles, 2125 amphibians). The largest sub-collection is that of Cabo Verde (1740 specimens), followed by Mozambique (1181 specimens), Guinea-Bissau (980 specimens), Angola (677 specimens), São Tomé & Príncipe (234 specimens), Macau (318 specimens), Portuguese India – Goa (26 specimens), and East Timor (17 specimens). The specimens were collected in 253 different localities across their respective countries. The collections hold 47 type specimens (two holotypes, 45 paratypes) of nine nominal taxa. Surprisingly, only 76 jars with an unknown number of specimens (due to the poor preservation or total destruction of the specimens) were discarded because they were beyond salvation. Detailed reviews of the different sub-collections are provided in the following accounts.

Cabo Verde collection

The herpetofauna of the Cabo Verde archipelago has been reviewed in the past decades and is currently well known. The most recent account of its terrestrial reptiles was published by Vasconcelos et al. (2013), listing a total of 31 extant taxa, of which 22 are endemic to the archipelago. Seven exotic reptiles have been recorded in Cabo Verde (Vasconcelos et al. 2013; Ceríaco and Sousa 2017), and the only amphibian present in the archipelago is the exotic African Common Toad, Sclerophrys regularis (Reuss, 1833) (Vasconcelos et al. 2010b). These numbers are constantly being updated, as a new
species has been recently described (Vasconcelos et al. 2020). The iconic giant skink, *Chioninia coctei* (Duméril & Bibron, 1839) is presumed to have gone extinct in the twentieth century due to a combination of human and ecological factors, and recent searches for this species have been unsuccessful (Ceríaco 2014).

This collection comprises a total of 1740 specimens (376 amphibians and 1364 reptiles), composed of one species of amphibians and 17 species and four subspecies of reptiles (Table 1). All the amphibians in the collection belong to the invasive African Common Toad (*Sclerophys regularis*), accounting for roughly 20% of the total collection. The reptile collection is composed of representatives from the families Gekkonidae, Phyllodactylidae and Scincidae, each represented by a single genus. Family Phyllodactylidae is the best represented with 871 specimens, followed by Scincidae with 489 and Gekkonidae with only four specimens. All specimens from the family Phyllodactylidae belong to endemic species of the genus *Tarentola*, and all species known to occur in Cabo Verde are represented in the collection, except *Tarentola boavistensis* Joger, 1993. Of the two recognised subspecies of *Tarentola gigas* (Bocage, 1875), only the nominal *T. g. gigas* is present in the collection, while both subspecies of *Tarentola protogigas* Joger, 1984 are represented (*T. p. protogigas* and *T. p. hartogi*). With 296 specimens, *Tarentola nicolaensis* Schleich, 1984 is the best represented species, followed by *Tarentola substituta* Joger, 1984, *T. gigas gigas* and *Tarentola* cf. *caboverdiana* Schleich, 1984 with 131, 128 and 124 specimens, respectively. The family Scincidae is represented by the endemic genus *Chioninia*, covering all known species except for the extinct *C. coctei*. At the subspecific level, *C. vaillantii vaillantii* (Boulenger, 1887) and *C. spinalis maioensis* (Mertens, 1955) are the only recognised subspecies that are represented in this collection. Within the Scincidae, *C. delalandii* (Duméril & Bibron, 1839) is the best represented species with 220 specimens, followed by *C. nicolaensis* (Schleich, 1987) with 90 specimens. The few specimens from the family Gekkonidae are assigned to *Hemidactylus* sp. and *Hemidactylus angulatus* Hallowell, 1854, which is the only exotic reptile from Cabo Verde that is represented in the collection.

The geographic range of this collection covers 74 different localities from ten islands and islets: São Nicolau, Santiago, Brava, Santo Antão, Maio, Raso, Fogo, São Vicente, Rombos, and Branco (Table 2; Fig. 9). Of all the major islands of the archipelago, only three are not represented: Santa Luzia in the Desertas group, and the eastern islands of Sal and Boavista. São Nicolau is the best represented island, with 474 specimens from 24 different localities, while the Rombos islets are the least sampled with only seven specimens. Collecting events took place between 1967 and 1994, although most of the material was collected between 1969 and 1972 in expeditions organised by the CZL, especially aimed at collecting birds and invertebrates.

Part of the material assigned to the genus *Chioninia* was studied and published by Margarida Pinheiro on two different occasions (Pinheiro 1986, 1990), while a few geckos of the genera *Hemidactylus* and *Tarentola* were used by José Jesus for sequencing and phylogenetic analysis (Jesus et al. 2001, 2002). More recently the collection has been consulted by Raquel Vasconcelos (1980–to date) for several ecological and dietary studies of species of the genus *Tarentola*. No type material is present in the collection.
### Table 1. Overview of the Cabo Verde amphibian and reptile collections of IICT.

| Family          | Genus                        | Species                                      | Localities – Accession number (* denotes a type specimen) | References | Number of specimens |
|-----------------|------------------------------|----------------------------------------------|-----------------------------------------------------------|------------|---------------------|
| **AMPHIBIANS**  |                              |                                              |                                                           |            |                     |
| **ANURA** Duméril, 1806 |                               |                                              |                                                           |            |                     |
| Bufonidae (Gray, 1825) | Sclerophrys              | Sclerophrys regularis (Reuss, 1833)          | **Brava Island:** Fajã D’Aguia – IICT/A 295–301/1969; Vinagre – IICT/A 273–294/1969; |            | 376                 |
|                 |                              |                                              | **Santiago Island:** Assomada – IICT/A 41–42/1969, 59–66/1969, 170–196/1969, 272/1969; Engenho – IICT/A 43–53/1969, 67–85/1969, 222–224/1969, 231–255/1969, 261–263/1969, 268–271/1969; Boa Entrada – IICT/A 54–58/1969, 86–91/1969, 264–267/1969, 1–11/1972; 18–31/1972; Boa Entrada stream – IICT/A 12–14/1969; Chão de Tanque – IICT/A 27–34/1969; Mato Sancho stream [or Mato Sanches stream] – IICT/A 1–11/1969; Picos – IICT/A 227–230/1969; Picos stream – IICT/A 225–226/1969; Praia Formosa – IICT/A 1–2/1993; Santa Catarina – IICT/A 10/1969, 16–26/1969; 256–260/1969, 37–37/1972, CV1–9, CV11, CV13; São Jorge dos Órgãos – IICT/A 103–169/1969; Sedeguma – IICT/A 35–40/1969, 92–102/1969, 197–214/1969, 15–17/1972; Santiago Island [unknown locality] – IICT/A 12–15/1969; 215–222/1969, CV10; |            |                     |
|                 |                              |                                              | **São Nicolau Island:** Ribeira João – IICT/A 4–21/1970; Ribeira Brava – IICT/A 1–3/1970 |            |                     |
| **TOTAL NUMBER OF AMPHIBIAN SPECIMENS** |                          |                                              |                                                           | 376        |                     |
| **REPTILES**   |                              |                                              |                                                           |            |                     |
| Gekkonidae (Gray, 1825) | Hemidactylus         | Hemidactylus angulatus Hallowell, 1854       | **Santo Antão Island:** Ponta do Sol – IICT/R 292/1972; Porto Novo – CV18 | 3          |                     |
|                 |                              |                                              | **Fogo Island:** São Filipe – IICT/R 442/1969 |            |                     |
|                 |                              |                                              | **Santo Antão Island:** Ponta do Sol, Fantanha – IICT/R CV16 |            |                     |
| Phyllodactylidae Gamble, Bauer, Greenbaum & Jackman, 2008 | Tarentola             | Tarentola bocagei Vasconcelos, Petera, Geniez, Harris & Carranza, 2012 | **São Nicolau Island:** between Jucalinho and Carrissal – IICT/R 509–515/1970; Carvoeiro – IICT/R 354–357/1970; Preguiça– IICT/R 167–174/1970; Preguiça Airfield – IICT/R 152–159/1970, 161–166/1970, 175–180/1970, 599–603/1970, 624–651/1970; Ribeira das Queimadas – IICT/R 57/1970; Ribeira Maiamba – IICT/R 135–140/1970; Tabeleiro – IICT/R 580–586/1970; São Nicolau Island [unknown locality] – IICT/R 48/1970, 58–59/1970, 499–509/1970 | 61         |                     |
|                 |                              |                                              | **São Nicolau Island:** CV16 |            |                     |
|                 |                              |                                              | **Tarentola cf. caboverdiana** Schleich, 1984 | 124        |                     |
|                 | Hemidactylus sp. Spicilegus | Tarentola darwini Joger, 1984                | **Santo Antão Island:** Ponta do Sol – IICT/R 354–357/1972, CV15; Porto Novo – IICT/R 119–134/1972, 145–156/1972, 166–243/1972, 232–1972; Santo Antão Island [unknown locality] – IICT/R 135–144/1972, 246–258/1969 | 2          |                     |
|                 |                              |                                              | **Santo Antão Island:** Ponta do Sol, Fantanha – IICT/R CV16 |            |                     |
|                 | Tarentola              | Tarentola gigas gigas Bocage, 1875          | **Santiago Island:** Praia – IICT/R CV19; S. João Batista – IICT/R 448–449/1969 | 10         |                     |
|                 |                              |                                              | **Fogo Island:** São Filipe – IICT/R 427–2487/1969, 435/1969, 439–441/1969, 444–446/1969; Fogo Island [unknown locality] – IICT/R 447/1969 |            |                     |
|                 | Tarentola              | Tarentola gigas gigan (Bocage, 1875)        | **Raso Island:** Raso Ilet [unknown locality] IICT/R 230–231/1970, 237/1970, 239–271/1970, 363/1970, 367–452/1969, 631–637/1970, CV3 | 128        |                     |
|                 |                              |                                              | **Maio Island:** Airport – IICT/R 365–375/1969; Barreiro – IICT/R 377–381/1969; Calheta – IICT/R 349/1969, 358/1969; Lagoa – IICT/R 343–348/1969; Vila do Maio – IICT/R 334–338/1969, 359–364/1969, 376/1969, 382–389/1969; 391–398/1969 | 61         |                     |
|                 |                              |                                              | **São Nicolau Island:** between Jucalinho and Carrissal – IICT/R 488–498/1970; between Ribeira Brava and Jucalinho– IICT/R 516–523/1970; Cabeçalinho – IICT/R 548–561/1970; Calejão – IICT/R 212–229/1970, 289–296/1970, 638–650/1970; | 296        |                     |
| Family       | Genus                  | Species                  | Localities – Accession number (* denotes a type specimen)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | References                                                                 | Number of specimens |
|--------------|------------------------|--------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------|---------------------|
| Phyllodactylidae | *Tarentola*       | *Tarentola nicolauensis* | Carvoeiro – IICT/R 340–353/1970, 358–362/1970, 598–623/1970; Chanzinha – IICT/R 284–288/1970; Preguiça – IICT/R 141–151/1970; Preguiça port – IICT/R 297–315/1970; Ribeira da Prainha – IICT/R 187–211/1970; Ribeira de Caixa – IICT/R 316–319/1970; Ribeira Maiamba – IICT/R 126–134/1970, 181–186/1970; Ribeira Seca – IICT/R 320–354/1970; S. João – IICT/R 272–277/1970; S. Nicolau hostel – IICT/R 475/1970; Taboleiro – IICT/R 533–539/1970, 562–579/1970, 583A–585A/1970, 587–595/1970; Ribeira Brava – IICT/R 115–125/1970, 355–359/1970; Ribeira Brava surroundings – IICT/R 476–487/1970; São Nicolau Island [unknown locality] – IICT/R 596–597/1970; Ribeira Brava – IICT/R 403–405/1969, 412–421/1969; Vinagre – IICT/R 422–425/1969; Brava Island: Achada do Favatal – IICT/R 403–405/1969, 412–421/1969; Vinagre – IICT/R 422–425/1969; Fogo Island: São Filipe – IICT/R 426/1969, 429/1969, 433–434/1969, 436–438/1969, 438/1969; Vale de Caraveliros lighthouse – IICT/R 292/1969; São Vicente Island: Praia – IICT/R 426/1969, 429/1969, 433–434/1969, 436–438/1969; São Filipe vivarium – IICT/R 443/1969; Vale de Caraveliros lighthouse – IICT/R 292/1969; São Pedro – IICT/R 259–287/1970; Santiago Island: Praia – IICT/R 350–357/1969, 399/1969; Fogo Island: São Filipe – IICT/R 426/1969, 429/1969, 433–434/1969, 436–438/1969, 438/1969; Vale de Caraveliros lighthouse – IICT/R 292/1969; São Pedro – IICT/R 259–287/1970; Brava Island: Achada do Favatal – IICT/R 237–255/1969; Calhau – IICT/R 321–333/1972; Mato Inglês – IICT/R 339–377/1972; Monte Sossego – IICT/R 396–412/1972; Ribeira Passário – IICT/R 381–395/1972; São Pedro – IICT/R 259–287/1970; Maio Island: Calheta – IICT/R 26–30/1969, 38–43/1969, 47/1969, 49/1969; Maio Island [unknown locality] – IICT/R 90/1969, 96–97/1969; São Vicente Island: Baia das Gatas – IICT/R 301–318/1972; Calhau – IICT/R 321–333/1972; Mato Inglês – IICT/R 339–377/1972; Monte Sossego – IICT/R 396–412/1972; Ribeira Passário – IICT/R 381–395/1972; São Pedro – IICT/R 259–287/1970; Pinheiro (1986, 1990) | 24 |
|              |                        |                          | São Nicolau Island: Caleijão – IICT/R 79–85/1970; Preguiça Airfield – IICT/R 12–13/1970, 160/1970; Ribeira das Queimadas – IICT/R 41–47/1970, 49–57/1970; Ribeira João – IICT/R 1–11/1970; São Nicolau Island [unknown locality] – IICT/R 14–40/1970, 60–78/1970, 102–106/1970, 651/1970; Pinheiro (1990, 1991) | Pinheiro (1990) | 56 |
|              |                        |                          | São Nicolau Island: Caleijão – IICT/R 79–85/1970; Preguiça Airfield – IICT/R 12–13/1970, 160/1970; Ribeira das Queimadas – IICT/R 41–47/1970, 49–57/1970; Ribeira João – IICT/R 1–11/1970; São Nicolau Island [unknown locality] – IICT/R 14–40/1970, 60–78/1970, 102–106/1970, 651/1970; Pinheiro (1990, 1991) | Pinheiro (1990) | 90 |
| Family | Genus | Species | Localities – Accession number (* denotes a type specimen) | References | Number of specimens |
|--------|-------|---------|----------------------------------------------------------|------------|---------------------|
| Scincidae | Chioninia | spinalis maioensis (Mertens, 1955) | Maio Island: Alcatraz – IICT/R 98–108/1969; Bumba stream – IICT/R 9–14/1969; Calheta – IICT/R 26A–37A/1969; 44–46/1969, 48/1969, 50/1969, 52–56/1969; Maio Island [unknown locality] – IICT/R 1–8/1969, 15–19/1969, 109–110/1969; Lage-Branca Islet – IICT/R 75–83/1969, CV3 | Pinheiro (1990) | 64 |
| | | | | | |
| | Chioninia | strangeri (Gray, 1845) | Raso Islet: Raso Islet [unknown locality] IICT/R 86–114/1970 | Pinheiro (1990) | 19 |
| | Chioninia | vaillantii vaillantii (Boulenger, 1887) | Santiago Island: Assomada – IICT/R 166–170/1969, 180–188/1969; Boa Entrada – IICT/R 118–120/1967, 125–130/1967, 148–150/1969, 172–175/1969, 1340–1343/1969; Tarrafal – IICT/R 177–178/1969; Santiago Island [unknown locality] – IICT/R 121/1969, 138–142/1969, 151–153/1969, 44/1972, CV28 | Pinheiro (1986) | 40 |

**TOTAL NUMBER OF REPTILES SPECIMENS** 1364

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**Figure 9.** Distribution of the Cabo Verde localities represented in the IICT herpetological collections.

This is the largest known herpetological collection from Cabo Verde, with 1740 specimens, and is followed by relevant collections from the MNHN with a total of 137 specimens, the NHMUK with 104 specimens, the MCNB with 102 specimens, and the TCWC with 97 specimens (data retrieved from GBIF.org in March 2020). Other collections worldwide generally do not exceed 50 specimens (data retrieved from GBIF.org in February 2021).
### Table 2. Gazetteer of Cabo Verde localities of IICT specimens. Latitude and longitude decimal coordinates are presented in WGS-84 projection.

| Island/Islet | Verbatim locality | Current locality | Latitude and Longitude | Uncertainty (meters) | Elevation (meters) | Number of taxa/records |
|--------------|-------------------|------------------|------------------------|----------------------|-------------------|------------------------|
| Brava        | Achada do Favatal [or Ach do Favatal] | Achada do Favatal (currently a waste dump) | 14.877435, -24.686155 | 1616 | 308 | 2/18 |
| Brava        | Ribeira de Bumba | Ribeira Island [or Brava] | 14.852066, -24.700687 | 5640 | 905 | 1/6 |
| Brava        | Cemitério de Nova Sintra | Nova Sintra graveyard | 14.876142, -24.69713 | 125 | 478 | 1/7 |
| Brava        | Fajã D’Agua | Fajã D’Agua | 14.870898, -24.730602 | 500 | 39 | 1/7 |
| Brava        | Nova Sintra | Nova Sintra | 14.870483, -24.695545 | 747 | 497 | 2/30 |
| Brava        | Senhora do Monte | Senhora do Monte | 14.857585, -24.719033 | 500 | 640 | 1/6 |
| Brava        | Vinagre | Vinagre | 14.866667, -24.7 | 350 | 634 | 3/33 |
| Brava        | Ilha Brava | Brava Island | 14.852066, -24.700687 | 5640 | 905 | 1/1 |
| Maio         | Aeroporto | Airport | 15.156885, -23.214155 | 1659 | 11 | 1/1 |
| Maio         | Alcatraz | Alcatraz | 15.217212, -23.103711 | 206 | 24 | 1/11 |
| Maio         | Barreiro | Barreiro | 15.135554, -23.160517 | 370 | 31 | 1/5 |
| Maio         | Calheta | Calheta | 15.229421, -23.210159 | 800 | 9 | 3/57 |
| Maio         | Ilhéu Lage-Branca | Lage-Branca Islet | 15.313, -23.137 | 47 | – | 1/10 |
| Maio         | Lagoa | Lagoa | 15.132533, -23.133345 | 540 | 5 | 1/6 |
| Maio         | Vila de Maio | Vila de Maio | 15.138703, -23.211588 | 730 | 22 | 1/5 |
| Maio         | Ribeira de Bumba | Bumba stream [undetermined locality] | – | – | – | 1/6 |
| Maio         | Ilha de Maio | Maio Island | 15.216667, -23.166667 | 13613 | 82 | 2/61 |
| Santiago     | Assomada | Assomada, Santa Catarina | 15.098508, -23.67269 | 3036 | 542 | 1/40 |
| Santiago     | Boa Entrada | Boa Entrada, Santa Catarina | 15.129985, -23.674844 | 420 | 475 | 4/77 |
| Santiago     | Ribeira Boa Entrada | Boa Entrada stream | 15.125498, -23.675343 | 1017 | 475 | 1/3 |
| Santiago     | Chã da Fazenda Sta. Catarina | Chã da Fazenda, Santa Catarina | 15.083664, -23.669757 | 5513 | 571 | 1/2 |
| Santiago     | Santa Catarina, Chão de Tanque | Chão de Tanque, Santa Catarina | 15.094417, -23.705235 | 906 | 257 | 1/8 |
| Santiago     | Santa Catarina – Engenho | Engenho, Santa Catarina | 15.083333, -23.666667 | 3036 | 382 | 3/84 |
| Santiago     | Ribeira de Mato Sancho | Mato Sanches stream [or Mato Sanches stream] | 15.098698, -23.728967 | 1677 | 349 | 1/11 |
| Santiago     | Picos | Picos | 15.081013, -23.636095 | 559 | 444 | 1/4 |
| Santiago     | Ribeira dos Picos | Picos stream | 15.081738, -23.632877 | 1257 | – | 1/2 |
| Santiago     | Praia Formosa | Praia Formosa | 14.942039, -23.516667 | 4271 | 69 | 2/27 |
| Santiago     | S. João Barista | S. João Barista | 14.95, -23.666667 | 3036 | 135 | 1/2 |
| Santiago     | Santa Catarina | Santa Catarina | 15.110938, -23.716136 | 737 | 293 | 2/81 |
| Santiago     | Sedeguma | Sedeguma, Santa Catarina | 15.111, -23.685382 | 768 | 510 | 1/37 |
| Santiago     | São Jorge dos Orgãos | São Jorge dos Orgãos | 15.052822, -23.601954 | 802 | 313 | 1/67 |
| Santiago     | Tarrafal | Tarrafal | 15.275278, -23.749454 | 1634 | 21 | 2/3 |
| Santiago     | Ilha de Santiago | Santiago Island | 15.103222, -23.622722 | 29199 | 242 | 3/40 |
| Santo Antão  | Chão do Mocho | Chão do Mocho | 17.161455, -23.119461 | 2046 | 187 | 1/7 |
| Santo Antão  | Ponta do Sol [or Ponta do Sol, Fantanha] | Ponta do Sol [or Ponta do Sol, Fantanha] | 17.200515, -23.091084 | 635 | 30 | 3/8 |
| Santo Antão  | Porto Novo | Porto Novo | 17.025443, -23.066603 | 1493 | 47 | 3/120 |
| Santo Antão  | Vale do Paul [or Vale Paul, Ribeira] | Vale do Paul [or Vale Paul, stream] | 17.148052, -23.013341 | 1217 | 7 | 1/12 |
| Santo Antão  | Ilha de Santo Antão | Santo Antão Island | 17.064672, -23.170897 | 23523 | 1077 | 2/36 |
| São Nicolau  | Arredores Vila Ribeira Brava | Ribeira Brava surroundings | 16.624659, -24.286525 | 1125 | 36 | 2/12 |
| São Nicolau  | Cabeçalinho | Cabeçalinho | 16.602177, -24.306767 | 430 | 300 | 1/14 |
| São Nicolau  | Caldeiras | Caldeira | 16.604442, -24.302121 | 303 | 221 | 2/46 |
| São Nicolau  | Carvoeiro | Carvoeiro | 16.648998, -24.302591 | 428 | 99 | 2/50 |
| São Nicolau  | Chanzinha | Chanzinha | 16.616616, -24.29656 | 507 | 107 | 1/5 |
| São Nicolau  | entre Jucalinho e Carrasil | between Jucalinho and Carrasil | 16.591956, -24.088655 | 6465 | 467 | 2/18 |
| São Nicolau  | entre Ribeira Brava e Juncalinho | between Ribeira Brava and Juncalinho | 16.643646, -24.216589 | 12531 | 54 | 1/8 |
| São Nicolau  | Perguica | Perguica | 16.563247, -24.281361 | 301 | 61 | 2/19 |
Guinea-Bissau collection

