

Species list of the Spanish herpetofauna: an update

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Since the last update of the list of the Spanish herpetofauna in 2018, recent studies have provided new evidence supporting the need to implement taxonomic changes in several groups. In this work, we present an updated reference list for the Spanish herpetofauna, which currently includes 132 native or historically introduced species, i.e. 37 amphibians and 95 reptiles, offering a standardized framework for amateurs, scientists, and environmental agencies. While updating the list, we had to undertake some nomenclatural acts. For instance, to solve the nomenclatural issues concerning *Blanus* species, we designate a neotype for *Amphisbaena oxyura* Wagler, 1824; thus, the valid name for the two recognized Iberian species are *Blanus cinereus* and *Blanus oxyurus*. We also provide an updated list for the 13 introduced species with documented breeding populations in Spain.

Key words: amphibians; nomenclature; reference list; reptiles; Spain; taxonomy.

In 2002, the publication of the *Atlas y Libro Rojo de los Anfibios y Reptiles de España* marked the first consensual effort to compile a comprehensive reference list detailing the species of the Spanish herpetofauna (PLEGUEZUELOS *et al.*, 2002). Since then, multiple phylogeographic and phylogenetic studies have led to the proposal of taxonomic changes, some of which have

been incorporated by the Taxonomic Committee of the Spanish Herpetological Society in successive updates of its standard species list (MONTORI *et al.*, 2005; CARRETERO *et al.*, 2009, 2011, 2014), with the last update in 2018 (CARRETERO *et al.*, 2018).

In the last decade, advancements in molecular techniques and the advent of the genomic era have shed light on the

evolutionary history of amphibians and reptiles in Spain (see reference list). These advancements have not only enriched our understanding of the process of species formation and clarified species boundaries and interactions, but also underscored the need for nomenclatural changes in several taxa. Additionally, other studies relying on alternative sources of evidence have addressed taxonomic and nomenclatural issues that had defied a stable solution. The dynamic nature of scientific research implies that taxonomic classifications are subject to change over time as new evidence challenges previous knowledge. As new methodologies arise and evidence accumulates, previously accepted classifications may no longer align with current knowledge and need to be replaced by new schemes that are firmly grounded in robust empirical evidence, providing stability and validity. While some taxonomic classifications may still undergo revisions due to the emergence of new evidence, others have become increasingly validated and stable over time. It is crucial to recognize and distinguish between these two categories when considering updates to taxonomic lists.

In this context, several taxonomic changes based on robust datasets and analyses have been published in recent years, emphasizing the necessity for a comprehensive update to the existing species list of the Spanish herpetofauna. An updated reference list will provide a standardized framework to be used by amateurs, scientists, and, especially, environmental agencies in charge of the conservation and management of the Spanish herpetofauna. Regular updates and

maintenance are essential to ensure taxonomic lists remain relevant and effective in supporting research, conservation, and educational endeavors.

Here, we first provide a brief discussion for each species undergoing taxonomic and nomenclatural changes since the last update in 2018. This includes three amphibians and six reptiles. Additionally, a section of recently introduced species with known breeding populations in the Spanish territory is provided.

MATERIALS AND METHODS

The geographic scope of this work encompasses all the territories of Spain, including the Canary and Balearic Islands, as well as the North African autonomous cities of Ceuta and Melilla.

This reference list focuses exclusively on the taxonomic rank of species, excluding infraspecific classification. We adhere to the generalized (unified) species concept (DE QUEIROZ, 1998, 2007), which considers a species as a separately evolving metapopulation lineage. Also, we use reproductive isolation as the primary criterion for species delimitation. While acknowledging the presence of genetic introgression in contact zones between lineages, we emphasize the importance of sufficient genetic isolation to maintain diverged lineages to be considered as species. This does not imply a total absence of reproductive isolation but rather the existence of complete or partial reproductive isolation based on genetic/genomic evidence confined to narrow contact zones and limited spatial scales (DUFRESNES *et al.*, 2021).

For taxa recently introduced in the study region, our reference list is limited to

species with documented breeding populations within Spanish territory. These taxa are listed in a separate account.

