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Catalogue of the Cleridae (Coleoptera: Cleroidea) from the "Arion-Panin" entomological collection of the Research-Development Institute for Plant Protection Bucharest

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Abstract: In the „Arion-Panin” entomological collection of the Research-Development Institute for Plant Protection (RDIPP), 76 pieces belonging to 9 (from a total of 28 recorded in Romania until now) checkered beetle species are conserved. This work aims to present a list of the conserved specimens, because of their importance, both historical and as Romanian biodiversity records. Also, here is reported the first record of *Tillus pallidipennis* Bielz, 1850 outside Transylvania.

Key words: *Cleridae*, *Tillus pallidipennis*, *Arion-Panin*

Introduction

The collecting range of the studied pieces ranges between 1898-1951, in those 53 years, 76 pieces were collected, with a peak in 1937, the year from which 21 pieces have been identified. The collectors are Sergius Panin, George Arion and Franz Salay. A remarkable presence is one specimen of *Tillus pallidipennis* Bielz, 1850, collected in the vicinity of Bucharest (Andronache forest), which is the second one seen by the author in 16 years of checkered beetle study. Even if the local population from which the specimen was collected does not exist today, or even if this was an accidental introduction (e.g., anthropochory), this record remains, however, an interesting one.

Materials and methods

The entomological specimens were investigated with a Carl Zeiss SteREO V8 stereomicroscope with a total magnification factor of 80x. The visual identification of the pieces and the distribution were cross-checked with the literature (Gerstemeier, 1997, Böhme, 2005, Löbl *et al.*, 2007, Niehuis, 2013). The UTM-system distribution map was generated using the coordinates from the literature (Lehrer & Lehrer, 1990). The range map was generated using a blank map as provided by Wikimedia (Wikimedia, 2021).

Abbreviations used

leg. = legit ("collected by", lat.)

spec(s) = specimen(s)

Counties: AG – Argeş; AR – Arad; BV – Braşov; CJ – Cluj; DB – Dîmboviţa; DJ – Dolj; GR – Giurgiu; IF – Ilfov; IL – Ialomiţa; IS – Iaşi; MH – Mehedinţi; NT – Neamţ; PH – Prahova; SB – Sibiu; VL – Vâlcea; VS – Vaslui.

Results

Class: Insecta

Order: Coleoptera

Suborder: Polyphaga

Suprafamily: Cleroidea

Family: Cleridae Latreille, 1802

Subfamily: Tillinae Leach, 1815

***Tillus elongatus* (Linnaeus, 1758)**

1 spec., Cumpăna (AG), 21.V.1938, *leg.* A. Popescu.

***Tillus pallidipennis* Bielz, 1850**

1 spec., Andronache forest (IF), 8.V.1918.

***Opilo pallidus* (Olivier, 1795)**

1 spec., Vlașca (IL), 12. VII.1939; 1 spec., Laza (VS), VI.1949; 1 spec., Perişoara forest (IL), 1949.

***Opilo mollis* (Linnaeus, 1758)**

1 spec., Craiova (DJ), 195 (sic!).

***Opilo taeniatus* (Klug, 1842)**

1 spec., Giurgiu, Vlașca county (sic!) (actually GR), 28.V.1938; 1 spec., 10.V.1957, Giurgiu (GR).

Subfamily: Clerinae Latreille, 1802

***Thanasimus formicarius* (Linnaeus, 1758)**

1 spec. Ciurel (old neighborhood of Bucharest (IF) [hardly legible], *leg.* Salay; 1 spec., Ceala (AR), V.1932; 1 spec., Iași (IS), 1940; 1 spec., Vălenii de Munte (PH), 10.V.1948.

***Clerus* (sub nom. *Pseudoclerops*) *mutillarius* Fabricius, 1775**

1 spec., Bucharest (IF) (sic!), 5.V.1934; 1 spec., Comana (GR), V.1935; 2 specs, Ilfov, V.1937; 1 spec., Făgăraș (BV), 14.VI.1937.