The herpetofauna of Guinea-Bissau is one of the most poorly known in the region. The most recent checklist was published by Auliya et al. (2012), listing respectively 25 and 73 species of amphibians and reptiles. Historically the country has been poorly surveyed in terms of its biodiversity, with the first available data on the country’s herpetofauna provided by Bocage (1866, 1867, 1872, 1873, 1896a, b), Ferreira (1902), and Boulenger (1905, 1906). The Swiss naturalist Albert Monard provided the first country-wide revision of the herpetofauna (Monard 1940a, b), which included the description of new species (*Agama boensis*, *Latastia ornata*) and the first records of previously unrecorded species for the country. This collection is still extant in the MHNC and is composed of a total of 329 (191 amphibians and 138 reptiles) specimens. From 1944 to 1946, Fernando Frade led an extensive zoological expedition to the country (Frade et al. 1946), which resulted in the collection of approximately a thousand specimens that were later studied by Sara Manaças and constitute the bulk of the IICT

| Island/Islet                  | Verbatim locality                | Current locality                | Latitude and Longitude | Uncertainty (meters) | Elevation (meters) | Number of taxa/records |
|-------------------------------|----------------------------------|---------------------------------|------------------------|----------------------|--------------------|------------------------|
| São Nicolau                   | Campo de Aviação da Preguiça     | Preguiça Airfield              | 16.588013, -24.285383  | 1296                 | 181                | 3/36                   |
| São Nicolau                   | Porto da Preguiça                | Preguiça port                   | 16.561723, -24.280177  | 159                  | 6                  | 1/19                   |
| São Nicolau                   | Ribeira da Prainha               | Ribeira da Prainha             | 16.620503, -24.290903   | 1719                 | 96                  | 1/24                   |
| São Nicolau                   | Ribeira das Queimadas            | Ribeira das Queimadas           | 16.641588, -24.315579   | 300                  | 241                 | 2/18                   |
| São Nicolau                   | Ribeira de Caixa                 | Ribeira de Caixa [undetermined locality] | –                      | –                    | –                  | 1/4                    |
| São Nicolau                   | Ribeira João                     | Ribeira João [undetermined locality] | –                      | –                    | –                  | 2/29                   |
| São Nicolau                   | Ribeira Maiamba                  | Ribeira Maiamba [undetermined locality] | –                      | –                    | –                  | 3/21                   |
| São Nicolau                   | Ribeira Seca                     | Ribeira Seca                    | 16.608037, -24.212366   | 24792                | 175                 | 1/15                   |
| São Nicolau                   | S. João                          | S. João                         | 16.602678, -24.215949   | 22806                | 200                 | 1/6                    |
| São Nicolau                   | Pousada S. Nicolau               | S. Nicolau hostel [undetermined locality] | –                      | –                    | –                  | 1/1                    |
| São Nicolau                   | Taboleiro                        | Taboleiro [undetermined locality] | –                      | –                    | –                  | 3/44                   |
| São Nicolau                   | Vila da Ribeira Brava [or Vale Paúl, Ribeira] | Ribeira Brava [or Vale Paúl, Ribeira] | 16.616667, -24.3 | 301                 | 142                | 2/19                   |
| São Nicolau                   | Ilha de São Nicolau              | São Nicolau Island              | 16.608037, -24.212366   | 24792                | 175                 | 3/66                   |
| São Vicente                   | Baia das Gatas                   | Baía das Gatas                  | 16.903244, -24.909886   | 301                  | 6                   | 1/18                   |
| São Vicente                   | Calhau                           | Calhau                          | 16.853122, -24.86641    | 1482                 | 8                   | 1/13                   |
| São Vicente                   | Mattos Ingles                    | Mattos Ingles                   | 16.860123, -24.946237   | 649                  | 191                 | 1/39                   |
| São Vicente                   | São Pedro                        | São Pedro                       | 16.828744, -25.060674   | 1821                 | 6                   | 1/29                   |
| São Vicente                   | Ribeira Passarão                 | Ribeira Passarão                | 16.869242, -24.979704   | 1425                 | 27                  | 1/15                   |
| São Vicente                   | Monte Sossego                    | Monte Sossego                   | 16.86152, -24.999323    | 414                  | 30                  | 1/17                   |
| Fogo                          | Posto de Fogo, Cavaleiros         | Vale de Cavaleiros lighthouse   | 14.923969, -24.501743   | 300                  | 44                  | 1/1                    |
| Fogo                          | S. Filipe                        | São Filipe                      | 14.899416, -24.493412   | 1484                 | 132                 | 4/27                   |
| Fogo                          | Viveiros de S. Filipe            | S. Filipe vivarium              | 14.893626, -24.494822   | 1559                 | 92                  | 2/5                    |
| Fogo                          | Ilha do Fogo                     | Fogo Island                     | 14.912456, -24.374662   | 16064                | 2004                | 3/6                    |
| Branco                        | Ilhéu Branco                     | Branco Islet                    | 16.658552, -24.670827   | 2405                 | 276                 | 1/5                    |
| Raso                          | Ilhéu Raso                       | Raso Islet                      | 16.617111, -24.586456   | 2405                 | 48                  | 3/156                  |
| Rombos                        | Ilhéus Rombos                    | Rombos Islets                   | 14.96853, -24.644065    | 2484                 | 9                   | 1/7                    |

The dataset of this collection is available at GBIF (Ceríaco et al. 2018b; https://www.gbif.org/dataset/e5dd4343-8bd9-449a-bef5-47c655968225).
collections (see below). Besides the Auliya et al. (2012) report on the herpetofauna of Bijagós, and two small contributions on amphibians (Rebelo 2018a) and reptiles (Rebelo 2018b) from “João Vieira e Poilão” National Park and a master’s thesis on the amphibians and reptiles of Boé area (Cabuy 2014), no modern data exists on its terrestrial herpetofauna.

The IICT collection comprises 980 specimens (604 amphibians and 376 reptiles), covering 12 species of amphibians and 37 species of reptiles (Table 3), corresponding to roughly half of the known taxa for the country. The amphibian collection comprises representatives of seven families and eight genera. These specimens are dominated by representatives of common species of the following families: Dicroglossidae, with 252 representatives of Crowned Bullfrogs, *Hoplobatrachusoccipitalis* (Günther, 1858); Bufonidae, with 188 representatives of African Common Toads, *Sclerophrysreguliris*; and Ptychadenidae, with 99 representatives of Mascarene Grass Frogs, *Ptychadena mascareniensis* (Duméril & Bibron, 1841), 27 representatives of Bibron’s Grass Frog, *Ptychadena bibronii* (Hallowell, 1845), and a single representative of Ansorge’s Grass Frog, *Ptychadena cf. ansorgii* (Boulenger, 1905). The first four taxa make up about 94% of the amphibian specimens, and approximately 60% of the entire collection. The reptile collection, despite being smaller, is taxonomically more diverse. It comprises representatives of 15 families and 26 genera. Within Squamates, the families Scincidae, Agamidae, and Lamprophiidae are the best represented, with 82, 82, and 52 specimens respectively. Families Lamprophiidae and Colubridae are those which have a greater diversity of species (seven species each), while the remaining families have no more than three species represented in the collection.

Geographically, these specimens come from 38 different localities distributed in the nine regions of the country – Bafatá, Biombo, Bissau, Bolama, Cacheu, Gabu, Oio, Quinara, and Tombali (Table 4; Fig. 10). The temporal range of collecting events ranges from 1939 to 1997, although the bulk of the specimens were collected between 1944 and 1946. The main contributors to the collections were Fernando Frade and his team during the Zoological Missions to Guinea Bissau (1944–1946), although different individuals collected other specimens on other occasions and dates. This material was primarily studied and published by Sara Manaças on five different occasions (Manaças 1947, 1949, 1950a, 1951a, b, 1955). Gans (1987) used specimens of *Cynisca feae* (Boulenger, 1906) (IICT 28/1945; 29/1945; 40/1945; 42/1945; 46/1945; 47/1945; 53/1945; 64/1945; 65/1945; 66/1945; 70/1945; 71/1945; 76/1945; 77/1945; 93/1945; 94/1945; 138/1945) in a taxonomic revision of the genus *Cynisca* (Squamata: Amphisbaenidae). Some of the snake specimens were used by Manaças (1982) to produce a checklist and identification keys for the venomous snakes of the Portuguese speaking countries in Africa. No further material was ever cited in subsequent papers and the collection has remained almost inaccessible until now. In the course of our rehousing effort, previously unpublished specimens were located, including the first confirmed record of the Gaboon Caecilian, *Geotrypetes seraphini* (Duméril, 1859) for the country (Marques and Ceríaco pers. obs.). Specimens from this collection are currently being used for ongoing taxonomic revisions and graduate students’ projects. The collection holds no type material.
Table 3. Overview of the Guinea Bissau amphibian and reptile collections of IICT.

| Family           | Genus                        | Species                                | Localities – Accession number (* denotes a type specimen) | References | Number of specimens |
|------------------|------------------------------|----------------------------------------|----------------------------------------------------------|------------|---------------------|
| **AMPHIBIANS**   |                              |                                       |                                                          |            |                     |
| Pipidae          | Pseudobatrachus               | Pseudobatrachus merlini                | Pitche – IICT/A 221-1946                                 | Manaças (1947) | 1                   |
|                  | Chabanaud, 1920              | Chabanaud, 1920                      |                                                          |            |                     |
|                  | Xenopus Wagner, 1827         | Xenopus tropicalis (Gray, 1864)        | Bissau – IICT/A 106 to 115-1945; Calequissse, Chachungo – IICT/A 143-1945 | Manaças (1947) | 11                  |
| Bufonidae (Gray, 1825) | Sclerophrys | Sclerophrys regularis (Reuss, 1833) | Bissalanca – IICT/A 15–20/1945; Bissau – IICT/A GB1; Bissorã – IICT/A 171–274/1945; Cacine – IICT/A 72–89/1946, 91–93/1946; Mansoa [or Mansôa] – IICT/A 171/1946; Marques Mano – IICT/A 1–10/1945, 166/1945; Pecixe – IICT/A 145–149/1945, 151–159/1945; Pitche – IICT/A 164–257/1946; Tor – IICT/A 28–31/1945; Manaças (1949) | 179          |
|                  | Tschudi, 1838                | Sclerophrys sp.                       | Bissorã – IICT/A 258–266/1945                           |            | 9                   |
|                  |                              |                                       |                                                          |            |                     |
| Hyperoliidae     | Hyperolius Rapp, 1842        | Hyperolius concolor (Hallowell, 1844) | Bissalanca – IICT/A 167/1945; Mansoa [or Mansôa] – IICT/A 25-1946; Marques Mano Farm – IICT/A 160–163/1945, 165/1945, 168–170/1945; Pitche – IICT/A 178-1946 | Manaças (1949) | 11                  |
|                  | Laurent, 1943                | Hyperolius sp.                        | between Buba and Corubal river – IICT/A-1990; Caiomete – IICT/A 131–132/1945; Cari – IICT/A GB2; Marques Mano Farm – IICT/A 1–4/1947, 164/1945 | Manaças (1949) | 9                   |
|                  |                              |                                       |                                                          |            |                     |
| Ptychadenidae    | Ptychadena                    | Ptychadena ansorgii (Boulenger, 1905) | Cacine – IICT/A 342-1946                                 | Manaças (1949) | 1                   |
|                  | Dubois, 1987                 | Ptychadena bibroni                    | Bissorã – IICT/A 50–52/1946; Cari, Mansoa [or Mansôa] – IICT/A 26–49/1946 | Manaças (1949) | 27                  |
|                  |                              | Ptychadena maccarenensis              | Bissorã – IICT/A 194–195/1945, 284–333/1946, 289–295/1945, 106–112/1946, 141/1946; Cari, Cufar – IICT/A 151/1946; Cari, Mansoa [or Mansôa] – IICT/A 283/1946; Gubú – IICT/A 97/1945; Madina do Boi – IICT/A 230–243/1945; Mansoa [or Mansôa] – IICT/A 35–41/1946; Praís – IICT/A 50–54/1945 | Manaças (1949) | 99                  |
|                  | (Duméril & Bibron, 1841)     |                                       |                                                          |            |                     |
| Dicroglossidae   | Hoplobatrachus                 | Hoplobatrachus occipitatus            | Bafatá – IICT/A 100–105/1945; Bissalanca – IICT/A 12–14/1945; Bissau – IICT/A 116–119/1945; Bissorã – IICT/A 191–193/1945, 196–207/1945, 246–250/1945, 254–257/1945, 268–273/1945, 275–288/1945; Calequissse, Chachungo – IICT/A 150–156/1945; Cachungo – IICT/A 120–130/1945, 133–142/1945; Cari, Cufar – IICT/A 148–150/1946, 152–155/1946; Farim – IICT/A 86–90/1945; Gabu – IICT/A 98–99/1945; Mansoa [or Mansôa] – IICT/A 1–7/1946, 9–24/1946, 53–65/1946, 258–282/1946, 336–341/1946; Praís – IICT/A 36–40/1945; Pecixe – IICT/A 150/1945; Marques Mano Farm – IICT/A 11/1945; São Domingos – IICT/A 55–57/1945; Tor – IICT/A 21–27/1945, 32–35/1945 | Manaças (1949) | 252                 |
|                  | Anderson, 1871                | Hoplobatrachus Peters                 |                                              | Manaças (1949) | 3                   |
|                  | Peters, 1863                  | Hoplobatrachus sp.                    |                                              | Manaças (1949) | 3                   |
| Ranidae          | Amniaraan                    | Amniaraan galamensis (Duméril & Bibron, 1841) | Cari – IICT/A 99–101/1946 | Manaças (1949) | 3                   |
|                  | Dubois, 1976                 |                                       |                                                          |            |                     |
| GYMNOPHIONA      | Müller, 1832                 |                                       |                                                          |            |                     |
| Dermophiidae     | Geotrypetes Peters            | Geotrypetes sp.                       | Machado Farm – IICT/A 296–297/1945                      |            | 2                   |
|                  | Taylor, 1969                 |                                       |                                                          |            |                     |
| Crocodylia       | Crocodylus                     | Crocodylus ruschii                   | Bijimita – IICT/R 102–109/1954                         |            | 8                   |
|                  | Cuvier, 1808                 | Crocodylus Laurenti                   |                                                          |            |                     |

**TOTAL NUMBER OF AMPHIBIAN SPECIMENS** 604

**REPTILES**

**CROCODYLIA** Gmelin, 1789

**Crocodileidae** Cuvier, 1808
| Family            | Genus                              | Species                        | Localities – Accession number | References | Number of specimens |
|-------------------|------------------------------------|--------------------------------|--------------------------------|------------|---------------------|
| SQUAMATA          | Oppel, 1811                        |                                |                                |            |                     |
| **Gekkonidae**    | Gray, 1825                         | Hemidactylus                   | Bissalanca – IICT/R 97/1945, 145/1945, 184/1945; Bissau – IICT/R 152/1945, 128–130/1946; Buba – IICT/R GB4; Cacine – IICT/R 17/1946, 19/1946, 28/1946; Chitone [or Xitone] – IICT/R 12/1946; Mansoa [or Mansôa] – IICT/R 1/1946; Marques Mano Farm – IICT/R 2–3/1944, 44/1945, 60–61/1945, 257–259/1945, 262/1945, 264/1945, 267/1945, 269/1945, 278/1945; Gabu – IICT/R A-B/1962; São Vicente – IICT/R 1A/1946 | Mânaças (1951) | 29 |
|                   | Gray, 1825                         | Hemidactylus angulatus         | Hallowell, 1854                |            |                     |
|                   | Gray, 1825                         | Hemidactylus                   | Bissalanca – IICT/R 29/1945; Pinche – IICT/R 122/1946 | Mânaças (1951) | 2 |
| **Phyllodactylidae** | Gamble, Bauer, Greenbaum & Jackman | *Tarentola* Gray, 1825          | Bafará – IICT/R 64/1945; Bissau – IICT/R 53/1945; Marques Mano Farm – IICT/R 28–30/1945, 40/1945, 42–43/1945, 46–48/1945, 54/1945, 65–71/1945, 76–77/1945, 76A/1945, 92–96/1945, 138–139/1945 | Mânaças (1955) | 29 |
|                   | Gray, 1825                         | *Tarentola*                    | Manaçás (1951)                 |            |                     |
| **Amphisbaenidae** | Gray, 1825                         | Cynisca Duméril & Bibron, 1839 | Bissalanca – IICT/R 45/1945, 51/1945, 80/1945; Brene – IICT/R 52/1945; Cacine – IICT/R 192/1945, 201/1945; Pecixe – IICT/R 219–220/1945; Pinche – IICT/R 112/1945; Tor – IICT/R 118/1945 | Mânaças (1955) | 10 |
|                   | Gray, 1825                         | Cynisca foet (Boulenger, 1906) | Manaçás (1951)                 |            |                     |
| **Varanidae**     | Hardwicke & Gray, 1824             | Varanus Merrem, 1820            | Bissalanca – IICT/R 29/1946    |            |                     |
|                   |                                     | Varanus exanthematicus (Bosc, 1792) | Manaçás (1851)                 |            |                     |
|                   |                                     | Varanus niloticus (Linnaeus, 1758) | Ilha Formosa – IICT/R 155/1946 |            | 1 |
| **Varanus* sp.**  | Guiné-Bissau [undetermined locality] | *Trachylepis* Fitzinger, 1843  | Bissalanca – IICT/R 309/1945; Pinche – IICT/R 31/1946; Cacine – IICT/R 31/1946; Cacine – IICT/R 31/1946; Chitone – IICT/R 97/1945; Cacine – IICT/R 192/1945, 201/1945; Pecixe – IICT/R 215–216/1945; Pinche – IICT/R 50/1946, 95–111/1946 | Mânaças (1951) | 56 |
|                   |                                    | *Trachylepis* affinis (Gray, 1838) | Manaçás (1951)                 |            |                     |
|                   |                                     | *Trachylepis* perroteti (Duméril & Bibron, 1839) | Manaçás (1951)                 |            |                     |
| **Scincidae**     | Cuvier, 1808                       | Mochlus Günther, 1864           | Pinche – IICT/R 29/1946        |            |                     |
|                   |                                     | Mochlus guineensis Peters, 1879 | Manaçás (1951)                 |            | 1 |
| **Agamidae**      | Gray, 1827                         | Agama Daudin, 1802              | Pinche – IICT/R 4/1946; Guiné-Bissau [undetermined locality] – IICT/R GB6 | Mânaças (1951) | 3 |
|                   |                                     | Agama cf. boensis Monard, 1940 | Manaçás (1951)                 |            |                     |
|                   |                                     | *Agama picticauda* Peters, 1877 | Manaçás (1951)                 |            | 79 |
| **Chamaeleonidae**| Gray, 1825                         | Chamaeleo Laurenti, 1768        | Pinche – IICT/R 290/1945; Bambadinca – IICT/R 175/1945; Bissau, city center – IICT/R 228/1945, Bissorá – IICT/R 298/1945, 310–311/1945; Cacine – IICT/R 205–209/1945, 209A/1945, 211–214/1945; Chitone [or Xitone] – IICT/R 8–11/1946; Cacine – IICT/R GB4; Bissau – IICT/R GB4; Cacine – IICT/R 14/1946, 20/1946, 32/1946; Catió – IICT/R 39–40/1946; Chitone [or Xitone] – IICT/R 13/1946; Mansoa [or Mansôa] – IICT/R 4/1946; Marques Mano Farm – IICT/R 11–13/1945, 34–36/1945, 98/1945; Pecixe – IICT/R 159–166/1945; Ilha Formosa – IICT/R 157–158/1945; Mansoa [or Mansôa] – IICT/R 5/1946; Marques Mano Farm – IICT/R 11–13/1945, 34–36/1945, 98/1945; Pecixe – IICT/R 185–187/1945, 189/1945, 218/1945, 221–223/1945; Pinche – IICT/R 47–49/1946, 51–65/1946, 67–75/1946, 121/1946; Tor – IICT/R 119–121/1945, 140–141/1945 | Mânaças (1951) | 31 |
| Family             | Genus                | Species                      | Localities – Accession number (* denotes a type specimen) | References  | Number of specimens |
|-------------------|----------------------|------------------------------|----------------------------------------------------------|-------------|---------------------|
| Chamaeleonidae    | Chamaeleo           | Chamaeleo senegalensis       | Bijimita – IICT/R 130/1945; Bissau – IICT/R 294–295/1945, 297/1945, 299–300/1945; 307/1945; Mansoa [or Mansôa] – IICT/R 3/1946 | Mанаças (1955) | 8                   |
|                   | Gray, 1825           | Laurenti, 1768               |                                           |             |                     |
|                   |                      | Daudin, 1802                 |                                           |             |                     |
| SERPENTES         |                      |                              |                                           |             |                     |
| Typhlopidae       | Afrotyphlops        | Afrotyphlops punctatus (Leach, 1819) | Marques Mano Farm – IICT/R 1/1939, 5/1947; Guiné-Bissau [undetermined locality] – IICT/R 282/1945 | Mанаças (1955) | 3                   |
|                   | Merrem, 1820         | Bradley & Wallach, 2009      |                                           |             |                     |
|                   |                      |                              |                                           |             |                     |
| Leptotyphlopidae  | Myriopholis         | Myriopholis narriusris (Peters, 1867) | Marques Mano Farm – IICT/R 49/1945 | Mанаças (1955) | 1                   |
|                   | Stejneger, 1892      | Hedges, Adalsteinsson & Branch, 2009 |                                           |             |                     |
| Pythonidae        | Python              | Pythonidae                  |                                           |             |                     |
|                   | Daudin, 1803         | Python sebae (Gmelin, 1819)  | Marques Mano Farm – IICT/R 283/1945 |             | 1                   |
|                   |                      | Laurenti, 1768               |                                           |             |                     |
|                   |                      | Daudin, 1803                 |                                           |             |                     |
| Viperidae         | Bitis                | Bitis ardens (Merrem, 1820)  | Marques Mano Farm – IICT/R 240/1945 |             | 1                   |
|                   | Oppel, 1811          | Causus Wagler, 1830          | Cachungo – IICT/R 113/1945 |             |                     |
|                   |                      | Causus macularus (Hallowell, 1842) |                                           |             |                     |
| Lamprophiidae     | Atractaspis         | Atractaspis aterrima (Günther, 1863) | Marques Mano Farm – IICT/R GB11; Cacine – IICT/R 35/1946; Machado Farm – IICT/R 11/1947; Guiné-Bissau [undetermined locality] – IICT/R GB12 | Mанаças (1955) | 4                   |
|                   | Fitzinger, 1843      |                               |                                           |             |                     |
|                   |                      |                               |                                           |             |                     |
| Elapidae          | Naja                 | Naja haje (Linnaeus, 1758)   | Marques Mano Farm – IICT/R 3/1945; Guiné-Bissau [undetermined locality] – IICT/R GB1 | Mанаças (1955) | 1                   |
|                   | Boie, 1827           | Laurenti, 1768               |                                           |             |                     |
|                   |                      |                               |                                           |             |                     |
| Colubridae        | Centropelotes       | Centropelotes hotamboeia (Laurenti, 1768) | Marques Mano Farm – IICT/R 25/1945; Guiné-Bissau [undetermined locality] – IICT/R GB13 | Mанаças (1955) | 9                   |
|                   | Fitzinger, 1843      |                               |                                           |             |                     |
|                   |                      |                               |                                           |             |                     |
| Dasypeltidae      | Dasypeltis          | Dasypeltis confusa           | Marques Mano Farm – IICT/R 25/1945; Guiné-Bissau [undetermined locality] – IICT/R GB13 | Mанаças (1955) | 1                   |
|                   | Wagler, 1830         |                               |                                           |             |                     |
|                   |                      |                               |                                           |             |                     |
Specimens from Guinea-Bissau are scarce in collections worldwide. The main collections holding specimens of amphibians and reptiles from Guinea-Bissau are the IICT, with 980 specimens; ZFMK, with 108 specimens (Aulyia et al. 2012); the MHNC, with 329 specimens (Monard 1940a, b), and the MNHN with 46 specimens (data retrieved from GBIF.org in February 2021). Other specimens exist in several other museums but generally not exceeding 10 specimens per collection (data retrieved from GBIF.org in March 2020).