AMPHIBIANS

Alytes almogavarii Arntzen & García-París, 1995

The systematics of midwife toads (*Alytes*, WAGLER, 1830) have been recently revised in a series of studies using genomic data to resolve phylogenetic relationships and assess patterns of introgression among taxa in contact zones (DUFRESNES & MARTÍNEZ-SOLANO, 2020; DUFRESNES & HERNANDEZ, 2021; DUFRESNES *et al.*, 2021; AMBU *et al.*, 2023, 2024). These studies provide a robust, well-resolved phylogeny, with *Alytes cisternasii* Boscá, 1879 (subgenus *Ammoryctis* Lataste, 1879) sister to subgenera *Baleaphryne* Sanchiz & Adrover, 1979 + *Alytes*. Within *Baleaphryne*, the North African *A. maurus* Pasteur and Bons, 1962 is sister to *A. muletensis* (Sanchiz & Adrover, 1979) + *A. dickhilleni* Arntzen & García-París, 1995, whereas in *Alytes*, *A. obstetricans* (Laurenti, 1768) is sister to *A. almogavarii*, which was raised to species status based on evidence of strong reproductive isolation from *A. obstetricans* (DUFRESNES & MARTÍNEZ-SOLANO, 2020), with very narrow hybrid zones (< 20 km) inferred in cline analyses along transects involving contacts between *A. almogavarii* and different lineages / subspecies of *A. obstetricans* (AMBU & DUFRESNES, 2024). The divergence between *A. obstetricans* and *A. almogavarii* has been estimated at around 3.9 million years, in the Pliocene (AMBU *et al.*, 2023).

Bufo viridis (Laurenti, 1768)

The systematics of Eurasian green toads (genus *Bufo* Rafinesque, 1815) have been revised in integrative studies using phenotypic and genomic data to address patterns of introgression among lineages in contact zones. The taxon in the Balearic Islands has been referred to as *Bufo balearicus* (Boettger, 1880) (DUFRESNES *et al.*, 2019) or as *Bufo viridis balearicus* (SPEYBROECK *et al.*, 2020), and is native to the Apennine peninsula, Sicily, Corsica, Sardinia, and the Balearic Islands. The divergence between *B. viridis viridis* (Laurenti, 1768) and *B. v. balearicus* has been estimated at around 3.5 million years, but the study of a contact zone in northern Italy under a cline analysis framework revealed introgression over a relatively wide area (50-60 km, DUFRESNES *et al.*, 2014; GERCHEN *et al.*, 2018), which is consistent with their recognition under subspecific status.

Rana parvipalmata López-Seoane, 1885

North Iberian common frogs were described as a different subspecies (*Rana temporaria parvipalmata*) by Galician naturalist Víctor López Seoane, based on phenotypic differences regarding the extent of webbing between the toes (“as well during as after the breeding season”, LÓPEZ-SEOANE, 1885). Recent genomic studies have thoroughly investigated patterns of genomic variation and introgression in common frogs across northern Iberia (DUFRESNES *et al.*, 2020, 2021, 2024). The results show strong reproductive isolation (hybrid zone of about 25 km, with multiple genomic regions impermeable to introgression) between two lineages: one distributed in Ga-

licia and Asturias, for which the nomen *R. parvoipalmata* applies, and a second lineage comprising all other populations from Cantabria to the Pyrenees, corresponding to *R. temporaria* Linnaeus, 1758. The split between *R. parvoipalmata* and *R. temporaria* has been dated at around 4 million years.