***Trichodes apiarius* (Linnaeus, 1758)**

1 spec., Periș (IF), 1904, *leg.* Salay; 1 spec., Ilfov, VI.1929, 4 specs, 19.VI.1937, 2 specs, VI.1937; 1 spec., forest Jiana Mare (MH), 5.VI.1930; 1 spec., Ceala (AR), VII.1932; 1 spec., Nucet (DB), 16.VII.1932; 3 specs, Roman (NT), 1933; 2 specs, Făgăraș (BV), 29.VI.1934; 5 specs, Sibiu (SB), 1935; 1 spec., [illegible h/w *locum*, probably Sibiu], 1935; 2 specs, Ecrene (Bulgaria), 19.VII.1935; 1 spec., Făgăraș (BV), 29.VI.1937; 1 spec., Ialomița (IL), VII.1937; 7 specs, Brașov (BV), VII.1937, 2 specs, 19.VII.1937; 1 spec., Brezoi (VL), 19.VII.1937; 1 spec., Comana (IF), VI.1945; 3 specs, Câmpulung, Ciocănești, 5.VIII.1947, 1 spec., 11.VIII.1947, 1 spec., 25.VIII.1947; 1 spec., Borlești Argeș (sic!)(VL), 4.VI.1945; 2 specs, Cluj (CJ), 15.VI.1918; 9 specs, Turda (CJ), 23.V.1946; 1 spec., Jilavele (IL), 1949.

***Trichodes quadriguttatus* Adams, 1817**

7 specs, Ecrene (Bulgaria), 19.VII.1935, *leg.* Arion-Panin; 1 spec., Caliacra (Bulgaria), *leg.* Arion-Panin.

Discussions

From the museological point of view, the examined material is important, due to the age, but also to the conservation status – above average – and by the original disposition of the material inside the entomological box.

The pieces are disposed in horizontal rows. The genus and species' labels are affixed at the upper part of each series of pieces. Most of the material is pinned on standard black enameled entomological pins (no. 0, 1 and 2), a small number of insects being glued onto mounting boards.

The labels are printed and partially handwritten, most of them presenting all the necessary identification data (Figure 1).

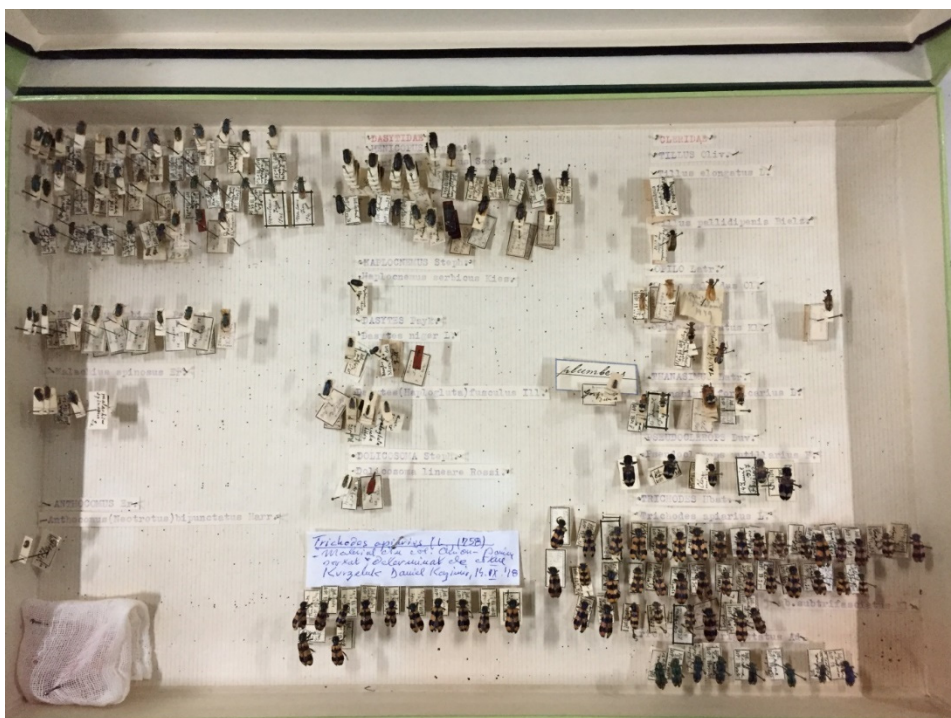


Figure 1. Cleridae material conserved in the „Arion-Panin” entomological collection

As distributional records, the presented data circumscribe to the known Western Palaearctic range of the examined species. The Romanian records presented here converge with the known distribution of the examined specimens according to the literature and museological distribution data investigated until now by the author.