| Family        | Genus                    | Species                          | Localities – Accession number (* denotes a type specimen) | References | Number of specimens |
|---------------|--------------------------|----------------------------------|----------------------------------------------------------|------------|---------------------|
| Colubridae    | Dasyptelis Wagler, 1830  | Dasyptelis gansi                 | Cachamba – IICT/R GB5                                    |            | 1                   |
|               |                          | Trape & Mané, 2006               |                                                          |            |                     |
|               | Dispholidus              | Dispholidus typus                | Cacine – IICT/R 25/1946                                   | Manaças    | 1                   |
| Duvernoy, 1832|                          | (Smith, 1828)                    |                                                          | (1955)     |                     |
|               | Grayia Günther, 1858     | Grayia smithi                    | Machado Farm – IICT/R 15/1947                             | Manaças    | 1                   |
|               |                          | (Leach, 1818)                    |                                                          | (1955)     |                     |
|               | Philothamnus             | Philothamnus irregularis         | Bijimita – IICT/R 100/1945, 104/1945; 115/1945; Bissalanca – IICT/R 181/1945, 20/1945; Bissau – IICT/R 230/1945; Bissorá – IICT/R 303/1945; Bolama – IICT/R GB3; Marques Mano – IICT/R 136/1945; Tor– IICT/R 89–91/1945, 114/1945; Guiné-Bissau [undetermined locality] – IICT/R 6/1944, 10/1944, GB8 |            | 16                  |
| Smith, 1840   |                          | (Leach, 1819)                    |                                                          |            |                     |
|               | Toxocodryas              | Toxocodryas blandingii           | Ilha de Bubaque – IICT/R GB2; Bissalanca – IICT/R 242/1945, 244/1945; Marques Mano Farm – IICT/R 16/1945 | Manaças    | 4                   |
| Hallowell, 1857|                          | (Hallowell, 1844)                |                                                          | (1955)     |                     |

**Figure 10.** Distribution of the Guinea-Bissau localities represented in the IICT herpetological collections.
Table 4. Gazetteer of Guinea-Bissau localities of IICT specimens. Latitude and longitude decimal coordinates are presented in WGS-84 projection.

| Province   | Verbatim locality            | Current locality | Latitude and Longitude | Uncertainty (meters) | Elevation (meters) | Number of taxa/records |
|------------|-------------------------------|-----------------|------------------------|----------------------|--------------------|------------------------|
| Bafatá     | Bafatá                        | Bafatá          | 12.166667, -14.666667  | 3056                 | 8                  | 5/10                   |
| Bafatá     | Bambadinca                   | Bambadinca      | 12.152227, -14.476879  | 3056                 | 49                 | 1/1                    |
| Bijaíôs    | Ilha de Bubaque              | Bubaque Island  | 11.252577, -15.861774  | 6585                 | 24                 | 1/1                    |
| Bijaíôs    | Bolama                       | Bolama          | 11.57671, -15.480105   | 3056                 | 16                 | 1/1                    |
| Bijaíôs    | Ilha Formosa                 | Formosa Island  | 11.483533, -15.966667  | 12350                | 31                 | 2/3                    |
| Biomboa    | Bijimite                     | Bijimite        | 11.883533, -15.85      | 3056                 | 13                 | 6/13                   |
| Biomboa    | Ponta de Machado             | Machado Farm    | 11.84958, -15.642988   | 10000                | 42                 | 9/15                   |
| Biomboa    | Marques Mano                 | Marques Mano Farm| 11.84958, -15.642988   | 10000                | 42                 | 20/104                 |
| Biomboa    | Prabis                       | Prabis [or Prâbis] | 11.8025, -15.738888    | 1008                 | 22                 | 3/25                   |
| Bissau     | Tor                          | Tor             | 11.847634, -15.901396  | 3036                 | 18                 | 10/45                  |
| Bissau     | Bissalanca                   | Bissalanca      | 11.883533, -15.666667  | 3036                 | 37                 | 14/32                  |
| Bissau     | Bissau                        | Bissau          | 11.857056, -15.58711   | 7327                 | 15                 | 7/19                   |
| Bissau     | Bissau, Cidade               | Bissau, city center | 11.858736, -15.579213  | 301                  | 14                 | 4/8                    |
| Bissau     | Brene                         | Brene           | 11.883533, -15.65      | 301                  | 35                 | 3/3                    |
| Cacheu     | Caiomete                     | Caiomete        | 11.985172, -16.234847  | 1000                 | 8                  | 1/2                    |
| Cacheu     | Calequisse, Canchingo        | Calequisse, Chachungo | 12.069722, -16.224444  | 900                  | 25                 | 4/13                   |
| Cacheu     | Chachungo                    | Chachungo       | 12.074424, -16.02772   | 825                  | 31                 | 4/34                   |
| Cacheu     | Pecixe                       | Pecixe          | 11.810861, -16.089651  | 3036                 | 8                  | 6/25                   |
| Cacheu     | São Domingos                 | São Domingos    | 12.401944, -16.200556  | 3036                 | 10                 | 1/3                    |
| Cacheu     | São Vicente                  | S. Vicente      | 12.230989, -15.755374  | 1566                 | 14                 | 1/1                    |
| Gabu       | Gabu [or Nova Lamego]        | Gabu            | 12.283533, -14.216667  | 2000                 | 48                 | 4/13                   |
| Gabu       | Madina Boé                   | Madina do Boé   | 11.75, -14.216667      | 3036                 | 98                 | 2/32                   |
| Gabu       | Mandinga [or Miniou, Mandinga]| Mandinga       | 12.618496, -15.102543  | 6437                 | 48                 | 2/2                    |
| Gabu       | Nhampuríbani, Pitche         | Nhampuríbani, Pitche | 12.333533, -15.95      | 3036                 | 71                 | 1/1                    |
| Gabu       | Pitche                       | Pitche          | 12.3226, -13.95412     | 1352                 | 66                 | 8/121                  |
| Oio        | Bissoram                     | Bissora         | 12.223056, -15.4475    | 7500                 | 15                 | 11/189                 |
| Oio        | Cuitá, Mansoa                | Cuitá, Mansoa   | 12.174722, -15.240833  | 3036                 | 35                 | 3/26                   |
| Oio        | Farim                        | Farim           | 12.483889, -15.221667  | 800                  | 11                 | 1/29                   |
| Quinara    | Buba                         | Buba            | 11.592204, -14.988713  | 1687                 | 40                 | 1/1                    |
| Quinara    | Chitolé [or Xitolé]          | Chitolé         | 11.733533, -14.816667  | 877                  | 28                 | 3/6                    |
| Quinara    | Entre Buba e o rio Corubal    | between Buba and Corubal river | 11.646348, -14.893414  | 5000                 | 23                 | 1/1                    |
| Quinara    | Tombô-Fulacunda              | Buba-Tombô      | 11.65, -15.01667       | 1094                 | 39                 |                        |
| Tombali    | Cachamba                     | Cachamba        | 11.191942, -15.0839    | 5168                 | 18                 | 1/1                    |
| Tombali    | Cacine                       | Cacine          | 11.123447, -15.01538   | 1640                 | 11                 | 11/47                  |
| Tombali    | Catió                        | Catió           | 11.283333, -15.25      | 301                  | 9                  | 8/56                   |
| Tombali    | Catió - Cufer                | Catió, Cufer    | 11.291869, -15.175909  | 700                  | 9                  | 2/8                    |
| Guiné-Bissau| Guiné-Bissau, undetermined locality | 10/13          |                       |                      |                    |                        |

The dataset of this collection is available at GBIF (Ceríaco and Marques 2018a; https://www.gbif.org/dataset/c6e94ce4-5d25-4758-8a52-2d5ee4d520fc).

São Tomé & Príncipe collections

Since the early 2000’s the herpetofauna of São Tomé & Príncipe has been subject of several studies, including the descriptions of various new species of amphibians and reptiles. A provisional checklist of the terrestrial herpetofauna of São Tomé, Príncipe, and Annobon was provided by Ceríaco et al. (2018a). This work listed eight species of amphibians (five for São Tomé and three for Príncipe) and 23 species of reptiles (12 for São Tomé and 13 for Príncipe). New studies have since contributed
to the expansion of our knowledge of the herpetofauna of the country, including the
description of a new species of the genus *Boaedon* (Ceríaco et al. 2021), and several
revisions have resurrected synonymised taxa, as the case of *Schistometopum ephele*
(O’Connell et al. in press). Exemplifying this constant flux of work, the recent publica-
tion of two major reviews on the herpetofauna of these islands by Bell et al. (in
press) and Ceríaco et al. (2021) provide detailed historical overviews on the study
of the amphibians and reptiles and updated the known number of species to eight
amphibians and 22 reptiles.

The collection comprises 234 specimens (76 amphibians and 158 reptiles), eight
species of amphibians and 20 species of reptiles (Table 5), corresponding to 80% of
the known taxa for the country. The amphibian collection comprises representa-
tives of five families and five genera corresponding to six anurans and one caecilian. The
family Dermophiidae is the best represented with 43 individuals of the São Tomé
Caecilian, *Schistometopum thomense* (Bocage, 1873), endemic to São Tomé Island.
The family Phrynobatrachidae is the second best represented within the collection
with a total of 15 individuals, of which nine correspond to the Príncipe Puddle Frog,
*Phrynobatrachus dispar* (Peters, 1870), endemic to Príncipe Island, and six correspond
to the Calm Puddle Frog, *Phrynobatrachus leveleve* Uyeda, Drewes & Zimkus, 2007,
endemic to São Tomé Island. All known amphibian species are present in the col-
collection with the exception of the Moller’s Reed Frog, *Hyperolius molleri* (Bedriaga
1892). The reptile collection comprises representatives of six families and 11 genera,
all squamates. The families Scincidae, Lamprophiidae, and Colubridae are the best
represented in the collection with representatives of all known taxa for the country
with 76, 23, and 21 specimens respectively. The Scincidae is the family with the great-
est diversity of species.

Geographically these specimens come from 23 different localities distributed in the
two islands, São Tomé and Príncipe, and in two small islets on each coast of the main
islands, respectively, Rolas and Tinhosa Grande (Table 6; Fig. 11). The temporal range
of collecting events is from 1954 to 1971, although the bulk of the specimens were
collected in the years 1954, 1956, and 1966. The main contributors to the collections
were Fernando Frade and his team during the Scientific Mission to São Tomé and
Príncipe (1954), and Décio Passos (birth and death dates unknown), an airport worker
in Príncipe, who collected and offered a good series of specimens during 1955 and
1956. This material was primarily studied and published by Sara Manaças on two dif-
ferent occasions (Manaças 1958, 1973). In recent years the importance of this collec-
tion has increased with the descriptions of six new species, all based on the IICT mate-
rial (Ceríaco 2015; Ceríaco et al. 2016, 2017, 2021a; Soares et al. 2018), which have
resulted in a good series of types in the collection, including the Adamastor Skink, *Tri-
chylepis adamastor* Ceríaco, 2015 (holotype and seven paratypes), the São Tomé Leaf-
litter Skink, *Panaspis thomensis* Ceríaco, Soares, Marques, Bastos-Silveira, Scheinberg,
Harris, Brehm & Jesus, 2018 (two paratypes), the São Tomé Cobra, *Naja perescobari*
Ceríaco, Marques, Schmitz & Bauer, 2017 (three paratypes), and the Príncipe Jita
Snake, *Boaedon mendesi* Ceríaco, Arellano, Jadin, Marques, Parrinha & Hallermannn,
Table 5. Overview of the São Tomé & Príncipe’s amphibian and reptile collections of IICT.

| Family                  | Genus                     | Species                                  | Localities – Accession number (* denotes a type specimen) | References | Number of specimens |
|-------------------------|---------------------------|------------------------------------------|----------------------------------------------------------|------------|---------------------|
| **ANURA Duméril, 1806** |                           |                                          |                                                          |            |                     |
| Hyperoliidae            | Hyperolius, 1842          | Hyperolius drewesi Bell, 2016            | Roça Esperança – IICT/A 13A/1954                        | 1          |                     |
|                         |                           | Hyperolius thomensis Bocage, 1886        | Roça Saudade – IICT/STP6; São Tomé Island [undetermined locality] – IICT/STP5 |            |                     |
| Arthroleptidae          | Arthroleptus Smith, 1849  | Lepota palmata (Peters, 1868)            | Principe Airport – IICT/A 52–53/1955, 54–55/1956; Santo António – IICT/A 13–14/1955; Ribeira Izé – IICT/A 44–45/1955 | 8          |                     |
|                        |                           |                                          | Roça Saudade – IICT/A STP6; São Tomé Island [undetermined locality] – IICT/STP5 |            |                     |
| Phychedenidae           | Psychadena, 1807          | Psychadena nevimi (Bocage, 1886)        | Roça Monte Café – IICT/A 1/1961; São Tomé Island [undetermined locality] – IICT/A 15/1967, 16A–16B/1967 | 4          |                     |
| Phrynobatrachidae       | Phrynobatrachus, 1870     | Phrynobatrachus dispar (Peters, 1870)   | Roça Monte Café – IICT/A 46–51/1955; Roça Azeitona [or Roça São Jorge] – IICT/STP7; Roça Esperança – IICT/A 15/1954, 18/1954 | 9          |                     |
|                         |                           |                                          | Roça Monte Café – IICT/A 46–51/1955; Roça Azeitona [or Roça São Jorge] – IICT/STP7; Roça Esperança – IICT/A 15/1954, 18/1954 | 9          |                     |
| GYMNOPHIONA Müller, 1832|                           |                                          |                                                          |            |                     |
| Dermophiidae            | Schizomantops, 1873       | Schizomantops thomensis (Bocage, 1873)   | Potó-Correia – IICT/A 9/1966; Roça Milagrosa – IICT/A 1/1954, 9–12/1954, 9/1966, STP3B; 3C; Roça Monte Café – IICT/A 26–41/1954; Roça Pinheira – IICT/A 1/1967; Roça Ponta-Figo – IICT/A 56–71/1958, STP3A; Roça S. Nicolau – IICT/A 5/1954; Roça Saudade – IICT/A 1–9/1963, 20–25/1954 | 43         |                     |
|                        |                           |                                          | Roça Porto Alegre – IICT/A 9/1966; Roça Milagrosa – IICT/A 1/1954, 9–12/1954, 9/1966, STP3B; 3C; Roça Monte Café – IICT/A 26–41/1954; Roça Pinheira – IICT/A 1/1967; Roça Ponta-Figo – IICT/A 56–71/1958, STP3A; Roça S. Nicolau – IICT/A 5/1954; Roça Saudade – IICT/A 1–9/1963, 20–25/1954 | 43         |                     |
| Scincidae               | Lygodactylus, 1864        | Lygodactylus delicatus Pasteur, 1962    | Principe Airport – IICT/A 9/1966; Roça Milagrosa – IICT/A 1/1954, 9–12/1954, 9/1966, STP3B; 3C; Roça Monte Café – IICT/A 26–41/1954; Roça Pinheira – IICT/A 1/1967; Roça Ponta-Figo – IICT/A 56–71/1958, STP3A; Roça S. Nicolau – IICT/A 5/1954; Roça Saudade – IICT/A 1–9/1963, 20–25/1954 | 30         |                     |
|                        |                           |                                          | Roça Porto Alegre – IICT/A 9/1966; Roça Milagrosa – IICT/A 1/1954, 9–12/1954, 9/1966, STP3B; 3C; Roça Monte Café – IICT/A 26–41/1954; Roça Pinheira – IICT/A 1/1967; Roça Ponta-Figo – IICT/A 56–71/1958, STP3A; Roça S. Nicolau – IICT/A 5/1954; Roça Saudade – IICT/A 1–9/1963, 20–25/1954 | 30         |                     |
| Scincidae               | Phelsuma, 1805            | Phelsuma longipes Bocage, 1887           | Roça Porto Real – IICT/R 28/1954, STP9; Roça Esperança – IICT/R 30–33/1954, 42/1954, STP9 | 8          |                     |
|                        |                           |                                          | Roça Porto Real – IICT/R 28/1954, STP9; Roça Esperança – IICT/R 30–33/1954, 42/1954, STP9 | 8          |                     |
|                        |                           |                                          | Roça Porto Real – IICT/R 28/1954, STP9; Roça Esperança – IICT/R 30–33/1954, 42/1954, STP9 | 8          |                     |
|                        |                           |                                          | Roça Porto Real – IICT/R 28/1954, STP9; Roça Esperança – IICT/R 30–33/1954, 42/1954, STP9 | 8          |                     |
|                        |                           |                                          | Roça Porto Real – IICT/R 28/1954, STP9; Roça Esperança – IICT/R 30–33/1954, 42/1954, STP9 | 8          |                     |
|                        |                           |                                          | Roça Porto Real – IICT/R 28/1954, STP9; Roça Esperança – IICT/R 30–33/1954, 42/1954, STP9 | 8          |                     |
| Family          | Genus                          | Species                  | Localities – Accession number (* denotes a type specimen) | References                                | Number of specimens |
|-----------------|-------------------------------|--------------------------|----------------------------------------------------------|-------------------------------------------|--------------------|
| Scincidae       | Cuvier, 1808                  | *Trachylepis* Fitzinger, 1843 | Príncipe Airport – IICT/R 7/1955, 79/1955, 77–80/1955, 99/1955; Roça Esperança – IICT/R 36–39/1954, 44/1954 | Manaças (1958); Ceríaco et al. (2016) | 14                 |
|                 |                               | *Trachylepis affinis* (Gray, 1838) | Relias Ilhéu – IICT/R 3–7/1954; Roça Bela Vista – IICT/R 13–16/1954; Potó-Correia – IICT/R 11–16/1966; Roça Pinheira – IICT/R STP11; São Tomé Island [undetermined locality] – IICT/R 14/1967 | Manaças (1958, 1973); Ceríaco et al. (2016) | 17                 |
|                 |                               | *Trachylepis thomensis* Ceríaco, Marques & Bauer, 2016 | Manaças (1958, 1973) | Ceríaco et al. (2016) | 14                 |
|                 |                               |                          | **SERPENTES**                                             |                                           |                    |
| Typhlopidae     | Merrem, 1820                  | *Afrotyphlops* Broadley & Wallach, 2009 | Príncipe Island [undetermined locality] – IICT/R 111–112/1956; Roça Esperança – IICT/R 29/1954; Santo António – IICT/R 27/1954 | Manaças (1958) | 4                 |
|                 |                               | *Afrotyphlops elegans* (Peters, 1868) | Roça Monte Café – IICT/R 22–23/1954, STP3; Roça Potó-Correia – IICT/R 7/1966, 10/1966 | Manaças (1958, 1973) | 5                 |
|                 |                               | *Lethoeboia* Cope, 1868 | Roça Porto Real – IICT/R 6/1967, 11–12/1967 | Manaças (1973) | 11                |
|                 |                               | *Lethoeboia nevoni* (Bocage, 1890) | Manaças (1958, 1973) | Ceríaco et al. (2017) | 11                |
|                 |                               | *Lethoeboia* sp.        |                                                   |                                           |                    |
| Lamprophiidae   | Fitzinger, 1843               | *Boaedon* Duméril, Bibron & Duméril, 1854 | Água-Izé – IICT/R 51/1954; Angra Toldo – IICT/R 2/1967; Ponta-Figo – IICT/R STP12; Potó-Correia – IICT/R 4/1966, 18/1967, 21/1967; Roça Boa Entrada – IICT/R 177/1967; Roça Porto Alegre – IICT/R 8/1954; São Tomé Island [undetermined locality] – IICT/R 3/1966, 19/1967, STP13 | Manaças (1958, 1973) | 12                |
|                 |                               | *Boaedon bedriagae* Boulenger, 1907 | Roça Sândy – IICT/R 113–114/1956, 267/1954, 8/1967; Santo António – IICT/R 109/1955; Príncipe Island [undetermined locality] – IICT/R 52–56/1955, 58–59/1955 | Manaças (1958, 1973) | 12                |
|                 |                               | *Boaedon mendesi* Ceríaco, Arellano, Jadin, Marques, Parrinha & Hallermann, 2021 | Manaças (1958, 1973) | Ceríaco et al. (2017) | 12                |
| Elapidae        | Boie, 1827                    | *Naja* Laurenti, 1768 | Ribeira Peixe – IICT/R 18/1972; Roça Porto Alegre – IICT/R 9/1954; Santa Josephina – IICT/R 20/1967; São Tomé Island [undetermined locality] – IICT/R 2/1966; Ubu-Budo – IICT/R STP10 | Manaças (1958, 1973); Ceríaco et al. (2017) | 12                |
|                 |                               | *Naja perombolari* Ceríaco, Marques, Schmitz & Bauer, 2017 | Manaças (1958, 1973) | Ceríaco et al. (2017) | 12                |
| Colubridae      | Oppel, 1811                   | *Hapalophis* Fischer, 1856 | Príncipe Airport – IICT/R 103/1955, 107–108/1955; Roça São Jorge [or Roça Azeirinha] – IICT/R 61–62/1955; Roça Sândy – IICT/R 41/1954; Príncipe Island [undetermined locality] – IICT/R 60–61/1955, 110/1956, STP2 | Manaças (1958) | 10                |
|                 |                               | *Hapalophis principii* (Boulenger, 1906) | Manaças (1958, 1973) | Ceríaco et al. (2017) | 10                |
|                 |                               | *Philothamnus* Smith, 1840 | Água-Izé – IICT/R 10/1954; Angra Toldo – IICT/R 3/1967; Ponta-Figo – IICT/R 115–117/1958; Roça Potó-Correia – IICT/R 5–8/1966, 13/1967; Roça Milagrosa – IICT/R 21/1954; São Tomé Island [undetermined locality] – IICT/R STP1 | Manaças (1958, 1973) | 11                |
|                 |                               | *Philothamnus* thomenii (Bocage, 1882) | Manaças (1958, 1973) | Ceríaco et al. (2017) | 11                |

**TOTAL NUMBER OF REPTILES SPECIMENS** 158

2021 (five paratypes). These specimens have also been used in phylogeographic studies (Ceríaco et al. 2020c).

The main collections holding specimens of amphibians and reptiles from São Tomé & Príncipe are CAS with 1562 specimens, followed by UMMZ with 1106, and USNM with 778 specimens (data retrieved from GBIF.org in February 2021). The IICT collection, together with the collection hosted at MUHNAC, is the fourth largest collection with a total of 457 specimens.

The dataset of this collection is available at GBIF (Ceríaco and Marques 2018b; https://www.gbif.org/dataset/c6e94c64-5d25-4758-8a52-2d5ee4d520fc).
Figure 11. Distribution of the São Tomé (A) & Príncipe (B) localities represented in the IICT herpetological collections.