REPTILES

Agama bibronii Duméril, 1851

Two names have been widely used in recent scientific literature for the North African rock lizard of the genus *Agama* Daudin, 1802: *Agama impalearis* Boettger, 1874, and *Agama bibronii* Duméril, 1851. DENZER (2021) revised and compiled the nomenclatural history of these taxa and stated that the correct name is *Agama bibronii* instead of *Agama impalearis*, reiterating that this issue was solved in 1971 by means of a petition (STIMSON, 1969) to the International Commission of Zoological Nomenclature (ICZN; MELVILLE, 1971). MERTENS (1955) found the name *Agama bibronii* Duméril, 1851 was already preoccupied by *Trapelus bibronii* Fitzinger, 1843, a South African taxon that BOULENGER (1885) placed in the synonymy of *Agama aculeata* Merrem, 1820. Thus, in the opinion of MERTENS (1955), *Agama bibronii* Duméril, 1851 and *Trapelus bibronii* Fitzinger, 1843 are homonyms. In this sense, MERTENS (1955) suggested using the next available name, *Agama colonorum* var. *impalearis* Boettger, 1874, for the North African rock agama. However, as no subsequent consensus was reached by herpetologists, following the petition by STIMSON (1969), and exercising plenary power, the ICZN suppressed the name *Trapelus bibronii* Fitzinger, 1843, establishing *Agama bibronii*

Duméril, 1851 as the correct name for the North African rock agama (MELVILLE, 1971). Thus, following the Commission's decision (MELVILLE, 1971), and as pointed out by DENZER (2021), *Agama bibronii* Duméril, 1851 should be used as the correct name for the North African rock agama.

Algyroides hidalgoi Boscá, 1916

The Iberian *Algyroides* Bibron & Bory de Saint-Vincent, 1833 have long been embroiled in a complex nomenclatural situation involving two names: *Algyroides hidalgoi* Boscá, 1916 and *A. marchi* Valverde, 1958. The types of *A. marchi* are currently located, whereas the holotype of *A. hidalgoi* is lost. This situation led SÁNCHEZ-VIALAS *et al.* (2018) to conduct a detailed morphological comparison between the material analyzed in the description of *A. hidalgoi* and 204 specimens of *A. marchi*, trait by trait, and designate a neotype in accordance with the ICZN rules.

SPEYBROECK *et al.* (2020) questioned the interpretation of the description provided by BOSCA (1916a) as presented by SÁNCHEZ-VIALAS *et al.* (2018) without providing new evidence, whereas RATO *et al.* (2021) did not support any of the two taxonomical opinions but exposed both. As the potential application to the commission for reversal (SPEYBROECK *et al.*, 2020) lacks objective data, and the neotype designation of *A. hidalgoi* is upheld as valid under Article 75.3 of the ICZN, we endorse the use of *Algyroides hidalgoi* as the valid name for the Iberian *Algyroides*, ensuring long-term nomenclatural stability.

Comments on the type locality of Algyroides hidalgoi

It is well-known that Boscá did not col-

lect Iberian *Algyroides*. The uncertainty surrounding the type locality of *A. hidalgoi* traces back to its original description, which identifies San Ildefonso in Sierra de Guadarrama as the collection site (Boscá, 1916a). However, additional evidence suggests that this might have been a misattribution to Sierra de Guadarrama by Boscá (SÁNCHEZ-VIALAS *et al.*, 2018). Boscá (1916b) also described *Lacerta muralis guadarramae* Boscá, 1916 (= *Podarcis guadarramae*) based on specimens from San Ildefonso that he did not collect. These specimens exhibited a color pattern typical of some *Podarcis* populations from southeastern Spain — where Iberian *Algyroides* is found — rather than the pattern of the populations of *Podarcis* from the Guadarrama Mountains (GENIEZ *et al.*, 2014; SÁNCHEZ-VIALAS *et al.*, 2018). In this regard, GENIEZ *et al.* (2014) noted “contradictory characters” when comparing the description of *Lacerta muralis guadarramae* with contemporary specimens from the Guadarrama region. This discrepancy raises doubt about the true geographic origin of the specimens described by Boscá as coming from San Ildefonso (Boscá, 1916a,b), indicating that the collection site might have been inaccurately attributed (SÁNCHEZ-VIALAS *et al.*, 2018). Notably, the same reasoning that SPEYBROECK *et al.* (2020) used to challenge the neotype designation for *Algyroides hidalgoi* could be similarly applied to the neotype designation of *Podarcis guadarramae*. Los Rasos, Peal de Becerro, Jaén, has been established as the neotype locality of *Algyroides hidalgoi*, unequivocally linking the name to the evolutionary unit of *Algyroides* from southeastern Iberia and resolving the longstanding nomenclatural

ambiguity surrounding this taxon (SÁNCHEZ-VIALAS *et al.*, 2018). As previously stated, given the available evidence, it remains reasonable to uphold *Algyroides hidalgoi* as the valid name for the Iberian *Algyroides* (GEORGIALIS *et al.*, 2019; CORDERO *et al.*, 2021; RUBIO & ALONSO-LUMBREROS, 2021; UETZ *et al.*, 2024).