The collecting records are partially covered by some of the local faunistic species list published, but in some cases the collecting records for the examined material were new. Also, in some cases, the labels bore localities which can't be found on today's maps.

For example, "Vlaşca" is the name of an ancient southern Romania County, which nowadays is split in between Giurgiu, Ilfov and Ialomiţa counties. Also, in the case of unclear (or too general) toponyms encountered (e.g.: "Ialomiţa", "Cumpăna, Argeş department" or "Ciocăneşti, Cîmpulung"), the pertaining three records were not shown on the map (Figure 2).

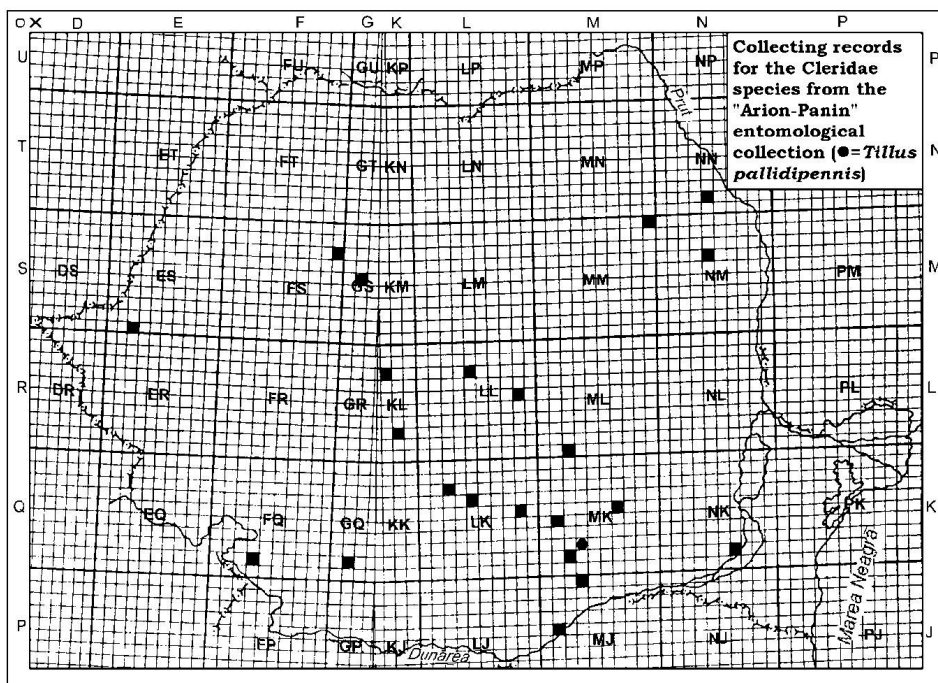


Figure 2. Distribution map for the Cleridae specimens' records from the "Arion-Panin" entomological collection (*T. pallidipennis* record represented by a star)

The range of *T. pallidipennis* also includes Romania, except for Bucovina, Moldavia and Dobrogea, being reported from multiple parts of the country (especially Transylvania).

Until now, this specimen is the second the author saw in all the examined Romanian entomological collections, the first being a paratype of the species from the "Transylvanian Entomological Society" conserved in the scientific collections of the Natural Sciences Museum of Sibiu.

T. pallidipennis is mentioned in the literature as developing in old oak (*Quercus* spp.) and other hardwood species stands, but with no clear indications of the species. Also, as it prefers treetops (acrodendric species) - thus being difficult to observe and collect. Even so, adults can be captured with the aid of some types of pheromone-baited traps that are used for various xylophagous pests' biological control, which also attracts this beetle. (Figure 3).