Table 6. Gazetteer of São Tomé & Príncipe localities of IICT specimens. Latitude and longitude decimal coordinates are presented in WGS-84 projection.

| Island/Islet | Verbatim locality | Current locality | Latitude and Longitude | Uncertainty (meters) | Elevation (meters) | Number of taxa/records |
|--------------|--------------------|------------------|------------------------|----------------------|--------------------|------------------------|
| Príncipe     | Aeroporto          | Príncipe Airport | 1.662259, 7.41235      | 1039                 | 180                | 9/50                   |
| Príncipe     | Roça Azeitona      | Roça Azeitona    | 1.666667, 7.38333      | 501                  | 171                | 2/5                    |
| Príncipe     | Ilha do Príncipe   | Príncipe Island  | 1.612248, 7.396894     | 11813                | 149                | 3/12                   |
| Príncipe     | Porto Real         | Roça Porto Real  | 1.624118, 7.405149     | 656                  | 132                | 2/5                    |
| Príncipe     | Roça Esperança     | Roça Esperança  | 1.635551, 7.398481     | 154                  | 188                | 7/18                   |
| Príncipe     | Roça Sundy         | Roça Sundy      | 1.608775, 7.383335     | 852                  | 169                | 2/5                    |
| Príncipe     | Santo António      | Santo António   | 1.636944, 7.419444     | 790                  | 12                 | 4/9                    |
| São Tomé     | Água-Ízé           | Água-Ízé        | 0.217868, 6.725149     | 210                  | 38                 | 3/4                    |
| São Tomé     | Angra Toldo        | Angra Toldo     | 0.15770, 6.67070       | 301                  | 19                 | 2/2                    |
| São Tomé     | Ponta-Figo         | Ponta-Figo      | 0.339465, 6.54286      | 920                  | 151                | 3/7                    |
| São Tomé     | Povo-Correia       | Povo-Correia    | 0.2965, 6.680288       | 1000                 | 291                | 6/18                   |
| São Tomé     | Ribeira Peixe      | Ribeira Peixe   | 0.09028, 6.61528       | 301                  | 19                 | 1/1                    |
| São Tomé     | Roça Bela Vista    | Roça Bela Vista | 0.366667, 6.7          | 3036                 | 27                 | 1/4                    |
| São Tomé     | Roça Boa Nova      | Roça Boa Entrada| 0.35, 6.666667        | 3036                 | 180                | 1/1                    |
| São Tomé     | Roça Milagrosa     | Roça Milagrosa  | 0.27978, 6.65995       | 211                  | 465                | 2/8                    |
| São Tomé     | Roça Monte-Café    | Roça Monte Café| 0.299931, 6.64031     | 311                  | 694                | 5/23                   |
| São Tomé     | Roça Nova Moca     | Roça Nova Moca  | 0.287436, 6.63414      | 339                  | 854                | 3/8                    |
| São Tomé     | Pinheira           | Roça Pinheira   | 0.286315, 6.716026     | 44                   | 118                | 2/2                    |
| São Tomé     | Roça Porto Alegre  | Roça Porto Alegre| 0.033333, 6.533333    | 634                  | 16                 | 3/5                    |
| São Tomé     | Roça S. Nicolau    | Roça S. Nicolau| 0.279608, 6.625934     | 427                  | 917                | 1/1                    |
| São Tomé     | Roça Saudade       | Roça Saudade    | 0.283333, 6.633333     | 3036                 | 771                | 2/16                   |
| São Tomé     | Santa Josefina     | Santa Josefina  | 0.066667, 6.533333     | 3036                 | 109                | 1/1                    |
| São Tomé     | Ubar-Budo          | Ubar-Budo      | 0.262, 6.72          | 333                  | 254                | 1/1                    |
| São Tomé     | São Tomé           | São Tomé Island | 0.232334, 6.598798    | 25289                | 695                | 7/15                   |
| Rolas        | Ilhéu das Rolas    | Rolas Islet    | -0.002066, 6.521748   | 1365                 | 89                 | 1/5                    |
| Tinhosa Grande| Pedras Tinhosas   | Tinhosa Grande | 1.342118, 7.292135    | 117                  | 55                 | 2/9                    |
Angola collection

After approximately four decades of violent armed conflict that closed the country to researchers, the study of Angolan herpetofauna has experienced a rapid growth in the last decade. The most recent checklists of the herpetofauna of Angola report 117 species of amphibians and 278 reptiles, of which 54 are endemic to the country (Marques et al. 2018; Baptista et al. 2019; Branch et al. 2019). However, the available checklists are rapidly becoming outdated due to the rapid growth of species discovery and new species descriptions (see Branch 2018; Marques et al. 2019a, b, 2020; Ceríaco et al. 2020a, b; Hallermannn et al. 2020). Marques et al. (2018) provide a comprehensive review of the history of herpetological research in Angola.

The collection comprises 677 specimens (259 amphibians and 418 reptiles), covering 21 species of amphibians and 45 species and 2 subspecies of reptiles (Table 7). A total of ten families of amphibians are represented in the collection comprising eleven different genera, all anurans. Ptychadenidae is the best represented family with 45 specimens of the multiple cryptic group of Mascarene Grass Frog, Ptychadena cf. mascareniensis; 16 specimens of Spotted Grass Frog, Ptychadena subpunctata (Bocage, 1866); 17 specimens of a series of tadpoles and juveniles of an unidentified Grass Frog Ptychadena sp.; two specimens of Grandison’s Grass Frog, Ptychadena grandisonae Laurent, 1954; and a single specimen of both Anchieta’s Grass Frog, Ptychadena anchietae (Bocage, 1868) and Upemba Grass Frog, Ptychadena upembae (Schmidt & Inger, 1959). These are followed by the families Hyperolidae with a series of 91 tadpoles and juveniles of an unidentified Reed Frog Hyperolius sp., two specimens of the Angolan Reed Frog Hyperolius angolensis Steindachner, 1867, and Phrynobatrachidae with 48 specimens of the Natal Dwarf Puddle Frog Phrynobatrachus natalensis (Smith, 1849). These three families make up almost 80% of the amphibian specimens. The reptile collection is taxonomically more diverse, comprising a total of 15 families corresponding to a total of 31 genera. Chelonians are represented by a single family, Pelomedusidae, while all other families are squamates. Among the squamates (non-snakes) the Scincidae is the best represented family with 124 specimens of four different genera, including Trachylepis (102 specimens), Sepsina (16 specimens), Panaspis (four specimens), and Lubuya (two specimens); followed by the family Agamidae with 51 specimens of two different genera, Acanthocercus (28 specimens) and Agama (23 specimens), and the families Chamaeleonidae (41 specimens) and Lacertidae (31 specimens), both represented by a single species, the Quilo Flap-Neck Chamaeleon, Chamaeleo dilepis quilensis Bocage, 1886 and the Angolan Rough-Scaled Lizard Ichnotropis bivittata Bocage, 1866, respectively. This collection includes a good diversity of snakes representative of the country, comprising six different families, Typhlopidae, Viperidae, Lamprophiidae, Elapidae, Colubridae, and Natricidae, representing 31% of the collection.

The geographic range of this collection covers 38 different localities from 10 different provinces: Bengo, Bié, Cuando-Cubango, Huambo, Huíla, Lunda Norte, Lunda Sul, Malanje, Moxico, and Uíge (Table 8; Fig. 12). Moxico is the best represented
## Table 7. Overview of the Angola amphibian and reptile collections of IICT.

| Family        | Genus                                      | Species                                      | Localities – Accession number (* denotes a type specimen)                                                                 | References       | Number of specimens |
|---------------|--------------------------------------------|----------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|------------------|---------------------|
| **AMPHIBIANS**|                                            |                                              |                                                                                                                          |                  |                     |
| **ANURA Duméril, 1806**|                                            |                                              |                                                                                                                          |                  |                     |
| Pipidae       | Gray, 1825                                 | *Xenopus* Wagler, 1827                        | *Xenopus petersii* Bocage, 1897 Calandula (or Kalandula) waterfalls – IICT/A 1/1957; Lucusse – IICT/A 18/1957; Calombe river – IICT/A 27/1959 | Ruas (2002a)     | 3                   |
| Bubonidae     | (Gray, 1825)                               | *Sclerophrys* Tschudi, 1838                  | *Sclerophrys garnani* (Meek, 1897) Calombe river – IICT/A 168/1959                                                                 | Ruas (2002a)     | 1                   |
|               |                                            |                                              | *Sclerophrys gutturalis* (Power, 1927) Calombe river – IICT/A 155/1959, IICT/A 166/1959; Calundo river, Luando Reserve – IICT/A 66–67/1958; Dilolo lake – IICT/A 64–65/1958; Luibango – IICT/A 55–1957; Luena – IICT/A 14/1957, IICT/A 17/1957; Luviiri – IICT/A 20/1957 | Ruas (2002a)     | 10                  |
|               |                                            |                                              | *Sclerophrys pusilla* (Mertens, 1937) Calandula (or Kalandula) waterfalls – IICT/A 2/1957                                                                 | Ruas (2002a)     | 1                   |
|               |                                            |                                              | *Sclerophrys* sp. Calombe river – IICT/A 151/1959                                                                                                                                  | Ruas (2002a)     | 1                   |
|               |                                            |                                              | *Poyntonophrynus* Frost, Grant, Fairovich, Bain, Haas, Haddad, de Sá, Channing, Wilkinson, Donnellan, Razworthy, Campbell, Blotto, Moler, Drewes, Nussbaum, Lynch, Green & Wheeler, 2006 |                  |                     |
|               |                                            |                                              | *Poyntonophrynus kavangensis* Poynton & Broadley, 1988                                                                        | Ruas (2002a)     | 1                   |
| Brevicipitidae | Bonaparte, 1850                            | *Breviceps* Merrem, 1820                      | *Breviceps poweri* Parker, 1936 Calombe – IICT/A 163/1959, 169/1959, 174–177/1959                                                                 | Ruas (2002a)     | 6                   |
| Hemisotidae   | Cope, 1867                                 | *Hemisus* Günther, 1859                      | *Hemisus marmoratus* (Peters, 1854) Calombe – IICT/A 150/1959, 171/1959                                                                                                                |                  | 2                   |
| Hyperoliidae  | Laurent, 1943                              | *Hyperolius* Rapp, 1842                      | *Hyperolius angolensis* Steindachner, 1868 Caconda – IICT/A 54/1957; Cameia lake – IICT/A 10-1958                                                                                   |                  | 2                   |
|               |                                            |                                              | *Hyperolius* sp. Calombe – IICT/A 100–112/1959, 152/1959; Calundo river, Luando Reserve – IICT/A 28–84/1959; Calundo river, Luando Reserve – IICT/A 26/1959; Saurimo – IICT/A 6/1957; Angola [undetermined locality] – IICT/A 147/1959 |                  | 91                  |
| Arthroleptidae | Mivart, 1869                               | *Arthroleptis* Smith, 1849                   | *Arthroleptis stenodactylus* Pfeffer, 1893 Calombe – IICT/A 172–173/1959                                                                                                          | Ruas (2002a)     | 2                   |
| Psychadenidae | Dubois, 1873                               | *Psychadena* Boulenger, 1917                 | *Psychadena anchiatae* (Bocage, 1868) Dilolo lake – IICT/A 62/1958                                                                                                               | Ruas (2002a)     | 1                   |
|               |                                            |                                              | *Psychadena granuliferae* Laurent, 1954 Calombe river – IICT/A 113/1959; Luena – IICT/A 15/1957                                                                                       | Ruas (2002a)     | 2                   |
|               |                                            |                                              | *Psychadena cf. mascareniensis* (Duméril & Bibron, 1841) Cameia lake – IICT/A 2–8/1958, 15–37/1958; Calundo river, Luando Reserve – IICT/A 17–20/1959, 22–23/1959; Dilolo lake – IICT/A 55–61/1958; Kwanza river margins, Luando Reserve – IICT/A 16-1959 | Ruas (2002a)     | 45                  |
|               |                                            |                                              | *Psychadena subpunctata* (Bocage, 1866) Cameia lake – IICT/A 1/1958, 38–50/1958; Dilolo lake – IICT/A 53/1958, 63/1958                                                                 | Ruas (2002a)     | 16                  |
|               |                                            |                                              | *Psychadena sp.* Calandula (or Kalandula) waterfalls – IICT/A 7–13/1957, 11/1958; Calombe – IICT/A 160–162/1959; Cameia lake – IICT/A 52/1958; Luena – IICT/A 16/1957; Angola [undetermined locality] – IICT/A 3/5/1957, 53/1957 |                  | 17                  |
|               |                                            |                                              | *Psychadena unepacae* (Schmidt & Inger, 1959) Cameia lake – IICT/A 14/1958                                                                                                           | Ruas (2002a)     | 1                   |
| Family           | Genus                  | Species                   | Localities – Accession number (* denotes a type specimen) | References | Number of specimens |
|------------------|------------------------|---------------------------|-------------------------------------------------------------|------------|---------------------|
| Ptychadenidae    | Ptychadena Boulengeger, 1917 | Ptychadena uzungwensis (Loveridge, 1932) | Calombe – IICT/A 167/1959 | Ruas (2002a) | 1                   |
| Phrynobatrachidae| Phrynobatrachus Günther, 1862 | Phrynobatrachus natalensis (Smith, 1849) | Calombe river – IICT/A 144–145/1959; Camanongue – IICT/A 21–52/1957; Kwanza river source, Luando Reserve – IICT/A 1/1959, 10–13/1959; Kwanza river margins, Luando Reserve – IICT/A 2–9/1959, 21/1959; | Ruas (2002a) | 48                  |
| Ptychophiidae    | Ptychophis Doucet, 2001 | Ptychophis lilliei (Boulenger, 1890) | Calombe – IICT/A 270/1959; Ruas – IICT/A 166/1959 | Ruas (2002a) | 3                   |
| Ranidae          | Amnirana Dubois, 1987 | Amnirana darlingi (Boulenger, 1902) | Calombe – IICT/A 154/1959, 157/1959, 159/1959; Angola [undetermined locality] – IICT/A 148–149/1959 | Ruas (2002a) | 5                   |
| TOTAL NUMBER OF AMPHIBIAN SPECIMENS | | | | | 259                  |

**REPTILES**

**CHELONI** Brongiart, 1800

| Family           | Genus                  | Species                   | Localities – Accession number (* denotes a type specimen) | References | Number of specimens |
|------------------|------------------------|---------------------------|-------------------------------------------------------------|------------|---------------------|
| Pelomedusidae    | Pelomedusa Wagler, 1830 | Pelomedusa subrufa (Lacepède, 1788) | Angola [undetermined locality] – IICT/R 4/1958 | Manaças (1963); Ceríaco, Agarwal, Marques and Bauer (2020) | 3                   |
| Pelusios Wagler, 1830 | Pelusios bechuanicus FitzSimons, 1933 | Pelusios bechuanicus FitzSimons, 1933 | Angola [undetermined locality] – IICT/R 1/1958, 1A/1958, 2A/1958, 3/1958 | Manaças (1963); Ceríaco, Agarwal, Marques and Bauer (2020) | 4                   |

**SQUAMATA** Oppel, 1811

| Family           | Genus                  | Species                   | Localities – Accession number (* denotes a type specimen) | References | Number of specimens |
|------------------|------------------------|---------------------------|-------------------------------------------------------------|------------|---------------------|
| Gekkonidae       | Hemidactylus Goldfuss, 1820 | Hemidactylus longicepsedalus Bocage, 1873 | Quizambil mines – IICT/R 1–3/1957 | Manaças (1963); Ceríaco, Agarwal, Marques and Bauer (2020) | 3                   |
|                  |                        | Hemidactylus nzingae Ceríaco, Agarwal, Marques & Bauer, 2020 | Candande farm – IICT/R 4–5/1957 | Manaças (1963); Ceríaco, Agarwal, Marques and Bauer (2020) | 2                   |
| Amphibiaenidae   | Dallocia Gray, 1865 | Dallocia angolensis Gans, 1976 | Calombe, 7 km “west” from Luena – IICT/R 50/1959, 167/1959, 204/1959, 265/1959, 294–296/1959, 298–300/1959, 318/1959, 387/1959, 399/1959, 430/1959 | Gans (1976) | 16                  |
|                  | Zygaspis Cope, 1885 | Zygaspis nigra Broadley & Gans, 1969 | Calombe, 7 km “west” from Luena – IICT/R 44/1959, 203/1959, 314–316/1959, 339A/1959 | | 6                   |
| Vranidae         | Varanus Mercem, 1820 | Varanus niloticus (Linnaeus, 1766) | Dilolo lake – IICT/R 108/1958 | Manaças (1963) | 1                   |
| Lacertidae       | Ichnotropis Peters, 1854 | Ichnotropis bivittata Bocage, 1866 | Luena – IICT/R 136–137/1958; Luena (Santa Cruz farm) – IICT/R 229–231/1959; Cameia lake – IICT/R 5/1958; Calombe – IICT/R 58–60/1959, 79–81/1959, 244/1959, 252/1959, 267/1959, 277/1959, 279/1959, 320–323/1959, 330/1959, 374–375/1959, 410/1959, 420/1959, 437/1959; Angola [undetermined locality] – IICT/R Angolâ–9 | Manaças (1963) | 31                  |
| Scincidae        | Lophuas Horton, 1972 | Lophuas teverisi (Bocage, 1879) | Calombe – IICT/R 48/1959, 259/1959 | Manaças (1963) | 2                   |
|                  | Panaspis Cope, 1868 | Panaspis sp. | Calombe – IICT/R 268/1959, 276–277/1959, 288/1959 | | 4                   |
|                  | Sepsina Bocage, 1866 | Sepsina angolensis Bocage, 1866 | Calombe – IICT/R 47/1959, 79A–81A/1959, 200–201/1959, 264/1959, 386/1959, 409/1959, 416/1959, 431–432/1959, 436/1959, 438–439/1959, Angolâ1 | | 16                  |
| Family          | Genus                        | Species                                  | Localities – Accession number (* denotes a type specimen)                      | References | Number of specimens |
|-----------------|------------------------------|------------------------------------------|---------------------------------------------------------------------------------|------------|---------------------|
| Scincidae       | Trachylepis Fitzinger, 1843  | Trachylepis bayonii (Bocage, 1872)        | Calombe – IICT/R 243/1959, 246/1959, 254–255/1959, 258/1959, 268–276/1959, 278/1959, 288/1959, 324–325/1959, 327–338/1959, 364–373/1959, 376–385/1959, 378A/1959, 385A/1959; Angola [undetermined locality] – IICT/R Angola18 | Manaças (1963) | 60                  |
|                 |                              | Trachylepis sp.                          | Cameia lake – IICT/R 30–31/1958                                                  |            |                     |
|                 |                              | Trachylepis wahlbergii (Peters, "1869" 1870) | Kuito – IICT/R 77/1957, 81/1957; Cameia lake – IICT/R 23/1958, 26/1958, 232/1959; Calombe – IICT/R 61–67/1959, 253/1959, 256–257/1959, 259/1959, 280/1959, 283/1959, 326/1959, 335/1959, 405/1959, 426/1959; Dilolo lake – IICT/R 79–84/1959, 124–125/1958; Luena – IICT/R 234–235/1959, 238/1959; Santa Cruz farm, Luena – IICT/R 138/1959; Angola [undetermined locality] – IICT/R Angola16–16 | Manaças (1963) | 40                  |
| Gerrhosauridae   | Gerrhosaurus Wiegmann, 1828   | Gerrhosaurus bulsi Laurent, 1954          | Camera lake – IICT/R 122/1958, Dilolo lake – IICT/R 2/1958, 72/1958               |            |                     |
|                 | Tetradactylus Merrem, 1820   | Tetradactylus ellenbergeri (Angel, 1922) | Calombe – IICT/R 310–313/1959, 319/1959                                        | Manaças (1963) | 5                   |
| Agamidae        | Acanthocercus Fitzinger, 1843 | Acanthocercus cyanochapus (Falk, 1925)   | Cachingues – IICT/R 8/1957; Caeco – IICT/R 15–18/1959; Calombe – IICT/R 53–55/1959, 69/1959, 251/1959, 261/1959, 291/1959, 302/1959, 391/1959, 395/1959; Cassamba – IICT/R 40/1957; Luachzes – IICT/R 38/1957; Luena – IICT/R 28/1957, 33/1957; Lumbala Nguimo – IICT/R 36–37/1957, Kuito – IICT/R 78/1957; Santa Cruz Farm, Luena – IICT/R 133–135/1959, 139–141/1959 | Manaças (1963) | 28                  |
|                 | Agama Daudin, 1802           | Agama aculeata Merrem, 1820              | Camera lake – IICT/R 27–28/1958; Calombe – IICT/R 57/1959, 68/1959, 70/1959, 262–263/1959, 266–268/1959, 306–361/1959, 401/1959, 407/1959, 449/1959, 450A/1959; Cassamba – IICT/R 39–1957; Huambo – IICT/R 36/1957; Luena – IICT/R 28/1957 | Manaças (1963) | 15                  |
|                 | Agama shacki Mertens, 1938   | Calandula [or Kalandula] waterfalls – IICT/R 32/1959, 32A/1959; outskirts of Huambo – IICT/R 84–85/1957 | Manaças (1963) | 4                   |
|                 | Agama sp.                    | Kwanza river waterfalls – IICT/R 8–11/1957 | Manaças (1963) | 4                   |
| Chamaeleonidae  | Chamaeleo Laurenti, 1768     | Chamaeleo dilepis Leach, 1819            | Cacolo – IICT/R 19/1957; Cameia lake – IICT/R 24/1958, 74/1958; Calombe – IICT/R 36/1959, 71/1959, 354–356/1959, 396–397/1959, 402–403/1959, 408/1959, 411/1959, 413–414/1959, 451/1959, 454–455/1959; Dilolo lake – IICT/R 85–96/1958, 123/1958; Luena (Santa Cruz farm) – IICT/R 131, 132/1958, 134/1958, 146A/1958, 149/1959, 149A/1959; Luena – IICT/R 42/1959, 241/1959, Mutumbo – IICT/R 82–1957 | Manaças (1963) | 41                  |
| SERPENTES       | Afrotyphlops Broadley & Wallach, 2009 | Afrotyphlops angolensis (Bocage, 1866) | Calombe Reserve – IICT/R 415A/1959, 425A/1959; Kwanza river source, Luando Reserve – IICT/R 34/1959 |            |                     |
| Typhlopidae     | Merrem, 1820                 | Afrotyphlops sp.                          | Dundo – IICT/R Angola17                                                          |            |                     |
| Viperidae       | Bitis Gray, 1842             | Bitis arieatus (Merrem, 1820)             | Luena – IICT/R Angola5                                                            |            |                     |
|                 | Bitis gabonica               | (Duméril, Bibron & Duméril, 1854)         | Mexico – IICT/R A-1966                                                            |            |                     |
| Family          | Genus               | Species                        | Localities – Accession number (* denotes a type specimen) | References | Number of specimens |
|-----------------|---------------------|--------------------------------|----------------------------------------------------------|------------|--------------------|
| Viperidae Oppel, 1811 | *Causus* Wagler, 1830 | *Causus bilineatus* Boulenget, 1905 | Camaia lake – ICT/R 12A/1958; Calombe – ICT/R 249/1959 | Manaças (1973 “1974”) | 2 |
|                 | *Causus rhombeatus* (Lichtenstein, 1823) |                                | Calombe – ICT/R 151–152/1958, 51/1959, 52A/1959, 209/1959, 290/1959, 304/1959, 306/1959, 309/1959, 384A/1959, 433/1959, 453/1959, 479/1959; Cananóngue – ICT/R 75/1957; Camaia lake – ICT/R 75/1958; Camonbe river source – ICT/R 52/1959; Dilolo lake – ICT/R 126/1958; Luena (Santa Cruz farm) – ICT/R 145/1958; Luena – ICT/R 8/1959, Angola4, Angola19; Angola [undetermined locality] – ICT/R 28/1959, 31/1959, 33A/1959, 38A/1959, 345/1959, 384A/1959, 410B/1959, 437A/1959, 438A/1959, 441/1959; Manaças (1973 “1974”); Hallermann et al. (2020) | 31 |
| Lamprophiidae Fitzinger, 1843 | *Boaedon* Duméril, Bibron & Duméril, 1854 | *Boaedon fradei* Hallermann et al. 2020 | Calombe – ICT/R 150/1958, 5/1959, 40/1959, 341/1959, 350/1959, 400/1959, 404/1959, 410A/1959, 450/1959, 340/1968; Luena – ICT/R 240/1968 | Manaças (1973 “1974”); Hallermann et al. (2020) | 11 |
|                 | *Lycophidion* Fitzinger, 1843 | *Lycophidion capense* Smith, 1831 | Camaia lake – ICT/R 7/1958 | 1 |
|                 | *Psammophis* Boie, 1825 | *Psammophis angolensis* (Bocage, 1872) | Luachimo dam canal – ICT/R Angola3 | 1 |
|                 | *Psammophis musambicus* Peters, 1882 |                                | Calombe – ICT/R 29/1959, 75/1959, 77/1959, 18/1959, 245/1959, 431A/1959, 443/1959, 452/1959; Camaia National Park – ICT/R 77/1958; Dilolo lake – ICT/R 127/1958; Luena – ICT/R Angola20; Angola [undetermined locality] – ICT/R 12/1958, 14/1958 | Manaças (1973 “1974”) | 13 |
|                 | *Psammophis zambiensis* Hughes & Wade, 2002 |                                | Calombe – ICT/R 303/1959; Camaia lake – ICT/R 30A/1958 | Manaças (1973 “1974”) | 2 |
|                 | *Psammophylex acutus* (Günther, 1888) |                                | Calombe – ICT/R 210–227/1959, 285/1959, 434/1959, 444/1959 | Manaças (1973 “1974”) | 21 |
|                 | *Psammophylex sp.* |                                | Menonque – ICT/R 15/1958 | 1 |
| Elapidae Boie, 1827 | *Prosymna* Gray, 1849 | *Prosymna angolensis* Boulenget, 1915 | Milano – ICT/R 14/1957; Angola [undetermined locality] – ICT/R 348–349, 348–349/1959; Angola5 | 5 |
| Colubridae Oppel, 1811 | *Crotaphopeltis* Fitzinger, 1843 | *Crotaphopeltis barotseensis* Broadley, 1968 | Dilolo lake – ICT/R 362/1959 | Manaças (1973 “1974”) | 1 |
|                 | *Crotaphopeltis batambotica* (Laurenti, 1768) |                                | Calombe – ICT/R 109–110/1958; Dilolo lake – ICT/R 362/1959, 406/1959, 417/1959 | Manaças (1973 “1974”) | 4 |
|                 | *Dasyptelis Wagler, 1830 | *Dasyptelis scabra* (Linnaeus, 1758) | Calombe – ICT/R 447/1959 | Manaças (1973 “1974”) | 1 |
|                 | *Dispholidus Duvernoy, 1832 | *Dispholidus typus typus* (Smith, 1828) | Calombe – ICT/R 76/1959, 457–458/1959; Luena (Santa Cruz farm) – ICT/R 142/1958, 147–148/1958; Luena – ICT/R 386/1958, 1–2/1959, 386/1968 | Manaças (1973 “1974”) | 9 |
|                 | *Dispholidus typus punctatus* Laurent, 1955 |                                | Calombe – ICT/R 76/1959 | Manaças (1973 “1974”) | 1 |
### Saving IICT herpetological collections

**Figure 12.** Distribution of the Angola localities represented in the IICT herpetological collections.
province, with 574 records from 14 different localities, while Lunda Sul is the least sampled with only one record. Collecting events took place between 1957 and 1968, although most of the material was collected between 1957 and 1959 during the Apiary

Table 8. Gazetteer of Angola localities of IICT specimens. Latitude and longitude decimal coordinates are presented in WGS-84 projection.

| Province | Verbatim locality | Current locality | Latitude and Longitude | Uncertainty (meters) | Elevation (meters) | Number of taxa/records |
|----------|-------------------|------------------|-----------------------|----------------------|-------------------|-----------------------|
| Bengo    | Minas do Quizambil | Quizambil mines  | -8.3166667, 13.733335 | 301                  | 262               | 1/3                   |
| Bié      | Cachingues        | Cachingues       | -13.071851, 16.749528 | 954                  | 1713              | 1/1                   |
| Bié      | Mutumbo           | Mutumbo          | -13.183353, 17.4      | 430                  | 1452              | 1/1                   |
| Bié      | Silva Porto       | Kuito            | -12.591968, 16.93867  | 2060                 | 1716              | 3/4                   |
| Cuando   | Cubango          | Menongue         | -14.666667, 17.7      | 3060                 | 1378              | 1/1                   |
| Huambo   | Nova Lisboa [or arredores de Nova Lisboa] | Huambo [or outskirts of Huambo] | -12.766667, 15.733333 | 5000               | 1719              | 2/3                   |
| Huila    | Colonata da Caconda | Caconda        | -13.75588, 15.06912  | 1600                 | 1670              | 1/1                   |
| Huila    | Sá da Bandeira   | Lubango          | -14.916667, 13.5      | 6100                 | 1751              | 1/1                   |
| Lunda Norte | Cacolo, Mennungo [or Cacolo, Minungo] | Cacolo | -10.14172, 19.26796  | 1832                 | 1351              | 2/5                   |
| Lunda Norte | Canal da Barragem de Luachimo | Luachimo Dam canal | -7.361735, 20.84899  | 980                  | 643               | 1/1                   |
| Lunda Norte | Dundo            | Dundo            | -7.77554, 20.835054   | 2240                 | 731               | 1/1                   |
| Lunda Norte | Vila Henrique Carvalho | Saurimo        | -9.662525, 20.39485   | 5000                 | 1075              | 1/1                   |
| Malanje | Quedas do Duque de Bragança | Calandula [or Kalandula] waterfalls | -9.073248, 16.001402 | 800                  | 1064              | 4/12                  |
| Malanje | Posto do Milano   | Milano           | -8.816667, 17.566667  | 600                  | 666               | 1/1                   |
| Mexico  | Calombe-Luso, Mexico | Calombe          | -11.833335, 19.933333 | 3060                 | 1345              | 3/7/24                |
| Mexico  | Calombe (7 km de Vila Luso) | Calombe, 7 km "west" from Luena | -11.833335, 19.933333 | 3060                 | 1345              | 2/20                  |
| Mexico  | Cacuma lake       | Cacuma lake      | -11.716667, 20.8      | 980                  | 1110              | 16/63                 |
| Mexico  | Cacuma lake       | Lucusse          | -12.526722, 20.818813 | 1758                 | 1144              | 1/3                   |
| Mexico  | Vila Gago Coutinho | Lumbala Ngumubim | -14.101654, 21.435308 | 2051                 | 1122              | 1/2                   |
| Mexico  | Kwanza River waterfall | Kwanza River waterfall | -9.874712, 16.670194 | 3060                 | 1086              | 1/4                   |
| Mexico  | Vila Henrique Carvalho | Saurimo        | -9.662525, 20.39485   | 5000                 | 1075              | 1/1                   |
| Malanje | Quedas do Duque de Bragança | Calandula [or Kalandula] waterfalls | -9.073248, 16.001402 | 800                  | 1064              | 4/12                  |
| Malanje | Posto do Milano   | Milano           | -8.816667, 17.566667  | 600                  | 666               | 1/1                   |
| Mexico  | Calombe-Luso, Mexico | Calombe          | -11.833335, 19.933333 | 3060                 | 1345              | 3/7/24                |
| Mexico  | Calombe (7 km de Vila Luso) | Calombe, 7 km "west" from Luena | -11.833335, 19.933333 | 3060                 | 1345              | 2/20                  |
| Mexico  | Cacuma lake       | Cacuma lake      | -11.716667, 20.8      | 980                  | 1110              | 16/63                 |
| Mexico  | Cacuma lake       | Lucusse          | -12.526722, 20.818813 | 1758                 | 1144              | 1/3                   |
| Mexico  | Vila Gago Coutinho | Lumbala Ngumubim | -14.101654, 21.435308 | 2051                 | 1122              | 1/2                   |
| Mexico  | Kwanza River waterfall | Kwanza River waterfall | -9.874712, 16.670194 | 3060                 | 1086              | 1/4                   |
research mission to Angola organised by the CZL, especially aimed at the study of bees and honey production.

Part of the snake and lizard collections was studied and published by Manaças (1963, 1973 “1974”, 1982), while the amphibians were studied by Ruas (1996, 2002a). In 1976 the American herpetologist Carls Gans (1923–2009) described a new species of amphibiaenian, the Angolan Worm Lizard, *Dalophia angolensis*, based on a series of specimens from this collection (Gans 1976). Several other well-known herpetologists such as Donald G. Broadley (1932–2016) and Barry Hughes (1935–to date) used the collection for their own research and provided important contributions to specimen identification. More recently the collection has been used in several projects, including new species descriptions (Ceríaco et al. 2020a, b; Hallermannn et al. 2020).

The collection holds type material for several species: *Dalophia angolensis* Gans, 1976 (holotype and 18 paratypes); Queen Nzinga’s Tropical Gecko, *Hemidactylus nz-ingae* Ceríaco, Agarwal, Marques & Bauer, 2020 (two paratypes); and Frade’s Brown House Snake, *Boaedon fradei* Hallermannnn, Ceríaco, Schmitz, Ernst Conradie, Verburgt, Marques & Bauer, 2020 (five paratypes). The IICT holds one of the largest known herpetological collections from Angola, with 677 specimens. Currently, the largest collection of Angolan amphibians and reptiles is held by MD, with a total of 2753 specimens (Ceríaco et al. 2020d), followed by the collections of AMNH with a total of 2280 specimens, the CAS with 1347 specimens, and the CM with 806 specimens (data retrieved from GBIF.org in February 2021). Other collections, as is the case of PEM in South Africa, ISCED and INBAC in Angola, have considerable and comparable collections, but the data regarding these collections is not available on online databases.

The dataset of this collection is available at GBIF (Ceríaco and Marques 2018c; https://www.gbif.org/dataset/ae52efd5-bfd4-4a81-ba12-813cace064f3).

**Mozambique collection**

Mozambique has a high diversity of amphibians and reptiles but remains relatively unexplored when compared with other southern African regions (Pietersen 2014). Since Wilhelm Peters’ (1815–1883) historical survey and the publication of his two major works (Peters 1854, 1882), very few surveys have been conducted in the country. The scientific literature of Mozambican herpetofauna was mostly incorporated on comprehensive works about southern and eastern African herpetofauna (e.g., FitzSimons 1962; Broadley 1990a; Channing 2001; Du Preez and Carruthers 2009; Spawls et al. 2018). In the last decade Mozambique has been targeted by researchers and new fieldwork is being conducted. This has already resulted in important contributions and new species descriptions (e.g., Branch et al. 2005a, 2014, 2017; Branch and Bayliss 2009; Branch and Tolley 2010; Portik et al. 2013a; Conradie et al. 2016) and checklists (Broadley 1990b, 1992; Branch et al. 2005b; Schneider et al. 2005; Downs and Wirminghaus 2010; Jacobsen et al. 2010; Pietersen et al. 2013; Ohler and Frétey
### Table 9. Overview of the Mozambique amphibian and reptile collections of IICT.

| Family         | Genus                     | Species                          | Localities – Accession number (* denotes a type specimen) | References | Number of specimens |
|----------------|---------------------------|----------------------------------|----------------------------------------------------------|------------|---------------------|
| **AMPHIBIANS** |                           |                                  |                                                          |            |                     |
| **ANURA Duméril, 1806** |                           |                                  |                                                          |            |                     |
| Pipidae        | Xenopus Wagler, 1825      | Xenopus muelleri (Peters, 1844)  | Porto Henrique – IICT/A 1–9/1948, 10–19/1948; Chizizira – IICT/A 1/1965; Gorongosa – IICT/A 44/1955, 49–54/1955, 69–76/1955, 85–90/1955; Caniçado, B.T.L; vivarium – IICT/A 42–42/1963, 278–283/1955; Mozambique [undetermined locality] – IICT/A 38–39/1966 | Manaças (1950); Ruas (2002b) | 50                  |
|                |                           |                                  |                                                          |            |                     |
| Bufonidae      | Schismaderma Smith, 1849  | Schismaderma corens (Smith, 1848) | Guenguela stream, Chibuto – IICT/A 185–189/1948, 209/1948; Matola – IICT/A 252–255/1948; Moamba – IICT/A 171–179/1948 | Manaças (1950), Ruas (2002b) | 19                  |
|                |                           |                                  |                                                          |            |                     |
|                | Sclerophrys Tschudi, 1838 | Sclerophrys garmani (Meek, 1897) | Boane – IICT/A 10/1963, 21/1963, 35/1948, 38/1948, 59/1948, 61/1948, 67/1948, 69/1948; Caniçado, watering channel – IICT/A 24–32/1963, 89/1963, 91/1963, 103/1963, 106/1963; Caniçado – IICT/A 60/1963; Centro Social – IICT/A 114/1963; Guenguela stream, Chibuto – IICT/A 190–215/1948; Guijá – IICT/A 81–83/1948; Manhiça – IICT/A 257/1948; Maqueze – IICT/A 239–245/1948; Moamba – IICT/A 123–139/1948; Porto Henrique – IICT/A 39/1948, 286/1948; Lagos de S. Matinho – IICT/A 315–31/1955 Mozambique [undetermined locality] – IICT/A Moz3 | Manaças (1950); Ruas (2002b) | 81                  |
|                |                           |                                  |                                                          |            |                     |
|                |                           |                                  |                                                          |            |                     |
|                |                           |                                  |                                                          |            |                     |
| Microhyliidae  | Phrynomantis Peters, 1867 | Phrynomantis bifasciatus (Smith, 1847) | Lagoa Chicungue, Bilene – IICT/A 320/1955 | Ruas (2002b) | 1                   |
| Günther, 1858  |                           |                                  |                                                          |            |                     |
| (1843)         |                           |                                  |                                                          |            |                     |
| Brevicipitidae | Breviceps Merrem, 1820    | Breviceps mosambicus Peters, 1854 | Manhiça – IICT/A 68/1948; Ponta do Ouro – IICT/A 34/1948 | Manaças (1950); Ruas (2002b) | 2                   |
| Bonaparte, 1850|                           |                                  |                                                          |            |                     |
| Hemisotidae    | Hemius Günther, 1859      | Hemius marmoratus (Peters, 1854) | Mozambique [undetermined locality] – IICT/A 258/1948 | Ruas (2002b) | 1                   |
| Cope, 1867     |                           |                                  |                                                          |            |                     |
| Ptychadenidae  | Ptychadena Boulenger, 1917| Ptychadena guinei Laurent, 1954 | Manhiça – IICT/A 62–63/1948; Magaiza, Panda – IICT/A 246/1948; Maqueze – IICT/A 103–140/1948, 142–161/1948; Pafuri – IICT/A 77/1948; Mozambique [undetermined locality] – IICT/A 289/1955 | Manaças (1950); Ruas (2002b) | 63                  |
| Dubois, 1987   |                           |                                  |                                                          |            |                     |

**References:**
- Manaças (1950)
- Ruas (2002b)
| Family                  | Genus                  | Species                               | Localities – Accession number (* denotes a type specimen) | References | Number of specimens |
|------------------------|------------------------|---------------------------------------|----------------------------------------------------------|------------|---------------------|
| Ptychadenidae          | Ptychadena            | Ptychadena oxyrhyncha (Smith, 1849)   | Gorongosa – IICT/A 56–68/1955, 133–137/1955, 161/1955    | Ruas       | 19                  |
|                        | Dubois, Boulenger, 1917| Ptychadena tamiocelis Laurent, 1954   | Macomaze – IICT/A 21/1948; Gorongosa – IICT/A 295/1955  | Ruas       | 2                   |
| Phrynobatrachidae      | Phrynobatrachus       | Phrynobatrachus mababiensis FitzSimons, 1932 | Pafuri – IICT/A 76/1948, 78/1948; Umbeluzi – IICT/A 297/1955 | Ruas       | 3                   |
|                        | Laurent, 1941          | Phrynobatrachus natagensis (Smith, 1849) | Namaacha – IICT/A 41/1948, 43/1948, 45/1948, 49–52/1948; Luí (Ile) river – IICT/A 1–2/1955 | Ruas       | 12                  |
|                        |                        |                                       |                                                          |            |                     |
| Ptychopalidae          | Amphieria              | Amphieria angolensis (Bocage, 1860)   | Gorongosa – IICT/A 3–6/1955, 9–23/1955, 47/1955, 91–94/1955, 101–131/1955, 138–143/1955, 148–151/1955, 158–160/1955, 167–170/1955, 272–275/1955, 284–288/1955; Mozambique [undetermined locality] – IICT/A 29A/1955, Moz5 | Ruas       | 83                  |
|                        | Boulenger, 1888        |                                       |                                                          |            |                     |
|                        |                        |                                       |                                                          |            |                     |
|                        | Phrynogaster          | Phrynogaster mababiensis (Hewitt, 1933) | Chite – IICT/A 1–2/1955; Luí (Ile) river – IICT/A 1–2/1955 | Ruas       | 1                   |
|                        |                        |                                       |                                                          |            |                     |
| Ranidae                | Ranarana              | Ranarana darlingi (Boulenger, 1902)   | Umbeluzi – IICT/A 291–294/1955                           | Ruas       | 4                   |
|                        | Boulenger, 1888        |                                       |                                                          |            |                     |
|                        |                        |                                       |                                                          |            |                     |
| Rhacophoridae          | Rhacophorus           | Rhacophorus mababiensis (Hewitt, 1933) | Chite – IICT/A 1–2/1955; Luí (Ile) river – IICT/A 1–2/1955 | Ruas       | 35                  |
|                        | Hoffinan, 1932         |                                       |                                                          |            |                     |

TOTAL NUMBER OF AMPHIBIAN SPECIMENS: 532

REPTILES

CROCODYLIA Gmelin, 1789

Crocodylidae

| Genus                  | Species                               | Localities – Accession number | References | Number of specimens |
|------------------------|---------------------------------------|------------------------------|------------|---------------------|
| Cuvier, 1808           | Crocodylus Laurenti, 1768             |                              |            | 4                   |
| Broadley (1963)         | Crocodylus niloticus Laurenti, 1768   |                              |            |                     |

SQUAMATA Oppel, 1811

Gekkonidae

| Genus                  | Species                               | Localities – Accession number | References | Number of specimens |
|------------------------|---------------------------------------|------------------------------|------------|---------------------|
| Gray, 1825             | Afropholis Loveridge, 1944            |                              |            | 4                   |
| Broadley (1963)         | Afropholis LoveridgeBroadley, 1953    |                              |            |                     |

Chondrodactylidae

| Genus                  | Species                               | Localities – Accession number | References | Number of specimens |
|------------------------|---------------------------------------|------------------------------|------------|---------------------|
| Peters, 1870           | Chondrodactylus turneri (Gray, 1864)  |                              |            | 1                   |
| Guenguela stream, Chibuto – IICT/R 1345/1948; Enchisca – IICT/A 180/1948; Magaia, Panda – IICT/A 1638–1640/1948 | Manacas (1952) | 5                   |
| Goldfuss, 1820          | Hemidactylus mabouia (Moreau de Jonnés, 1818) |                              |            |                     |
| Chibuto – IICT/R 1320–1322/1948; Mauele – IICT/R 1582/1952; Nhaluário – IICT/R 8–10/1971; Gorongosa – IICT/R 114/1955, 148–149/1955 | Manacas (1952) | 10                  |

Homopholis

| Genus                  | Species                               | Localities – Accession number | References | Number of specimens |
|------------------------|---------------------------------------|------------------------------|------------|---------------------|
| Boulenger, 1885        | Homopholis wahlbergi (Smith, 1849)    |                              |            | 1                   |
| Homoine – IICT/R 111/1963 |                                       |                              |            |                     |

Lygodactylidae

| Genus                  | Species                               | Localities – Accession number | References | Number of specimens |
|------------------------|---------------------------------------|------------------------------|------------|---------------------|
| Gray, 1849             | Lygodactylus capensis (Smith, 1849)   |                              |            | 16                  |
| Gorongosa – IICT/R 7–8/1955, 14/1955, 16/1955, 115/1955, 146–149/1955, 153A/1955; Lífidi, Angónia – IICT/R 132A/1948, 1782–1783/1948; Manhiça – IICT/R 644–646/1948; | Manacas (1952, 1961) | 16                  |

Lygodactylus

| Genus                  | Species                               | Localities – Accession number | References | Number of specimens |
|------------------------|---------------------------------------|------------------------------|------------|---------------------|
| Gray, 1825             |                        |                              |            |                     |