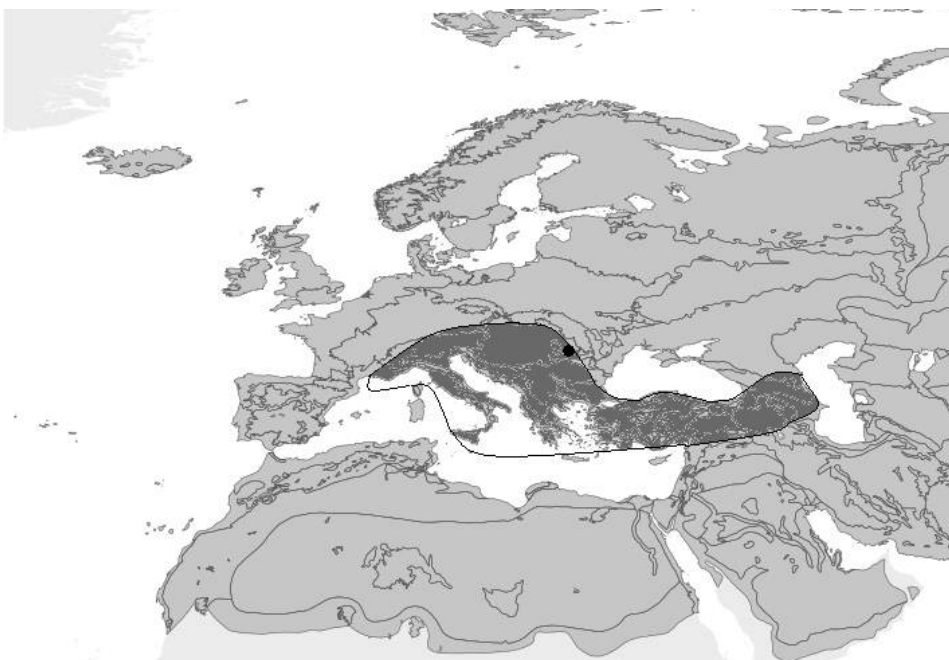


Figure 3. Western Palearctic range of *T. pallidipennis* (the collecting record for the investigated specimen represented as a dot)

The collecting period covers 47 years (1904-1951), with a peak in 1937, where 32 specimens were collected. The number of specimens collected from one place and year only (unacceptable according to the actual collecting ethics) can be explained by the fact that when those specimens were collected, the scientists were not aware of the dangers of excessive collecting and of the pressure put upon the local populations (from which the specimens were drawn) deriving from this practice (Figure 4).

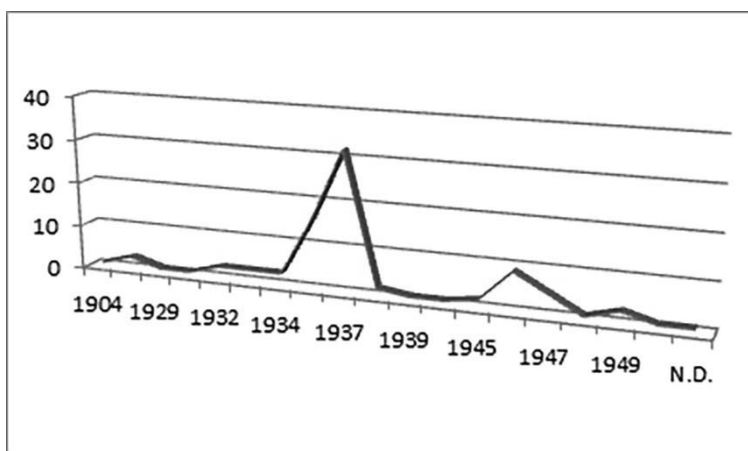


Figure 4. Collecting data abundance per year for the Cleridae of the “Arion-Panin” entomological collection (N.D. = No data available, 1 specimen)

The phenogram (monthly distribution of the collecting records) of the investigated species is typical for Romania, but, as more specimens of *Trichodes apiarius* were collected from Moldavia, where the annual mean temperature is lower than in the rest of the country, the maximum peak was recorded in July (not in May, as usual).

Another explication of the actual shift of the maximum can be explained also by the climate change that occurred between the collecting period of the examined specimens and now (Figure 5).