TOTAL NUMBER OF REPTILE SPECIMENS: 37
| Family            | Genus                                      | Species                        | Localities – Accession number (* denotes a type specimen) | References | Number of specimens |
|-------------------|--------------------------------------------|--------------------------------|----------------------------------------------------------|------------|---------------------|
| Amphisbaenidae    | Monopeltis Smith, 1848                     | Monopeltis sphenurusyncbus (Peters, 1879) | Manhiça – IICT/R 532–538/1948 | Manaças (1954) | 8                   |
|                   | Zygaspis Cope, 1885                       | Zygaspis violacea (Peters, 1854) | Manaços – IICT/R 524–531/1948, 1747/1948                  | Manaças (1954) | 9                   |
| Varanidae         | Varanus Merrem, 1820                      | Varanus exanthematicus (Bosc, 1792) | Caniçado – IICT/R 39/1963 | Manaças (1952, 1961) | 1                   |
| Lacertidae        | Heliobolus Fitzinger, 1845                 | Heliobolus lagurus (Smith, 1838) | Pafuri – IICT/R 727/1948 | Manaças (1961) | 10                  |
|                   | Nucras Gray, 1838                         | Nucras cf. holubi (Steindachner, 1882) | Boane – IICT/R 52/1948, 1150+1152/1948, 1196/1948, 1199/1948 | Manaças (1952) | 10                  |
|                   | Scincidae Cuvier, 1808                    | Acontias aurantiacus (Peters, 1854) | Maule – IICT/R 1023/1948, 1151–1152/1948, 1196/1948, 1199/1948 | Manaças (1954) | 5                   |
|                   | Mochlus Günther, 1864                     | Mochlus nunezvaldi (Smith, 1849) | Maule – IICT/R 1164–1167/1948, 1581/1948; Gorongosa – IICT/R 28/1955 | Manaças (1952, 1961) | 6                   |
|                   | Panaspis Cope, 1868                       | Panaspis wahlbergii (Smith, 1849) | Lifdzi, Angônia – IICT/R 1790–1791/1948                  | Manaças (1952) | 2                   |
|                   | Scelotes Fitzinger, 1826                  | Scelotes arenicola (Peters, 1854) | Maule – IICT/R 1153–1156/1948, 1200–1202/1948             | Manaças (1954) | 7                   |
|                   | Trachylepis Fitzinger, 1845               | Trachylepis boulengeri (Sternfeld, 1911) | Gorongosa – IICT/R 116/1955 | Manaças (1952) | 1                   |
|                   | Trachylepis depensa (Peters, 1854)        | Maule – IICT/R 1584/1948 | Manaças (1952) | 1                   |
|                   | Trachylepis margaritifera (Peters, 1854)  | 10–13/1955, 13A/1955; Nhandare river margins, Gorongosa – IICT/R 30–31/1955, 348/1948, 414–415/1948, 441–449/1948; Nhaluio – IICT/R 4/1971, 7/1971; Sussundenga – IICT/R 10–11/1955 | Manaças (1952, 1961) | 23                  |
|                   | Trachylepis sp.                           | Maule – IICT/R 1582/1948; Porto Henrique – IICT/R 235/1948 | Manaças (1952, 1961) | 2                   |
|                   | Trachylepis varia (Peters, 1844)          | Boane – IICT/R 14/1948, 16/1963, 45/1963, 51/1963, 53–54/1963; Caniçado, watering channel – IICT/R 59/1963; Chibuto, Ribeira de Guenguela – IICT/R 1354–1357/1948; Dondo – IICT/R 911/1948; Lifdzi, Angônia – IICT/R 132C/1948; Limpopo river Dam – IICT/R 33–34/1963; Manhiça – IICT/R 561–613/1948, 1692–1694/1948, 1719/1948, 1744/1948, 1962–1964/1948; Marqueze, Alto Changane – IICT/R 1504–1515/1948; Maule – IICT/R 1024–1032/1948, 1160–1162/1948, 1184–1192/1948; Mozambique – IICT/R 1297–1298/1948, 1323/1948; Mutuali – IICT/R Moz10; Nhaluio – IICT/R 1–3/1971, 5–6/1971; São Martinho do Bilene – IICT/R 178/1955; road between Inhassoro and Vilanculos – IICT/R 2/1955; Sussundenga – IICT/R 17/1964; Umbeluzi – IICT/R 1–6/1963; Gorongosa – IICT/R 32–33/1955, 87–92/1955 | Manaças (1952, 1961) | 135                  |
| Cordylidae        | Smaug Stanley, 1937                       | Smaug monamblicus (FitzSimons, 1958) | Gorongosa – IICT/R 29/1955 | Manaças (1952, 1961) | 17                  |
| Family          | Genus               | Species                  | Localities – Accession number (* denotes a type specimen) | References | Number of specimens |
|-----------------|---------------------|--------------------------|----------------------------------------------------------|------------|---------------------|
| Cordylidae      | Platyasaurus Smith, 1844 | *Platyasaurus intermedius* Hewitt, 1909 | Namaacha – IICT/R 418–420/1948, 450–454/1948; 15 mls SE of Manica – IICT/R/DB UM 3579 | Manaças (1952) | 9                   |
|                 |                     | *Platyasaurus maculatus* lineicauda Broadley, 1965 | 14 mls west of Mortumbala – IICT/R/DB UM 7981 | Broadley (1965) | 1                   |
|                 |                     | *Platyasaurus maculatus* maculatus Broadley, 1965 | Mitucue Mountains – IICT/R/DB UM 8064, 8071 | Broadley (1965) | 2                   |
| Gerrhosauridae  | Gerrhosaurus Wiegmann, 1828 | *Gerrhosaurus flavigularis* Wiegmann, 1828 | Gorongosa – IICT/R 59–60/1955; 124/1955, 127/1955, 156/1955; Manhiça – IICT/R 109/1953; Mozambique [undetermined locality] – IICT/R Moz12 | Manaças (1952, 1961) | 8                   |
| Matobosaurus  & Tolley, 2013 | *Matobosaurus sulatus* Smith, 1849 | Centro Social – IICT/R 6/1965; Gorongosa – IICT/R 39/1955, 121/1955; Nhandare river margins, Gorongosa – IICT/R 9/1955; Namaacha – IICT/R 4/1964 | Manaças (1961) | 5                   |
| Tetradactylus  Merrem, 1820 | *Tetradactylus* cf. ellenbergeri Angel, 1922 | Meponda – IICT/R Moz6 | | | 2                   |
| Agamidae        | Acantbocerus Fitzinger, 1843 | *Acantbocerus atriollis* Smith, 1849 | Boane – IICT/R 17/1965; Caniçado, B.T.L. vivarium – IICT/R 69–70/1963, Moz16; Guenguella stream, Chibuto – IICT/R 1326–1344/1948, 1429–1436/1948; Guijá – IICT/R 964–966/1948; Inharrime – IICT/R 110/1963; Manhiça – IICT/R 553–560/1948; Mapuca, Alto Changane – IICT/R 1499–1500/1948; Limpopo river margins – IICT/R 79/1963; Namaacha – IICT/R 349–413/1948; Susundenga – IICT/R 39/1966 | Manaças (1952) | 57                  |
|                 | Agama Peters, 1855 | *Agama armata* Peters, 1855 | Lifidzi, Angónia – IICT/R 132B/1948, 1784–1788/1948; Manhiça – IICT/R 1695/1948; Mauele – IICT/R 1204–1212/1948; Susundenga – IICT/R 16–22/1966 | Manaças (1952) | 20                  |
|                 | Agama Peters, 1854 | *Agama mosambica* Peters, 1854 | Centro Social – IICT/R 7/1964; Dondo – IICT/R 898–904/1948; Gorongosa – IICT/R 5–6/1955, 18–26/1955, 61/1955, 64–70/1955, 93–97/1955, 111–113/1955, 128–129/1955, 132–134/1955, 139–141/1955 | Manaças (1961) | 41                  |
|                 | Agama Peters, 1855 | *Agama kirkii* Bouleenger, 1885 | Centro Social – IICT/R 8–9/1964; Susundenga – IICT/R 2–4/1964, 12–15/1966 | | 9                   |
| Chamaeleonidae  | Chamaeleo Laurenti, 1768 | *Chamaeleo dilepis* Leach, 1819 | Boane – IICT/R 12–13/1963, 15/1963; Caniçado IICT/R 67–68/1963, 84–85/1963, 95–97/1963; Gorongosa – IICT/R 47/1955, 27/1955, 71–80/1955, 81A/1955, 82/1955, 98–99/1955, 100–102/1955, 108–110/1955, 122/1955, 125–126/1955, 161–165/1955, 166–167/1955; Guenguella stream, Chibuto – IICT/R 1346–1353/1948, 1354A/1948, 1356A/1948, 1426–1428/1948, 1439–1449/1948; Guijá – IICT/R 37–38/1948, 58/1963, 71/1963, 113/1963; Lifidzi, Angónia – IICT/R 1766–1800/1948; Manhiça IICT/R 1801/1948, 614/1948, 616–620/1948, 642/1948; Matola – IICT/R 20/1963; Mocuba – IICT/R 3A/1955; São Martinho do Bilene – IICT/R 174–177/1955 | Manaças (1952, 1961) | 81                  |
|                 | Chamaeleo Hallowell, 1844 | *Chamaeleo gracilis* Moz17 | Mozambique [undetermined locality] – IICT/R Moz17 | | 1                   |
|                 | Rhampholeon Günther, 1874 | *Rhampholeon gorongosae* Broadway, 1971 | Gorongosa – IICT/R 145/1955 | | 1                   |
| Family          | Genus                        | Species                        | Localities – Accession number (* denotes a type specimen) | References | Number of specimens |
|-----------------|------------------------------|--------------------------------|-----------------------------------------------------------|------------|---------------------|
| **SERPENTES**   |                              |                                |                                                           |            |                     |
| **Typhlopidae** | *Afrotyphlops* Broadley & Wallach, 2009 | *Afrotyphlops* cf. fornasini (Bianconi, 1849) | Mauele – IICT/R 1157–1159/1948 |            | 3                   |
|                 |                              | *Afrotyphlops* cf. mucron (Peters, 1854) | Chizizira – IICT/R 38/1966; Nhaliwre – IICT/R 1A/1971; Pafuri – IICT/R Moz26 |            | 3                   |
|                 |                              | *Afrotyphlops* cf. schlegelii (Bianconi, 1849) | Meponda – IICT/R Moz5; Nova Mambone – IICT/R Moz3; presumably Mozambique [undetermined locality] – IICT/R Moz25 |            | 3                   |
| **Leptotyphlops** | Fitzinger, 1843 | *Leptotyphlops inconfusus* (Broadley & Watson, 1976) | Cafumpe – IICT/R 63/1948 | Manaças (1954) | 1                   |
| **Viperidae**   | Oppel, 1811                   | *Bitis* Gray, 1842          | *Bitis arnivora* (Merrem, 1820) | Manaças (1959) | 11                  |
|                 |                              | *Causus* Wagler, 1830       | *Causus defilippii* (Jan, 1863) | Manaças (1959) | 4                   |
|                 |                              | *Causus* cf. rhombatus (Lichtenstein, 1823) | Metengo Balama – IICT/R 2/1949 | Manaças (1959) | 1                   |
| **Lampropilidae** | Fitzinger, 1843 | *Amblyodipsas* Peters, 1857 | *Amblyodipsas microphalma* (Bianconi, 1852) | Manaças (1959) | 2                   |
|                 |                              | *Amblyodipsas polyespis* (Bocage, 1873) | Nova Mambone – IICT/R 2/1956 |            | 1                   |
|                 |                              | *Aparallactus* Smith, 1849   | *Aparallactus capensis* Smith, 1849 | Manaças (1959) | 4                   |
|                 |                              | *Aparallactus lumilatus* (Peters, 1854) | Gorongosa – IICT/R 54/1955 | Manaças (1959) | 1                   |
|                 |                              | *Atractaspis* Smith, 1849    | *Atractaspis bibronii* Smith, 1849 | Gorongosa – IICT/R 57/1955 | 1                   |
|                 |                              | *Boaedon* Duméril, Bibron & Duméril, 1854 | *Boaedon capensis* Duméril, Bibron & Duméril, 1854 | Manaças (1959) | 12                  |
|                 |                              | *Limaformosa* Broadley, Tolley, Conradie, Wishart, Trape, Burger, Kusamba, Zassi-Boulou & Greenbaum, 2018 | *Limaformosa capensis* (Smith, 1847) | Manaças (1959) | 1                   |
|                 |                              | *Lycoptilodon* Fitzinger, 1843 | *Lycoptilodon capense* (Smith, 1831) | Manaças (1959) | 1                   |
|                 |                              | *Pammorphis* Boie, 1825      | *Pammorphis musambicus* Peters, 1882 | Manaças (1959) | 14                  |
### Lamprophiidae

| Family          | Genus                | Species                              | Localities – Accession number (* denotes a type specimen) | References | Number of specimens |
|-----------------|----------------------|--------------------------------------|----------------------------------------------------------|------------|--------------------|
| Psammophis      | Psammophis           | orientalis Broadley, 1977             | Inhassoro – IICT/R 3/1955; Gorongosa – IICT/R 48/1963, 84–86/1955, 160/1955; Nhuluiro – IICT/R 2/1971; Nova Mambone – IICT/R 12/1956 | Manaças (1959) | 9                  |
| Psammophylax    | Psammophylax         | trianeriatus (Günther, 1868)         | Meteongo Balama – IICT/R 3/1949; Mozambique [undetermined locality] – IICT/R 252 | Manaças (1959) | 2                  |
| Xenocalamus     | Günther, 1868        |                                      | Manhiça – IICT/R 1589/1948, 1688/1948                      | Manaças (1952, 1959) | 2                  |

### Elapidae Boie, 1827

| Family          | Genus                | Species                              | Localities – Accession number (* denotes a type specimen) | References | Number of specimens |
|-----------------|----------------------|--------------------------------------|----------------------------------------------------------|------------|--------------------|
| Aspidelaps      | Aspidelaps           | scutatus Smith, 1849                 | Mauele – IICT/R 1174/1948                                 | Manaças (1961) | 3                  |
| Dendroaspis     | Dendroaspis         | angusticeps (Smith, 1849)            | Maputo – IICT/R 173/1955; Mozambique [undetermined locality] – IICT/R 88/1948 | Manaças (1959) | 1                  |
| Elapoaidea      | Elapoaidea          | boilengeri Boettger, 1895            | Guijá – IICT/R 969/1948; Mauele – IICT/R 1193/1948, 1218/1948 | Manaças (1959) | 2                  |
| Elapoaidea      | Elapoaidea          | undevalli Smith, 1848               | Mauele – IICT/R 1218/1948                                 |            | 1                  |
| Naja            | Naja                | annulifera Peters, 1854              | Moamba – IICT/R 1278/1948; Mozambique [undetermined locality] – IICT/R Moz9 | Manaças (1959) | 2                  |
| Naja            | Naja                | monambica Peters, 1854               | Chinde – IICT/R 4/1949; Gorongosa – IICT/R 38/1955        | Manaças (1959) | 2                  |

### Colubridae Oppel, 1811

| Family          | Genus                | Species                              | Localities – Accession number (* denotes a type specimen) | References | Number of specimens |
|-----------------|----------------------|--------------------------------------|----------------------------------------------------------|------------|--------------------|
| Cotaphophis     | Cotaphophis          | hotamboeia (Laurenti, 1768)          | Mauele – IICT/R 1276/1948; Nova Mambone – IICT/R 3/1956; Porto Henrique – IICT/R 1641/1948; São Martinho do Bilene – IICT/R 170/1955; Gorongosa – IICT/R 46/1955, 53/1955, 55/1955, 81/1955, 105/1955, 119/1955; Mozambique [undetermined locality] – IICT/R Moz18 | Manaças (1959) | 11                 |
| Dtpoloboides    | Dtpoloboides         | typus (Smith, 1828)                  | Chibuto – IICT/R 1422–1423/1948; Gorongosa – IICT/R 45/1955, 107/1955, 118/1955, 136/1955; Guenguela stream, Chibuto – IICT/R 1424/1948; Manhiça – IICT/R 1683/1948; Nova Mambone – IICT/R 2A/1948; São Martinho do Bilene – IICT/R 171/1955; | Manaças (1959) | 10                 |
| Dtpoloboides    | Dtpoloboides         | olivacea Loveridge, 1953             | Angónia – IICT/R 5/1949; Gorongosa – IICT/R 45/1955, 58/1955, 130/1955, 154/1955, 157–158/1955; Mozambique [undetermined locality] – IICT/R Moz20 | Manaças (1959) | 8                  |
| Dtpoloboides    | Dtpoloboides         | hoplagaster (Günther, 1863)          | Chizizira – IICT/R 15/1964; Gorongosa – IICT/R 123/1956, 153/1956, 155/1956, 159/1956; Nova Mambone – IICT/R 1/1956 | Manaças (1959) | 6                  |
| Dtpoloboides    | Dtpoloboides         | semivirgatus (Smith, 1840)           | Chizizira – IICT/R 11/1964; Gorongosa – IICT/R 105/1955; Meponda, Niassa lake – IICT/R Moz2; Meponda – IICT/R Moz4; Nova Mambone – IICT/R 4/1956; Sussundenga – IICT/R 14/1964; Mozambique [undetermined locality] – IICT/R A1/1948, Moz24 | Manaças (1959) | 8                  |

### Natricidae

| Family          | Genus                | Species                              | Localities – Accession number (* denotes a type specimen) | References | Number of specimens |
|-----------------|----------------------|--------------------------------------|----------------------------------------------------------|------------|--------------------|
| Natriciteres    | Natriciteres        | olivaceus Peters, 1854               | Gorongosa – IICT/R 52/1955, 120/1955; Tehzirne – IICT/R 12/1964 | Manaças (1959) | 3                  |

**TOTAL NUMBER OF REPTILES SPECIMENS**: 649
| Province | Verbatim locality | Current locality | Latitude and Longitude | Uncertainty (meters) | Elevation (meters) | Number of taxa/records |
|----------|-------------------|------------------|-----------------------|---------------------|--------------------|-----------------------|
| Gaza     | Alferes Chamusca, canal de rega (Guijá) | Caniçado (or Caniçado, water channel; or Caniçado, B.T. vivarium) | -24.49750, 33.01335 | 9059 | 34 | 7/38 |
| Gaza     | Barragem do Rio Limpopo | Limpopo river Dam | -23.384942, 32.862182 | 3182 | 36 | 1/2 |
| Gaza     | Chibuto | Chibuto | -24.689738, 33.558942 | 3660 | 104 | 5/9 |
| Gaza     | Chicala-Cuala | Chicaluata (a.k.a Eduardo Mondlane) | -22.079167, 31.678611 | 3036 | 456 | 1/1 |
| Gaza     | Guijá | Guijá | -24.18323, 32.901765 | 11027 | 36 | 5/13 |
| Gaza     | Ribeira de Guenguela, Chibuto | Guenguela stream, Chibuto | -24.69473, 33.520468 | 3113 | 22 | 7/79 |
| Gaza     | Maqueze | Maqueze | -24.279167, 33.566667 | 3036 | 23 | 2/29 |
| Gaza     | Maquez (Alto Changane) | Maqueze, Alto Changane | -23.39422, 33.831389 | 3996 | 57 | 3/15 |
| Gaza     | Margens do Rio Limpopo | Limpopo river margins | -25.19361, 33.52583 | 3036 | 8 | 2/8 |
| Gaza     | Pafuri (or Mabaça (Pafuri)) | Pafuri | -22.453056, 31.352778 | 500 | 223 | 6/7 |
| Inhambane | Govuro | Govuro | -21.33047, 34.59716 | 3036 | 127 | 1/1 |
| Inhambane | Homoine | Homoine | -23.884444, 35.151389 | 3036 | 108 | 1/1 |
| Inhambane | Inharime | Inharime | -24.476944, 35.030728 | 3036 | 39 | 1/1 |
| Inhambane | Inhasoso | Inhasoso | -21.534722, 35.202222 | 3036 | 42 | 1/1 |
| Inhambane | Magazine (Panda) | Magazine, Panda | -23.847222, 34.199444 | 2639 | 108 | 2/4 |
| Inhambane | Mauele | Mauele [undetermined locality] | ~ | ~ | ~ | 20/149 |
| Inhambane | Mambone | Nova Mambone | -20.988056, 35.022222 | 500 | 5 | 10/10 |
| Inhambane | Panda | Panda | -20.063333, 34.730278 | 7220 | 160 | 1/1 |
| Inhambane | Inhasoso, Vilanculos | road between Inhasoso and Vilanculos | -21.803504, 35.117303 | 27302 | 23 | 1/1 |
| Inhambane | S. Martinho de Bilene | São Martinho do Bilene / Lagoa São Martinho / Lagoa Chincungue, Bilene | -25.281111, 33.253889 | 10000 | 21 | 8/16 |
| Manica   | 15 mls SE of Vila Manica, P.E.A. | 15 mls SE of Vila Manica, P.E.A. | -18.933332, 32.877127 | 1000 | 700 | 1/1 |
| Manica   | Chimoio (or Vila Ferry) | Bengo, Chimoio | -19.110117, 33.462887 | 4772 | 715 | 3/8 |
| Manica   | Cufumpe | Cufumpe | -19.101389, 33.570278 | 765 | 715 | 1/1 |
| Manica   | Chizizira (or Posto Piscicola Chizizira) | Chizizira | -19.484811, 33.297222 | 3433 | 536 | 6/9 |
| Manica   | Sussundenga | Sussundenga | -19.403889, 33.290278 | 3036 | 600 | 8/20 |
| Maputo   | Boane (or Boane) | Boane | -26.041667, 32.325278 | 3036 | 51 | 8/24 |
| Maputo   | Centro Social | Centro Social [undetermined locality] | ~ | ~ | ~ | 5/6 |
| Maputo   | Echita (Maputo) | Alto Enchia | -26.329907, 32.264797 | 4298 | 47 | 3/3 |
| Maputo   | Maluana | Maluana | -25.495, 32.654167 | 2000 | 62 | 1/1 |
| Maputo   | Manhiça | Manhiça | -25.402222, 32.807222 | 6500 | 22 | 19/121 |
| Maputo   | Lourençoes Marques | Maputo | -25.965278, 32.589167 | 7000 | 21 | 2/2 |
| Maputo   | Matola | Matola | -25.962222, 32.458889 | 7317 | 42 | 2/6 |
| Maputo   | Mohamba (or Mohamba, Chibuto, or Mozamba) | Mozamba | -25.596111, 32.245333 | 3036 | 112 | 6/18 |
| Maputo   | Mucumaze, Maputo | Mucumaze | -26.733333, 32.816667 | 3036 | 30 | 2/13 |
| Maputo   | Namaacha | Namaacha | -25.982624, 32.027959 | 3036 | 575 | 9/40 |
| Maputo   | Porto Henriques, Maputo (or Porto Henriques) | Porto Henriques | -26.3, 32.348889 | 1000 | 32 | 5/24 |
| Maputo   | Ponta do Ouro, Maputo | Ponta do Ouro | -26.842778, 32.896944 | 1807 | 34 | 1/1 |
| Maputo   | Umbeluzi | Umbeluzi | -26.028333, 32.39 | 1977 | 16 | 3/11 |
| Nampula   | Mutami | Mutami | -14.870556, 37.004444 | 4000 | 587 | 2/2 |
| Niassa   | Meponda, Lago Niassa | Meponda, Lago Niassa | -13.421667, 34.871667 | 2071 | 476 | 1/1 |
| Niassa   | Meponda | Meponda | -13.421667, 34.871667 | 3036 | 483 | 3/3 |
| Niassa   | Mitucue Mountains, Niassa | Mitucue Mountains | -14.753545, 35.669491 | 5311 | 1136 | 1/2 |
| Sofala   | Dondo | Dondo | -19.604444, 34.730506 | 1787 | 55 | 3/10 |
| Sofala   | Margens do Rio Nhambare, Gorongosa (or Vila Paiva de Andrade, Rio Nhantare) | Nhambare river margins, Gorongosa (or Nhambare river, Gorongosa) | -18.74608, 34.05541 | 53862 | 205 | 2/8 |
| Sofala   | Serra da Gorongosa | Mount Gorongosa | -18.41098, 34.086773 | 13178 | 1487 | 3/24 |
### Table 1

| Province | Verbatim locality | Current locality | Latitude and Longitude | Uncertainty (meters) | Elevation (meters) | Number of taxa/records |
|----------|-------------------|------------------|------------------------|----------------------|-------------------|------------------------|
| Sofala   | Vila Paiva de Andrada [or Gorongosa] | Gorongosa | -18.684092, 34.070301 | 1815 | 372 | 40/331 |
| Tete     | Angónia           | Angónia         | -14.715833, 34.373056 | 40000 | 1250 | 1/1 |
| Tete     | Fumo-Chial, Angónia | Chialé     | -14.619722, 34.085278 | 460  | 1147 | 1/1 |
| Tete     | Liédzi (Angónia)  | Liédzi, Angónia | -14.55, 34.233333 | 1800 | 1250 | 7/23 |
| Tete     | Metengo, Balama, Angónia | Metengo Balama | -14.848056, 34.526111 | 2000 | 1370 | 2/2 |
| Tete     | Nhaluíro [or Nhaluíro Velho, or Ribeira Nhaluíro] | Nhaluíro | -15.543889, 31.909722 | 3036 | 481 | 6/16 |
| Tete     | Vila Coutinho     | Ulongué        | -14.574444, 34.306111 | 3036 | 1295 | 3/3 |
| Tete     | Viola (Mazowe River Bridge), P.E.A. | Viola, Mazowe River Bridge | -16.53173, 35.428165 | 3036 | 173 | 1/1 |
| Zambézia | 14 mls west of Morrumbala | Morrumbala | -17.354788, 35.472782 | 1000 | 309 | 1/1 |
| Zambézia | Mocuba            | Mocuba         | -16.845556, 36.964167 | 1439 | 148 | 1/1 |
| Zambézia | Rio Licungo       | Licungo river [undetermined locality] | – | – | – | 1/1 |
| Zambézia | Rio Luá (Ile)     | Luá (Ile) river | -15.92, 37.119167 | 6000 | 415 | 1/2 |
| Tchizine | Tchizine [undetermined locality] | – | – | – | 1/1 |
| Tchizigine | Tchizigine [undetermined locality] | – | – | – | 1/1 |
| Moçambique | Moçambique [undetermined locality] | – | – | – | 15/30 |

**Figure 13.** Distribution of the Mozambique localities represented in the IICT herpetological collections.
Currently, the Mozambican herpetofauna comprises more than 100 amphibians and 294 reptiles (Frost 2021; Bates 2018). The collection comprises 1181 specimens (532 amphibians and 649 reptiles), 26 species of amphibians, and 70 species of reptiles and two subspecies (Table 9), corresponding to approximately 26% of the known taxa for the country. The amphibian collection comprises representatives of 11 families and 16 genera, all anurans. The families Bufonidae, Pyxicephalidae, and Ptychadenidae are the best represented with 193, 125, and 85 specimens, respectively. The reptile collection comprises representatives of 16 families and 50 genera, all squamates, with the exception of four juvenile specimens of *Crocodylus niloticus* Laurenti, 1768. The families Scincidae, Agamidae, and Chamaeleonidae are the best represented in the collection with representatives of all taxa known from the country with 199, 127, and 83 specimens, respectively. Lamprophiidae is the family with the greatest diversity of species (13), followed by the Scincidae (10) and Colubridae (9).

Geographically, these specimens are from 62 different localities distributed in the nine provinces of the country (Table 10; Fig. 13). The temporal range of collecting events is from 1947 to 1971, although the majority of the specimens were collected in 1948 and 1955. The main contributors to the collections were Fernando Frade and his team during the Scientific Mission to Mozambique, and Marques da Silva (dates of birth and death unknown) from the Trypanosomiasis Eradication Mission. Several specimens were also collected by staff of the Zootechnical Post in Angonia.

The collection was primarily studied and published on by Sara Manaças resulting in four publications (Manaças 1950b, 1954, 1959, 1961a), while Clara Ruas published a paper focused on the amphibians (Ruas 2002b). In 1965 the Zimbabwean herpetologist, Donald G. Broadley (1932–2016) described two new species of *Platysaurus*, the Spotted Flat Lizard, *Platysaurus maculatus maculatus* (two paratypes) and the Striped Tail Flat Lizard, *Platysaurus maculatus lineicauda* (one paratype), based on some specimens from this collection (Broadley 1965). The previously unpublished specimens of Wilhelm’s Flat Lizard, *Platysaurus intermedius wilhelmi* Hewitt, 1909, represent the first records for the subspecies in Mozambique.

Globally, this is the largest collection of amphibians and reptiles from Mozambique with 1168 specimens, followed by those of the TM with 847, the MCZ with 643, and the MNHN with 510 (data retrieved from GBIF.org in February 2021). Other specimens exist in several other museums, with numbers ranging from 132 to 456 specimens per collection (data retrieved from GBIF.org in February 2021).

The dataset of this collection is available at GBIF (Ceríaco and Marques 2018d; https://www.gbif.org/dataset/3c66c8f5-a981-46ea-8b0f-6ae44f799220).

**Macau collection**

The most comprehensive account of the herpetofauna of China was provided by Zhao and Adler (1993), listing a total of 661 species. Since then, that number almost doubled and new species are being described every year (Murphy 2016; Kai et al. 2020). However, works dedicated to the herpetofauna of Macau are scarce (e.g., Barros...
Table 11. Overview of the Macau amphibian and reptile collections of IICT.

| Family | Genus | Species | Localities – Accession number (* denotes a type specimen) | References | Number of specimens |
|--------|-------|---------|-------------------------------------------------------------|------------|--------------------|
| **AMPHIBIANS** | | | | | |
| **URODELA Duméril, 1806** | | | | | |
| Cryptobranchidae Fitzinger, 1826 | *Andrias* Tschudi, 1837 | *Andrias japonicus* (Boulenger, 1924) | Bought in a market [undetermined locality] – IICT/A A-B/1988 | Dias et al. (1994) | 2 |
| **ANURA Duméril, 1806** | | | | | |
| Bufonidae (Gray, 1825) | *Duttaphrynus* Frost, Grant, Faivovich, Bain, Haas, Haddad, de Sá, Channing, Wilkinson, Donnellan, Raxworthy, Campbell, Blotto, Moler, Drewes, Nussbaum, Lynch, Green & Wheeler, 2006 | *Duttaphrynus melanostictus* (Schneider, 1799) | Cheoc Van – IICT/A 21-22/1989; Hac-Sá barracks road – IICT/A 81-88/1989, 154-161/1989; Old Military Road – IICT/A 89-100/1989; Hac-Sá – 12/1988, 31/1988, 19-20/1089, 37-43/1989, 153/1989, 165/1989, 183-195/1989; former N1 post of Maritime Delegation – IICT/A 15/1989, 32/1989, 61-62/1989, 65-70/1989, 164/1989; Maritime Delegation road – IICT/A 1-6/1989; On the Military Road to Coloane village – IICT/A 128/1989; Coloane Alto Military Road – IICT/A 140-152/1989; Garden of Montanha Russa [or Montanha Russa Municipal Park] – IICT/A 23-29/1989, 207-208/1989, 210-227/1989, 230-237/1989, 239-246/1989; Ka-Ho – IICT/A 31/1989; Macau [undetermined locality] – IICT/A 248-252/1989; Bought in a market [undetermined locality] – IICT/A 166-169/1989; Mong-Há Municipal Park – IICT/A 59-60/1989, 247/1989; Picnic Park – IICT/A 33-36/1989; Seac-Pai-Van – IICT/A 13/1988, 117-118/1989 | Mendes et al. (1994a) | 151 |
| | | *Hoplobatrachus* Peters, 1863 | Bought in a local market [undetermined locality] – IICT/A 76-77/1989 | Mendes et al. (1994b) | 2 |
| | | *Fejervarya* Bolkay, 1915 | *Fejervarya limnocharis* (Gravenhorst, 1829) | Mendes et al. (1994b) | 10 |
| | | *Kaloula* Gray, 1831 | *Kaloula pulchra* Gray, 1831 | Mendes et al. (1994b) | 27 |
| | | *Microhyla* Tschudi, 1838 | *Microhyla pulchra* (Hallowell, 1861) | Mendes et al. (1994b) | 1 |
| | | | *Microhyla ornata* (Duméril & Bibron, 1841) | Mendes et al. (1994b) | 18 |
| | | | *Microhyla sp.* | On the Military Road to Coloane village – IICT/A 132-138/1989 | Mendes et al. (1994b) | 7 |
| | | *Sylvirana* Dubois, 1992 | *Sylvirana guentheri* (Boulenger, 1882) | Mendes et al. (1994b) | 1 |
| | | *Polypedates* Tschudi, 1838 | *Polypedates megacephalus* Hallowell, 1861 | Mendes et al. (1994b) | 4 |
| Family      | Genus         | Species                     | Localities – Accession number                                                                 | References               | Number of specimens |
|-------------|---------------|-----------------------------|------------------------------------------------------------------------------------------------|--------------------------|---------------------|
| Rhacophoridae | *Polypedates* Tschudi, 1838 | *Polypedates megacephalus* Hallowell, 1861 | Ka-Ho – IICT/A Macau1; former N°1 post of Maritime Delegation – IICT/A Macau2; Macau [undetermined locality] – IICI/A Macau3 | 43                       |                     |

TOTAL NUMBER OF AMPHIBIAN SPECIMENS

266

REPTILES

CHELONIA Brongniart, 1800

| Family      | Genus         | Species                     | Localities – Accession number                                                                 | References               | Number of specimens |
|-------------|---------------|-----------------------------|------------------------------------------------------------------------------------------------|--------------------------|---------------------|
| Geomydidae  | *Mauremys* Ritgen, 1828 | *Mauremys reevesii* (Gray, 1831) | Macau [undetermined locality] – IICT/R Macau1-2 | 3                         |                     |

SQUAMATA Oppel, 1811

| Family       | Genus                  | Species                          | Localities – Accession number                                                                 | References               | Number of specimens |
|--------------|------------------------|----------------------------------|------------------------------------------------------------------------------------------------|--------------------------|---------------------|
| Agamidae     | *Calotes* Cuvier, 1816 | *Calotes versicolor* (Daudin, 1802) | Hac-Sá – IICT/R 10-11/1988, 28/1988; Ka-Ho – IICT/R 23/1989; Mong-Há Inn – IICT/R 3-1988 | 5                         |                     |

| Family       | Genus                  | Species                          | Localities – Accession number                                                                 | References               | Number of specimens |
|--------------|------------------------|----------------------------------|------------------------------------------------------------------------------------------------|--------------------------|---------------------|
| Gekkonidae   | *Gekko* Laurenti, 1768 | *Gekko chinensis* (Gray, 1842)    | Seac-Pai-Van – IICT/R 15-17/1988; Hac-Sá – IICT/R 18-19/1989 | 5                         |                     |

| Family       | Genus                  | Species                          | Localities – Accession number                                                                 | References               | Number of specimens |
|--------------|------------------------|----------------------------------|------------------------------------------------------------------------------------------------|--------------------------|---------------------|
| Hemiadactylus | *Hemiadactylus* Gray, 1825 | *Hemiadactylus brocki* Gray, 1845 | Mong-Há Inn – IICT/R 4-5/1988; Coloane – IICT/R 8/1988 | 3                         |                     |

| Family       | Genus                  | Species                          | Localities – Accession number                                                                 | References               | Number of specimens |
|--------------|------------------------|----------------------------------|------------------------------------------------------------------------------------------------|--------------------------|---------------------|
| Scincidae    | *Scincella* Mittleman, 1950 | *Scincella reevesii* (Gray, 1838) | Mong-Há Inn – IICT/R 22/1989; Coloane – IICT/R 29-30/1988 | 5                         |                     |

SERPENTES

| Family       | Genus                  | Species                          | Localities – Accession number                                                                 | References               | Number of specimens |
|--------------|------------------------|----------------------------------|------------------------------------------------------------------------------------------------|--------------------------|---------------------|
| Colubridae   | *Lycodon* Boie, 1827   | *Lycodon subcinctus* Boie, 1827   | On the Military Road to Coloane village – IICT/R 12/1989 | 1                         |                     |

| Family       | Genus                  | Species                          | Localities – Accession number                                                                 | References               | Number of specimens |
|--------------|------------------------|----------------------------------|------------------------------------------------------------------------------------------------|--------------------------|---------------------|
| Ptyas Fitzinger, 1843 | *Ptyas korros* (Schlegel, 1837) | *Ptyas mucosa* (Linnaeus, 1758) | Hac-Sá – IICT/R 6/1989; Purchased in a local market – IICT/R 41/1988 | 3                         |                     |

| Family       | Genus                  | Species                          | Localities – Accession number                                                                 | References               | Number of specimens |
|--------------|------------------------|----------------------------------|------------------------------------------------------------------------------------------------|--------------------------|---------------------|
| Xenochrophis | *Xenochrophis* Günther, 1864 | *Xenochrophis picator* (Schneider, 1799) | Maritime Delegation road – IICT/R 10-11/1989 | 2                         |                     |

| Family       | Genus                  | Species                          | Localities – Accession number                                                                 | References               | Number of specimens |
|--------------|------------------------|----------------------------------|------------------------------------------------------------------------------------------------|--------------------------|---------------------|
| Elapidae     | *Bungarus* Daudin, 1803 | *Bungarus multicinctus* Blyth, 1861 | Bought in a market [undetermined locality] – IICT/R 38/1988 | 1                         |                     |

| Family       | Genus                  | Species                          | Localities – Accession number                                                                 | References               | Number of specimens |
|--------------|------------------------|----------------------------------|------------------------------------------------------------------------------------------------|--------------------------|---------------------|
| Ophiophagus  | *Ophiophagus* Günther, 1864 | *Ophiophagus hannah* (Cantor, 1836) | Bought in a market [undetermined locality] – IICT/R 39/1988 | 1                         |                     |

| Family       | Genus                  | Species                          | Localities – Accession number                                                                 | References               | Number of specimens |
|--------------|------------------------|----------------------------------|------------------------------------------------------------------------------------------------|--------------------------|---------------------|
| Viperidae    | *Trimeresurus* Lacepede, 1804 | *Trimeresurus albolabris* Gray, 1842 | Natural and Agrarian Museum, Seac-Pai-Van (or Museum Natural e Agrário, Seac-Pai-Van)– IICT/R 5/1989 | 1                         |                     |

| Family       | Genus                  | Species                          | Localities – Accession number                                                                 | References               | Number of specimens |
|--------------|------------------------|----------------------------------|------------------------------------------------------------------------------------------------|--------------------------|---------------------|
| Typhlopidae  | *Indotyphlops* Hedges, Marion, Lipp, Marin & Vidal, 2014 | *Indotyphlops brasinius* (Daudin, 1803) | Hac-Sá – IICT/R 1/1989, 19-20/1988; Seac-Pai-Van – IICT/R 25/1988 | 5                         |                     |

TOTAL NUMBER OF REPTILE SPECIMENS

52
1978), contrary to those concerning other Chinese territories, such as Hong Kong (e.g., Romer 1975, 1979a, b; Karsen et al. 1998). Easton and Leung (1993) provided the only systematic account of the reptiles and amphibians of Macau that is available in English. This work lists a total of 31 species for Macau and was mostly based on material collected between 1989 and 1992 that was deposited in the BPBM. Zhao and Leung (1999) published an updated checklist (available only in Chinese) of the amphibians and reptiles from Macau and recorded a total of 38 species for the region. The most recently updated checklist of Macau herpetofauna is available on the online database Macau Biodiversity (www.macaubiodiversity.org; accessed 5 February 2021), listing nine species of amphibians and 30 species of reptiles occurring in the territory.

The collection comprises a total of 318 specimens (266 amphibians and 52 reptiles) that include nine species of amphibians and 16 species of reptiles (Table 11). The amphibian collection includes representatives of eight genera and six different families, including two specimens of the iconic South China Giant Salamander, *Andrias sligoi* (Boulenger, 1924). This collection is dominated by the Asian Toad, *Duttaphrynus melanostictus* (Schneider, 1799) with 151 specimens, followed by the Banded Bull Frog, *Kaloula pulchra* Gray, 1831 with 27 specimens, and the Ornamented Pygmy

### Table 12. Gazetteer of Macau localities of IICT specimens. Latitude and longitude decimal coordinates are presented in WGS-84 projection.

| Island     | Verbatim locality                                      | Current locality                                      | Latitude and Longitude | Uncertainty (meters) | Elevation (meters) | Number of taxa/records |
|------------|--------------------------------------------------------|------------------------------------------------------|------------------------|----------------------|--------------------|-----------------------|
| Coloane    | Chok Van                                               | Cheoc Van                                            | 22.113993, 113.560058  | 100                  | 51                 | 1/2                   |
| Coloane    | Coloane                                                | Coloane                                              | 22.126318, 113.56243   | 400                  | 63                 | 3/5                   |
| Coloane    | Estrada do Quartel de Hac-Sa [or Estrada do Quartel de Ac-Sa] | Hac-Sá Barracks road                                      | 22.112826, 113.568982  | 108                  | 40                 | 3/18                  |
| Coloane    | Estrada Militar Velha                                  | Old military road                                     | 22.122163, 113.554919  | 200                  | 57                 | 4/28                  |
| Coloane    | Granja (Serviços Agrários da Câmara Municipal das Ilhas) | Natural and Agrarian Museum, Seac-Pai-Van [or Museu Natural e Agrário, Seac-Pai-Van] | 22.125826, 113.556575  | 62                   | 8                  | 1/1                   |
| Coloane    | Hac-Sa [or Ac-Sa]                                      | Hac-Sá                                               | 22.121577, 113.569413  | 786                  | 22                 | 9/52                  |
| Coloane    | Posto n°1                                              | former N°1 post of Maritime Delegation               | 22.113577, 113.550274  | 60                   | 9                  | 5/26                  |
| Coloane    | Estrada da Delegação [or Estrada da Delegação Marítima] | Maritime Delegation road                             | 22.113943, 113.550113  | 200                  | 7                  | 2/8                   |
| Coloane    | Estrada da Delegação Marítima a Chok-Van               | On the road from Maritime Delegation to Cheoc Van     | 22.111574, 113.55314   | 300                  | 52                 | 4/6                   |
| Coloane    | Estrada Militar a Coloane                              | On the Military road to Coloane village              | 22.122987, 113.558851  | 496                  | 92                 | 6/15                  |
| Coloane    | Estrada Militar do Alto de Coloane                      | Alto de Coloane, military road                       | 22.122987, 113.558851  | 496                  | 92                 | 2/14                  |
| Coloane    | Ka-Ho                                                  | Ka-Ho                                                | 22.137762, 113.576933  | 26                   | 56                 | 3/3                   |
| Coloane    | Parque de Merendas                                      | Picnic Park                                           | 22.114778, 113.562985  | 60                   | 85                 | 1/4                   |
| Coloane    | Seac-Pai-Van                                           | Seac-Pai-Van                                         | 22.129308, 113.562903  | 300                  | 13                 | 5/10                  |
| Macau      | Montanha Russa [or Montanha Russa (jardim)]            | Garden of Montanha Russa [or Montanha Russa Municipal Park] | 22.204354, 113.552576  | 60                   | 22                 | 4/51                  |
| Macau      | Mong-Há                                                | Mong-Há Municipal Park                                | 22.20797, 113.548063   | 225                  | 33                 | 3/6                   |
| Macau      | Pousada Mong-Há                                        | Mong-Há Inn                                          | 22.206509, 113.548921  | 40                   | 28                 | 4/6                   |
|            | Comprada num mercado en Macau [or Comprada em Macau, mercado] | Bought in a local market [undetermined locality] | –                      | –                   | –                   | –                     |
|            | Macau                                                  | Macau [undetermined locality]                        | –                      | –                   | –                   | –                     |
Frog, *Microhyla ornata* (Duméril & Bibron, 1841) with 18 specimens. Specimens of the Asian Toad account for nearly half of all the material from Macau, while most of the remaining amphibian species are represented by 10 specimens or less. The reptile collection is considerably smaller, with only 52 specimens, but more diverse, covering 13 genera from eight different families. The Gekkonidae is the best represented family among squamates, with 18 specimens from genera *Gekko* and *Hemidactylus*, followed by the Agamidae with five specimens of *Calotes versicolor* (Daudin, 1802) and four specimens of *Leiolepis reevesii* (Grey, 1831). Most snake species are represented by a single specimen, and *Colubridae* is the most represented family with seven specimens from four different species.

Except for one specimen collected in 1984, all the specimens were collected in November 1988 and July 1989 during two expeditions organised and led by Jaime
Augusto Travassos Dias (1920–1999; Dias et al. 1994). Geographically, this material comes from 19 different localities in the Macau Peninsula and Coloane Island (Table 12; Fig. 14). Hac-Sá, in Coloane, and Garden of Montanha Russa in Macau are the best represented localities with 52 and 51 records, respectively, while few other localities exceed 20 records. Some material was purchased at local markets and might have been imported from neighbouring regions of China. This is the case for *Andrias sligoi* and *Ophiophagus hannah* (Cantor, 1836), two iconic species that are represented in the IICT collection but were not recorded by Easton and Leung (1993) nor Zhao and Leung (1999).

This collection was partly studied by Dias et al. (1994), Mendes et al. (1994a, b), and Pinheiro (1994), but none of these authors provided a complete overview of the collection.

Even though specimens from mainland China are common in museum collections, specimens of amphibians and reptiles from Macau are scarce in western museum collections. IICT holds the largest known herpetological collection from that region, with 323 specimens, followed by the BPBM with 27 specimens (Easton and Leung 1993).

The dataset of this collection is available at GBIF (Ceríaco and Marques 2018e; https://www.gbif.org/dataset/7df6557f-1996-4874-a08a-1ac5718ef413).

**Portuguese India (Goa) Collection**

The Indian herpetofauna is still poorly known and lacks an updated systematic account. Despite recent efforts to summarise the knowledge of Indian amphibians and reptiles in checklists and field guides (e.g., Daniel 2002; Venugopal 2010; Das and Das 2017), the works of Boulenger (1890), Smith (1931, 1935, 1943), and Sharma (1998, 2007) remain the most comprehensive accounts of India’s herpetofauna. There are approximately 610 species of reptiles (Khandekar et al. 2021) and 472 species of amphibians (Gosavi et al. 2021) currently known from India, of which nearly half are endemic. However, these numbers are expected to increase as several new species have been described in recent years (e.g., Biju et al. 2011; Agarwal et al. 2019; Giri et al. 2019). While there are several accounts of the herpetofauna of former British India (e.g., Günther 1864; Boulenger 1890; Smith 1931, 1935, 1943; Constable 1949), reports on the reptiles and amphibians of former Portuguese territories in India are scarce (see Das 2004 for a detailed history of herpetological research in India). The first contribution from Portuguese naturalists was published by Bocage (1863), reporting only seven species. Later, Ferreira (1897a) provided an account of the Indian reptiles and amphibians present in the collections of the Zoological Section of the National Museum of Lisbon, listing 68 species of reptiles and 8 species of amphibians. All of those specimens were destroyed in a fire in 1978. Themido (1941) gave an account of the small collection of reptiles from Portuguese India present in the Museu Zoológico da Universidade de Coimbra (currently MCUC), covering a total of 12 species of reptiles. After the annexation of Goa by the Republic of India in 1961, the ZSI collected 413 specimens of reptiles from 40 localities in the state of Goa between 1966 and
Table 13. Overview of the former Portuguese India amphibian and reptile collections of IICT.

| Family       | Genus                      | Species                                      | Localities – Accession number (* denotes a type specimen) | References | Number of specimens |
|--------------|----------------------------|----------------------------------------------|----------------------------------------------------------|------------|--------------------|
| AMPHIBIANS   |                            |                                              |                                                          |            |                    |
| Dicroglossidae | Hoplobatrachus          | Hoplobatrachus tigerinus (Daudin, 1802)    | Santa Cruz [or Calaphur] – IICT/A 15-21/1959; Taleigão – IICT/A 10-14/1959 | Manaças (1961) | 12                 |

TOTAL NUMBER OF AMPHIBIAN SPECIMENS 12

REPTILES

SQUAMATA

Agamidae: Calotes

| Family       | Genus                      | Species                                      | Localities – Accession number (* denotes a type specimen) | References | Number of specimens |
|--------------|----------------------------|----------------------------------------------|----------------------------------------------------------|------------|--------------------|
| Agamidae     | Calotes                  | Calotes versicolor (Daudin, 1802)            | Santa Cruz [or Calaphur] – IICT/R 1-9/1959; Pernem – IICT/R India1-4 | Manaças (1961) | 13                 |
| Scincidae    | Lygosoma                  | Lygosoma punctata (Gmelin, 1799)             | Pernem – IICT/R India5                                   |            | 1                  |

TOTAL NUMBER OF REPTILE SPECIMENS 14

Table 14. Gazetteer of the former Portuguese India localities of IICT specimens. Latitude and longitude decimal coordinates are presented in WGS-84 projection.

| State | Verbatim locality | Current locality | Latitude and Longitude | Uncertainty (meters) | Elevation (meters) | Number of taxa/records |
|-------|-------------------|------------------|------------------------|----------------------|--------------------|------------------------|
| Goa   | Pernem            | Pernem           | 15.71674, 73.796996    | 1833                 | 23                 | 2/5                    |
| Goa   | Santa Cruz        | Santa Cruz       | 15.470833, 73.843056   | 1833                 | 12                 | 2/16                   |
| Goa   | Taleigão          | Taleigão         | 15.4675, 73.821389     | 1833                 | 16                 | 1/5                    |

Figure 15. Distribution of the Goa localities represented in the IICT herpetological collections.
1969. This material was later examined and published by Sharma (1976), who listed 46 species, including two newly described species of lizards (*Cnemaspis goaensis* and *Lygosoma goaensis*).