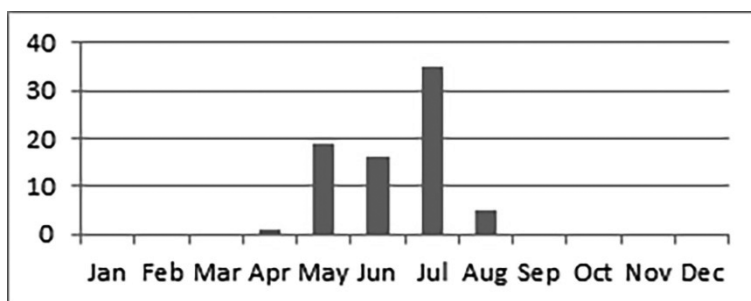


Figure 5. Monthly phenogram for the Cleridae of the "Arion-Panin" entomological collection (n = 88 specimens)

An interesting specimen is the *T. pallidipennis* collected in the Andronache forest, situated near Bucharest. In the Romanian collections investigated until now, this is the second specimen seen by the author. The collecting record hereby presented can be circumscribed to the species' range according to the literature but remains an important one (Figure 6).



Figure 6. *Tillus pallidipennis* dorsal view (left), lateral view (center) and labels (right)

Conclusions

The presented data are important as historical records for the Romanian checkered beetle fauna. Also, a specimen of *Tillus pallidipennis* Bielz, 1849 is recorded for the first time in Muntenia from the Andronache forest.

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Two cases of diseased reptiles in the Vivarium of the Țării Crișurilor Museum, Oradea

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Abstract. Two seriously diseased individuals of green iguana (*Iguana iguana*) and savannah monitor (*Varanus exanthematicus*) from the collection of the Vivarium were treated medically with different success.

Introduction

Almost no pathognomonic signs exist for reptile diseases and there is a lack of the information regarding pathophysiology needed to define therapeutic protocols, which are otherwise based solely on clinical signs. Veterinarians are able now to make more informed decisions about therapeutic protocols, yet many of the most used prescription drugs need more studies in the most

common reptile species. When research information is incomplete regarding the reptile species being treated, general knowledge about the basic chemistry and pharmacology data from other vertebrates is essential (Gibbons 2014).

The present article aims at documenting the therapeutic protocols applied in two remarkable cases of severely diseased reptiles in the collection of the Vivarium at the Țării Crișurilor Museum, Oradea, and their respective success.

Material and methods

On March 13, 2019, a green iguana *Iguana iguana* (Linnaeus, 1758) adult female of the green morph was introduced in the Vivarium's collection by SC AcvaShop Trade SRL, the maintenance firm that was contracted by the Museum at that time and which has acquired the individual from a private keeper in Sibiu, Romania. The iguana was installed in a temporary, quarantine cage, had a badly healed old fracture of the tip of its tail and was very stressed and aggressive towards its caretakers. It refused meals and showed occasional oral bleeding and a yellowish lump of unknown nature, ca. 2 cm in length, behind the tongue insertion. Besides the severe infection of the oral mucosa, a cutaneous, possibly fungal infection was present as well on the cloaca area and on the back legs (the latter expanded until March 25). The individual's condition looked severe, possibly life-threatening, especially with relation to the unknown, suspectedly cancerous cause of the lump in its mouth. Moreover, there is a certain zoonotic risk about bacterial diseases transmitted from iguanas to humans, such as melioidosis (Zehnder et al. 2014), so the animal's condition required prompt intervention.

The other reptile was a savannah monitor *Varanus (Polydaedalus) exanthematicus* (Bosc, 1792), also a female adult, which was raised in the Vivarium since its juvenile stage but for a few weeks in August 2021 showed lack of appetite, a distended coelomic cavity, progressive muscular emaciation on its limbs, and decreased activity.