The collection comprises only 26 specimens (12 amphibians and 14 reptiles) belonging to three different species (Table 13). The Dicroglossidae is the only amphibian family represented in the collection, with 12 specimens of *Hoplobatrachus tigerinus* (Daudin, 1802). Squamates are represented by the families Agamidae, with 13 specimens of *Calotes versicolor*, and Scincidae, with only one specimen of *Lygosoma punctata* (Gmelin, 1799).

Geographically, this collection covers only three localities in the state of Goa: Santa Cruz (or Calaphur) with 16 records, Taleigão, and Pernem, with five records each (Table 14; Fig. 15). This material was opportunistically collected in November 1959 by Armando Castel-Branco (1909–1977), a researcher for the CZL, while conducting entomological studies in Goa. This modest collection was studied and published by Manaças (1961b).

The dataset of this collection is available at GBIF (Ceríaco and Marques 2018e; https://www.gbif.org/dataset/7df6557f-1996-4874-a08a-1ac5718ef413).

**East Timor collection**

Despite a series of herpetological surveys that started in the beginning of the twenty-first century (Kaiser et al. 2011; O’Shea et al. 2012), the knowledge of the reptiles and amphibians of this country is still very incipient. The most recent account of the herpetofauna of mainland East Timor was provided by O’Shea et al. (2015) and reports at least 60 species of amphibia and reptiles, including more than 20 undescribed species. A first record of the herpetofauna of Antaúro Island was provided by Kaiser et al. (2013), listing 14 species of reptiles, of which at least five are likely undescribed endemic species. The exclave of Oecusse District, in the western part of Timor Island, was also surveyed in recent years (Sanchez et al. 2012). Historically, even though some authors addressed the herpetofauna of Timor (e.g., van Lidth de Jeude 1895), these efforts are mostly focused on the western part of the island, with records from the territory that is now East Timor being scarce. The Portuguese contribution to the knowledge of the herpetofauna of East Timor started with the explorations of Francisco Newton between 1895 and 1897, whose specimens were examined by Ferreira (1897b, 1898) and were subsequently lost in the fire that destroyed the zoological collections of Museu Bocage, Lisbon, in 1978. Other Portuguese contributions were published by Themido (1941) based on material collected by several contributors and offered to the MCUC. Following Portuguese decolonisation in 1975, Indonesia invaded the country, instituting a period of political instability that halted biological research. This period lasted until 2002, when East Timor regained independence, and was followed by a series of surveys that greatly improved previous knowledge of the country’s herpetofauna and are expected to continue increasing the number of known species (Kaiser et al. 2011, 2013; O’Shea et al. 2012, 2015; Sanchez et al. 2012).
Table 15. Overview of the East Timor amphibian and reptile collections of IICT.

| Family          | Genus                  | Species                                | Localities – Accession number | References                      | Number of specimens |
|-----------------|------------------------|----------------------------------------|-------------------------------|---------------------------------|---------------------|
| SQUAMATA        |                        |                                        |                               |                                 |                     |
| Agamidae        | Draco Linnaeus, 1758    | Draco timorensis Kuhl, 1820            | Dili – IICT/R 6-1956, Timor3  | Manaças (1956, 1972)            | 2                   |
| Gekkonidae      | Gekko Laurenti, 1768   | Gekko gecko (Linnaeus, 1758)          | Dili – IICT/R 4/1956, Timor6  | Manaças (1956, 1972)            | 2                   |
|                 |                        | Hemidactylus Gray, 1825               | Dili – IICT/R 1-3/1956        | Manaças (1972)                  | 3                   |
| Varanidae       | Varanus Merrem, 1820   | Varanus timorensis (Gray, 1831)       | Dili – IICT/R 7/1956          | Manaças (1972)                  | 1                   |
| SERRIDENTES     |                        |                                        |                               |                                 |                     |
| Colubridae      | Dendrelaphis Boulenge, 1890 | Dendrelaphis inornatus timorensis Smith, 1927 | Dili – IICT/R Timor2, Timor5  |                                 | 2                   |
| Elapidae        | Laticauda Laurenti, 1768 | Laticauda colubrina (Schneider, 1799)   | Dili – IICT/R Timor4          |                                 | 1                   |
| Viperidae       | Trimeresurus Lacepede, 1804 | Trimeresurus insularis Kramer, 1977    | Dili – IICT/R 8/1956          | Manaças (1972)                  | 1                   |
| Cylindrophiidae | Cylindrophis Wagler, 1828 | Cylindrophis boulengeri Roux, 1911    | Dili – IICT/R 9-10/1956, Timor1, Timor8 |                     | 4                   |
| Typhlopidae     | Indotyphlops Hedges, Marion, Lipp, Marin & Vidal, 2014 | Indotyphlops braaminus (Daudin, 1803) | Dili – IICT/R Timor7          |                                 | 1                   |
| TOTAL NUMBER OF REPTILE SPECIMENS |                     |                                        |                               |                                 | 17                  |

Table 16. Gazetteer of East Timor localities of IICT specimens. Latitude and longitude decimal coordinates are presented in WGS-84 projection.

| State | Verbatim locality | Current locality | Latitude and Longitude | Uncertainty (meters) | Elevation (meters) | Number of taxa/records |
|-------|-------------------|------------------|------------------------|----------------------|--------------------|------------------------|
| Dili  | Dili              | Dili             | -8.558611, 125.573611  | 6710                 | 3                  | 8/14                   |

Figure 16. Distribution of the East Timor localities represented in the IICT herpetological collections.
Most specimens vouchered during these recent surveys have been deposited in the collections of the USNM.

The material from East Timor constitutes the smallest herpetological sub-collection of the IICT, with only 17 reptile specimens. Despite its small size, this collection covers nine species of reptiles from eight different families (Table 15), corresponding to roughly 15% of the total number of species currently known from East Timor. The Gekkonidae is the best represented family, with three specimens of *Hemidactylus frenatus* Duméril & Bibron, 1836 and two specimens of *Gekko gecko* (Linnaeus, 1758). With only four specimens, *Cylindrophis boulengeri* Roux, 1911, is the best represented species. No amphibian species are represented in the collection.

Geographically, all specimens were collected in Dili (Table 16; Fig. 16). While a few specimens were collected in 1953 and sent to the CZL by the Portuguese anthropologist Ruy Cinatti (1915–1986), most of the material was collected and offered by Cunha Porto (birth and death dates unknown) in 1956. This small collection was only studied by Sara Manaças and published on twice (Manaças 1956, 1972).

Herpetological specimens from East Timor are rare in museum collections, with recent surveys contributing relevant collections for MCZ, with 256 specimens, and the NCSM, with 30 specimens (data retrieved from GBIF.org in February 2021). Material from other collections worldwide generally do not exceed 10 specimens (data retrieved from GBIF.org in February 2021). There is also a small collection with 23 specimens at the MCUC (Themido 1941).

The dataset of this collection is available at GBIF (Ceríaco and Marques 2018e; https://www.gbif.org/dataset/7df6557f-1996-4874-a08a-1ac5718ef413).

**Discussion**

**The importance of the IICT herpetological collection for research and conservation**

As part of an institution aimed at the scientific study of the Portuguese colonial territories, the CZL and its researchers had privileged access to the fauna of those areas. This resulted in very important herpetological collections, which rank amongst the largest available collections for some of the Portuguese speaking countries in Africa. Within the Portuguese natural history context, the IICT herpetological collections rank amongst the largest of the country.

Besides its overall diversity and extensive geographic distribution (297 species from 258 unique localities in eight countries), the collections house a considerable amount of type material. This type material belongs to nine different taxa, mainly from São Tomé & Príncipe (18 types), Angola (25 types), and Mozambique (three types).

As demonstrated by the role of the IICT specimens in the description of new species (Ceríaco 2015; Ceríaco et al. 2016, 2017, 2020a, 2021a; Soares et al. 2018; Hallermann et al. 2020), national checklists and atlases (Ceríaco et al. 2018a; Marques et al. 2018), as well as phylogeographic studies (Ceríaco et al. 2020c), the collections
housed in the IICT continue to play an important role on the development of herpetology in a global context, especially in the Portuguese speaking world. This is critically important, as this collection, originally created in a colonial context, can now serve to enhance and foster scientific cooperation and knowledge transfer between former colonial powers and independent countries.

Currently, the collection is fully catalogued and accessible. It is regularly consulted by international researchers, Portuguese and foreign students for their Master and PhD theses, and used in conservation assessments (Ceríaco and Marques 2019).

**The future of Portuguese natural history collections**

Natural history collections are an irreplaceable resource for the study of past and present biodiversity and its future conservation, as well as an invaluable resource for teaching and training students (Miller et al. 2020). The recent global pandemic has brought attention to how these collections can be used in multidisciplinary studies such as helping to understand emerging diseases (Cook et al. 2020).

Despite their scientific importance and potential use for research, biodiversity conservation, and teaching, natural history collections currently face serious challenges (Kemp 2015). These challenges vary from country to country due to specific economic and political situations and different institutional backgrounds. This is particularly true for southern European countries whose funds for research are not comparable to their northern European and North American counterparts. Recently, Italian researchers pointed out the severe risk of the neglect and loss of the country’s natural history collections, due to severe disinvestment and lack of proper and sustainable management strategies (Andreone et al. 2014; Andreone 2015). Although perhaps not as dramatic as the Italian scenario, the Portuguese situation, for which the IICT collections serve as an example, is far from ideal.

Altogether, the Portuguese natural history collections house more than 3,500,000 specimens. Although this number may seem small when compared to other major natural history collections in Europe, the Portuguese natural history collections are rich in specimens from biodiversity hotspots, such as the Mediterranean region and the tropical regions spanned by their former colonial possessions and range from the mid-eighteenth century to the present day. As recently noted by Monfils et al. (2020), smaller, regional collections play a fundamental role in modern biodiversity research and conservation, comparable to those of larger museums. This is especially true for the IICT collections, which represent, for some African countries, the largest (or among the largest) herpetological collections available.

Despite its national and international importance, the staff allocated to the curation, preservation, and study of this collection is limited. None of the three main museums, MUHNAC, MHNC-UP, and MCUC, have collection managers as part of their permanent staff, and very few collections have permanent curators. The curatorial staff in the three main museums is composed of movable groups of volunteers,
including graduate students, post-doctoral researchers, grantees from different research projects, and retired professors or researchers at other national institutions.

The major Portuguese natural history collections are currently part of larger interdisciplinary university museums, which were recently created through the merging of former more discipline-oriented museums. The University of Lisbon manages MUHNAC, which houses zoological, botanical (herbaria), geological, paleontological, anthropological, and scientific instrument collections, as well as an assortment of memorabilia and smaller collections related to the history of science in the university. The IICT collections, despite being institutionally independent from the museum, are in practice managed as part of the museum collections, as they share the same space and staff. Similarly, the University of Porto and the University of Coimbra, respectively, manage MHNC-UP and MCUC, which also house comparably diverse and interdisciplinary collections from the historical museums of both universities. With the exception of the Herbarium of the University of Coimbra (COI; the largest Portuguese herbarium, with ca. 800.000 specimens) which is run by the Department of Life Sciences, these interdisciplinary museums are all directly under the management of their respective dean’s offices. Other collections, usually run by research groups in departments, research centres, or municipalities, also exist, but these are usually smaller in number of specimens and have very limited taxonomic scope.

There are various reasons why these disciplinally distinct collections were merged within the university museums structure, although one of the major drivers was the economic and management burden caused by having several independent museums within the universities. There are both advantages and disadvantages to such mergers, which have raised several challenges at the methodological, management, and even epistemological levels. Curating a biological collection is radically different from curating a collection of historical scientific instruments and developing a functional database that serves both the interests and needs of curators of almost opposite typologies of collections is challenging.

Being a university museum is, a priori, a very interesting opportunity in favour of natural history collections, as this institutional relation can foster important research collaborations and teaching partnerships between the museum and the rest of the academic community, from professors and researchers to graduate and undergraduate students (Cook et al. 2014). Some of the larger and more important natural history collections in the USA are part of universities, as it is the case of the MCZ, MVZ, YPM, or the natural history museums of the universities of Kansas, Michigan, and Florida, and their collections are used on a daily basis by the university community, as well as by national and international researchers. Contrary to this advantageous relationship between natural history collections and universities, the Portuguese case has produced different outcomes. Coming from decades of abandonment, these collections are generally perceived by the academic community as the dusty remains of the past practices of science, cumbersome to manage and use, and mostly oriented to the low-impact factor science of taxonomy. Merging it with other types of museum material, such as old
scientific instruments and academic memorabilia, has contributed to reinforce the idea of museums as repositories of historical heritage, time capsules of the science of the past (Lourenço and Dias 2017), rather than tools of modern and impactful research.

This association is pernicious and has consequences for the relationship between the museum and its academic community. Firstly, it has led to a physical and emotional separation of professors, researchers, and students from the museum. This has resulted in several immediate problems, such as the abandonment of systematic and taxonomic studies associated with the collections, fostering the already worrisome distance between taxonomists and the rest of the academic community and the well-known negative consequences that this has for biodiversity studies as a whole (Britz et al. 2020). The lack of continuity in the use of collections and the transmission of collections-related practices has led to the loss of basic curatorial and natural history competencies by the community, such as specimen collecting, fixation, and taxidermic techniques, natural history collection management, etc. Although specimen collecting remains an essential tool for biological research (Rocha et al. 2014) and enriching collections is still fundamental to keeping natural history collections relevant for future research (Hope et al. 2018), Portuguese natural history collections are experiencing a considerable deceleration in accessioning new specimens, with some natural history collections not having incorporated any newly collected specimens in the last two decades.

Divorced from its research and teaching objectives, the collection staff is usually reduced to a minimum, which has immediate consequences for the curation and maintenance of its collections, including cataloguing and digitising, leading to drastic limitations on accessibility. This lack of accessibility contributes to a taxonomic impediment (Coleman 2015), frustrating the users of these collections and impeding, rather than supporting, research. This situation further confirms the current general idea of the museum as a dusty place, incapable of supporting modern research, creating a vicious circle. Unfortunately, these consequences have far-reaching effects on a global scale. As a considerable percentage of natural history specimens housed in Portuguese natural history collections originated in the former Portuguese colonial territories in South America, Africa and Asia, all of them important biodiversity hotspots but currently suffering from major threats to biodiversity, the lack of research in and accessibility to these collections is a major challenge for international researchers, particularly those in these megadiverse and developing countries (Romeiras et al. 2014; Neves et al. 2018; Ceríaco and Marques 2019).

Natural history collections in Portuguese universities risk being considered simply as the historical heritage of the universities, becoming displays of past glories, mostly used in commemorative and outreach programs. This historical nature also causes some practical challenges in terms of their use in exhibitions other than those more focused on history. As many of these collections were assembled for research purposes from the mid-eighteenth century to the mid-twentieth century, their aesthetic and pedagogic value for exhibitions is limited. The concerns raised by the natural history collections being considered as historical heritage also causes problems regarding the accessibility and use of collections. As the first author personally experienced, researchers are sometimes blocked from the study of fluid preserved specimens simply because
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this would mean that the jar containing those specimens would have to be opened and that would destroy its historical sealant.

Recently, Portuguese natural history collections have been included in important international initiatives aimed at promoting their use, such as DiSSCo, a pan-European Research Infrastructure (Addink et al. 2019). This is a critical opportunity to review current practices and strategies. Natural history collections, although an important part of the historical scientific heritage of Portuguese universities, need to be acknowledged for their full potential and scientific importance. In the current biodiversity crisis, natural history collections should not be seen, managed, and funded at the same level as academic memorabilia or historical scientific instruments (notwithstanding their importance), but as fundamental tools for the study of the earth’s biota and its conservation. In order to achieve this, a new generation of museum naturalists needs to be trained and promoted.

Interestingly, the problems surrounding the Portuguese natural history museums are not new but are a recurrent situation. In 1865, the Portuguese herpetologist José Vicente Barbosa du Bocage (1823–1907), then director of the Zoological Section of the National Museum of Lisbon (precursor of current day MUHNAC), wrote a brief report about the state of the museum (Bocage 1865). The following statement, transcribed from Bocage’s (1865) mid-nineteenth century report, still applies:

"In the current conditions, with the present organisation, the Lisbon museum not only is unable to develop and prosper but will shortly precipitate into a fast and lethal decadence. There is no staff to study part of its collections, there is no staff dealing with its conservation, there is no staff to prepare a portion of its specimens, there are no resources that can be used to enrich its collections. What more can I do besides ask for immediate help? There may be people amongst us that consider this establishment useless, and this may even be the most predominant feeling in the country; but in this case, logic demands that it cannot remain in its current conditions, but rather needs to be closed. To have or to not have a zoological museum is the first thing that needs to be decided, but if we decide to have one, the triumph of the status quo can’t be the corollary of the needed actions."

A protocol to rescue abandoned natural history collections

After decades of being in limbo, world natural history collections are currently in a state of flux. Several major international initiatives, such as iDigBio (www.idigbio.org) in the USA and DiSSCo (http://www.dissco.eu) in Europe, are driving an important and almost revolutionary change on how society sees, uses, and values these resources. This revolution aims to foster the use of natural history collections data through digitisation and global accessibility (Hendrick et al. 2020). Modern technologies allow us to revisit specimens in ways that seemed like science fiction just a few years ago, extending the specimens beyond their traditional use and adding new layers of information (Webster 2018).

Yet not all collections present the minimum standards for joining the ongoing revolution, especially abandoned collections. Due to lack of proper curation, lack of
accessibility, inconsistent internal organisation, and poor conservation, these abandoned collections risk being left aside, simply because in their current state they are almost unusable. This is not only a problem for the collections but a loss of critical scientific data. Unfortunately, this situation is not exclusive to the IICT collections; several collections around the world are in a similar or worse state.

Based on our experience with the recovery of the IICT herpetological collection, we have developed a simplified workflow of ten steps (Fig. 17) for dealing with abandoned collections. For the purpose of this protocol, we assume that the legal ownership of the collection is clarified (i.e., that the collection has a legal owner), and it is accessioned in an institution. In the cases for which the legal ownership is not known, this should be addressed first.

1. **Designation of a recovery team**: The recovery team should be constituted by experts on the taxa (taxonomists) represented in the collection, collection managers or individuals trained in natural history curatorial practices, and volunteers or students. The presence of experts on conservation and restoration is desirable but depends on the particular collection. Health inspectors and other appropriate authorities should be called to assess potential dangers and hazards that the collection may pose to public health and security.

2. **Inspection of the collection and specimens**: An initial inspection of the collection allows the team to understand the challenge that lies ahead. During this inspection the team should record the number of specimens in the collection, identify the main conservation techniques used (taxidermy, osteological preparation, fluid preservation, etc.) and the main problems affecting the collection (e.g., pests, loss of preservative fluids, environmental problems in the storage area). Estimate how many
specimens will need more complete intervention, and which materials, chemicals, and other gear are needed to proceed. The team should gather all available catalogues, logs of databases, field notebooks, and other documentation associated with the collection. The team should evaluate whether the place where the collection is housed has sufficient space and laboratory facilities to safely carry out the recovery procedures.

3. **Revision of the available metadata:** It is fundamental that all the available data associated with the collection and specimens be gathered and reviewed. Without this data, specimens will lose their scientific importance. This associated metadata may be in a variety of formats such as catalogues, databases, field notebooks, tags associated with the specimens, labels on containers or specimens, manuscript documentation, or data from studies of the specimens. This metadata should never be dissociated from the specimen, even if the team finds it to be outdated or not entirely correct. All metadata, if possible, should be digitised. Field notebooks and old catalogues can be digitised and converted to pdf format, while old labels can be digitally photographed. Original documentation should be kept and deposited in an appropriate place that is accessible to researchers, curators, and collection managers.

4. **Review of available published sources:** Many collections were studied and published on by researchers in the past. These publications often have additional data regarding the collections or specimens that should, whenever possible, be cross-linked with the specimens in the database. Publications related to the collection vary in format and content: they may be books or papers in scientific journals, and can provide more details on the locality, morphology, or nomenclatural type status of the specimen, etc. Specimen tissues may have sequences deposited in databases such as GenBank ([www.genbank.org](http://www.genbank.org)) or specimens may have been CT-Scanned, radiographed, or photographed and have morphological data available in morphology databases such as MorphoSource ([www.morphosource.com](http://www.morphosource.com)) or Morphobank ([www.morphobank.org](http://www.morphobank.org)).

5. **Taxonomic revision of individual specimens:** All specimens should be individually inspected by a trained taxonomist to review the available identification and confirm, correct, or update it as necessary. The identification should take into account the associated metadata and all published sources on the specimen. Identification techniques vary across taxonomic groups, thus the need for a trained taxonomist. New labels should be created and associated with the specimen, but always keep all the original labels.

6. **Repairing specimens and replacing containers:** As each specimen is individually examined for taxonomic purposes, the team will be able to evaluate the condition of the specimen and container. Some specimens will require intervention (e.g., rehydration, cleaning, consolidation of taxidermy mounts, etc.), and some will have problems with their containers (broken containers, evaporation problems, etc.), which can either be repaired or replaced with new containers. For fluid preserved specimens see Simmons (2014), for taxidermy see Ramotnik (2006), for entomological collections see Robinson (2008). The Society for Preservation of Natural History Collections (SPNHC; [www.spnhc.org](http://www.spnhc.org)) has online resources regarding this topic.

7. **Preparing or identifying a new storage location:** In most instances abandoned collections are kept in insalubrious or inadequate repositories. This is one of
the major drivers of collection problems. The team should evaluate the current storage area, determine whether the environmental conditions are appropriate for the collection, if cleaning or adaptations are required, or if it is preferable to move the collection to new repository. For a better understanding of the management and conditions for collection storage, see Elkin and Norris (2019).

8. **Cataloguing, digitisation, and georeferencing protocols:** If the collection is not catalogued (i.e., if the specimens do not have a unique identifier), each specimen should be assigned an individual catalogue number. All the data gathered and reviewed during this process should be digitised and formatted according to standard formats, such as DarwinCore (http://dwc.tdwg.org), in order to follow the FAIR standards (Wilkinson et al. 2016) and be shared in major international databases, such as GBIF (www.gbif.org). Whenever possible, locality data should be georeferenced using established protocols (see Chapman and Wieckzorek 2020).

9. **Make the collection accessible to the public:** Whenever the recovery process is finished, the collection should be made accessible to the public, both physically and virtually through the museum databases and the publication of the datasets on GBIF (www.gbif.org). This will ensure that the collection is visible and usable by any interested parties. A usable and useful collection is the best insurance against future abandonment.

10. **Publish:** The team should publish the results of the recovery process, including any taxonomic or scientifically relevant findings they make.

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