The iguana was first treated with methylen blue and vitamins A and D in its drinking water. Microbiological samples were taken on March 19, 2019, and

injectable glucosis was administered on March 20 and 23. Following the results of the microbiological analysis, an antibiotic treatment was applied daily from March 25 to 29 with intramuscular Marbofloxacin 0.4 ml and oral Metronidazole 150 mg/kg, and Betadine was applied locally on the cutaneous infection two or three times a day. Starting from March 26, the animal was force-fed three times a day with a blended mixture of suitable vegetables and mineral supplements turned into a paste and administered through a syringe. Local treatment with Betadine continued on March 30 and April 1 and 2, and then with a scar spray from April 3 to May 10, and the terrarium was disinfected and cleaned thoroughly on April 1.

For the savannah monitor female, the medical intervention begun on August 20, 2021, with a ultrasound scan examination of its abdomen, with no sedation or anaesthesia needed, which showed eggs retention and two possibly tumoral formations. Then the reptile was anesthetized with inhalable Isoflurane throughout the intervention and exploratory surgery was performed on it immediately, showing two ovarian tumors of ca. 10 per 5 cm, with caseous content, on a side of its abdomen and adherent to the abdominal wall, as well as multiple millitary formations on the liver. A histopathological examination on the sample taken (26x13x7 mm) was performed with hematoxilin-eosin coloration and two cassettes with sections were examined for confirmation of the clinical diagnosis.

Results

The microbiological analysis of the samples from the iguana, set on March 19, 2019, and communicated on March 25, showed the presence of *Trichomonas sp.* and a multi-drug resistant strain of *Enterococcus sp.* On March 28, its third day of treatment, the iguana's general condition was ameliorated and by April 1 the infection of the oral mucosa was cured and the cutaneous infection was ameliorated. Thus, fortunately the lump in its mouth proved to be not cancerous, but a severe inflammation caused by the infection of the mucosa. On April 3 the

iguana started to eat by its own and its stress and aggressiveness decreased from April 9, disappearing until May 4. On May 10 it was completely cured and on May 23 it shed for the first time since it was introduced in the Vivarium.

The sample taken from the savannah monitor showed tissular fragments with tumoral aspect and fasciculated pattern, made up of prolonged cells with oval nuclei and rounded ends, unequal granular chromatin pattern, inconstantly observable nucleoli, and with elongated and eosinophilous cytoplasm. Light to moderate anisokariosis and mitotic figures were observed, as well as few and isolated singular nuclear aberrations. The stroma was little and with fibrous aspect, with areas marked by granules of a brownish pigment. The sample had extended areas with non-structured necrosis and with necrobiosis. In conclusion, the histological set, in usual coloration, suggested tumor proliferation with spindle cells (probably mesenchymal).

Discussion

Bacterial infections in captive cold-blooded animals show compromised immunity or poor keeping conditions, so the timely and accurate identification of the causing organism is very important in the pathology of captive reptiles, as well as providing and monitoring appropriate environmental conditions and the animal's health status, along with proper sanitary actions (Arabkhazaeli et al. 2018, Šupić et al. 2021). This, corroborated with the behavior of the iguana individual discussed in the present paper, strongly suggest that it had been neglected and kept in very poor conditions by its previous owner.

Trichomonas spp. are commensal in reptiles and the upper digestive tract of birds and can be found in their feces. The most common species infecting birds is *T. gallinae*, which is not known to pose a risk to human health, and two of the other significant species causing avian trichomoniasis share a genetic similarity with *T. vaginalis*, which normally infects humans. Transmission is due to ingestion of contaminated water and feed, and in reptiles the protozoan proliferates in the gastrointestinal tract most commonly because of poor husbandry or immunosuppression (Arabkhazaeli et al. 2018, Gieger & Furmaga

2020). This is another indication of the previous poor husbandry of the discussed iguana individual. Since no genetic analysis was performed, the pathogen in this case was most probably not *T. vaginalis*, but a similar species. *T. vaginalis* causes a sexually transmitted disease in humans and is not a significant cause of disease in reptiles (Gieger & Furmaga 2020), while *T. gallinae*, a cosmopolitan parasite of birds, may have been an ancient pathogen of non-avian theropod dinosaurs, namely tyrannosaurids, causing impaired feeding and starvation, down to a population bottleneck (Wolff et al. 2009). The yellowish nodule on the iguana's oropharyngeal mucosa could have been first relatable to the ones generated by the bacteria *Burkholderia pseudomallei* on internal organs (Zehnder et al. 2014), but due to the identification of *Trichomonas* sp. it was most probably a necrotic, caseous mass typical for the latter's advanced infection.

The bacterial flora in the oral and cloacal cavities of wild green iguanas is substantial, one study finding 72% of the detected bacteria as being associated with infections in humans and 72% of the identified species belonging to *Enterobacteriaceae* (Charruau et al. 2020). Salmonellosis is the principal and potential lethal zoonotic risk posed by reptiles in indirect or direct contact with humans. Improper use of antibiotics by humans may promote dissemination of drug resistant strains in animals, both in anthropogenic biased sites in the wild and in situations where proximity between man and animals is high (Kocsis et al. 2014, Di Lallo et al. 2021). The latter situation applies also to captive husbandry and may suggest again previous negligent keeping of the discussed iguana individual.

Enterococcus is a genus of Gram-positive bacteria normally present in the intestinal microbiota of many animals, including humans. It is widespread in nature and on many products, and it can survive on surfaces for years. Strains of *Enterococcus* sp. resistant to antibiotics are known from wild populations of terrestrial iguanas and other animal species in the Galapagos isles, as well as from pets and farm animals in various countries (Racines Medina 2019). Antibiotics-resistant *Enterococcus* are also frequent in pet reptiles, which could be thus a zoonotic hazard that needs to be known to and dealt with by owners,

not only with regard of bacterial, but also of mycotic, viral, and parasitic diseases. Information about antimicrobial efficiency in reptiles is still deficient, so the given dosages are extrapolated from human medicine or assumed empirically, which may increase the resistance to antimicrobials commonly used in reptiles. The common bacteria are considered commensal in reptiles and infections are caused usually by Gram-negative bacteria, and the simplest and easiest way to combat resistance is the completion of an antibiogram. Since the European Union is the largest importer of reptiles globally, various infections in pet reptiles are currently studied, yet antimicrobial treatments applied without a previous antibiotics' resistance confirmation have influenced the evolution of resistance, which unfortunately is now frequent and has not been thoroughly identified in reptiles (Cristina et al. 2022).

Marbofloxacin, a synthetic fluoroquinolone with exclusive veterinary use, is a common prescription drug utilized in injectable treatments of bacterial infections in reptiles due to its broad spectrum of action and low toxicity. The intramuscular route shows a rapid and complete absorption, and it is administered in doses of 2 mg/kg every 24 hours (Nardini et al. 2015) or 5 mg/kg in more severe conditions (Zerbe et al. 2010, Gibbons 2014). Metronidazole is an oral, synthetic nitroimidazole with protozoacidal (including trichomonacidal) and bactericidal effect against obligate anaerobes, and pharmacokinetic studies on its administration to green iguanas are available, suggesting that a 20 mg/kg dose administered every 48 hours would be sufficient for most infections and that the dosing frequency could be increased to every 24 hours for resistant strains (Gibbons 2014). Thus, the multi-resistant enterococcus strain identified by the microbial analysis was addressed with a large dose of 150 mg/kg every 24 hours for five days.

In the case of the savannah monitor, the use of Isoflurane as anaesthetic matches the previous findings about the association Propofol-Isoflurane as well suited for reptiles (Kocsis et al. 2014). The two massive tissular proliferation in the coelomic cavity appeared inoperable and even if surgical resection was tried

on them, the outcome would have been reserved and life quality would have been severely affected. Therefore, a decision to euthanize the animal had to be taken on the spot and the procedure was performed immediately by applying ca. 5 ml of injectable T61 (embutramide, mebezonium iodide and tetracain chlorhydrate). The pituitary gland of the animal was not investigated to identify a possible functional adenoma secreting the follicle stimulating hormone, which could have been connected to the ovarian tumors (Frye et al. 1999). Reports of neoplasia in reptiles, especially savannah monitors, are rare, as well as the use of ultrasonography in reptiles, although it is a useful, non-invasive diagnostic technique (Martorell et al. 2002).

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