***Podarcis hispanicus* (Steindachner, 1870)**

The lizards of the genus *Podarcis* Wagler, 1830 in the southern and eastern Iberian Peninsula illustrate a complex taxonomic situation (HARRIS & SÁ-SOUSA, 2002; PINHO *et al.*, 2006, 2007; RENOULT *et al.*, 2009, 2010; KALIONTZOPOULOU *et al.*, 2011; BASSITA *et al.*, 2020). GENIEZ *et al.* (2007) restricted the taxon *Podarcis hispanicus* to the southeast of the Iberian Peninsula by designating a lectotype (NMW 16088:1) for *Lacerta oxycephala* var. *hispanica* Steindachner, 1870 from Monteagudo, Murcia. However, subsequent molecular studies revealed the existence of highly divergent mitochondrial lineages within *Podarcis hispanicus* in this region, namely “Galera lineage”, “Valencia lineage”, and “Albacete/Murcia lineage” (HARRIS & SÁ-SOUSA, 2002; KALIONTZOPOULOU *et al.*, 2011). In this regard, *P. hispanicus* could represent a species complex. Later, BASSITA *et al.* (2020), using mitochondrial and nuclear DNA markers, estimated that the “Galera lineage” diverged from other lineages of *Podarcis* in the southeastern Iberian Peninsula approximately 12 million years ago, supporting its specific status. This raises the question: to which of these lineages does the lectotype of *L. o. hispanica* from Monteagudo (Murcia) belong?

The morphology of specimens from the

“Galera” and “Albacete/Murcia” lineages is so similar that it is difficult to distinguish them based on morphology alone (RENOULT *et al.*, 2009; BASSITA *et al.*, 2020). This complicates the assignment of the lectotype of *L. o. hispanica* to a specific lineage. BASSITA *et al.* (2020) suggested assigning the name *P. hispanicus* to the “Albacete/Murcia” lineage because it shares almost all the morphological features proposed by GENIEZ *et al.* (2007) for the name-bearing type specimens [“samples from the Albacete/Murcia lineage were identified as the nominal form of the complex, as this lineage shares almost all morphological features proposed by GENIEZ *et al.* (2007) for the name-bearing type specimens”]. However, GENIEZ *et al.* (2007) did not provide any morphological description of the lecto- and paralectotypes, but rather a mix of lineages (as also noted by BASSITA *et al.*, 2020) from various regions (Murcia, Almería, Alicante, and parts of Jaén and Granada) as morphologically referable to “*P. hispanicus*” *sensu* GENIEZ *et al.* (2007).

In this regard, due to the current lack of comprehensive morphological comparisons between the lecto- and paralectotypes of *P. hispanicus* and the sequenced specimens of Albacete/Murcia and Galera lineages, it is premature to draw conclusions on the nomenclatural assignment of these lineages. Additional complications arise from the genetically analyzed populations near Monteagudo. The nearest DNA-sequenced specimens to Monteagudo are from Laderas del Campillo, 4.5 km north, belonging to the “Murcia/Albacete” lineage. However, 9.5 km northeast of Laderas del Campillo is Orihuela, where sequenced individuals belong to the “Galera” lineage.

This indicates that the distribution boundaries of the “Galera” and “Albacete/Murcia” mtDNA lineages are not geographically well-defined and probably intermix along the geographical boundaries of the provinces of Murcia and Alicante (see BASSITA *et al.*, 2020). Therefore, potential intermixing and gene flow among lineages cannot be discounted and their specific status cannot be conclusively assessed.

Given these uncertainties, we opt to be conservative and tentatively maintain the “Galera lineage”, “Valencia lineage”, and “Albacete/Murcia lineage” as part of the *P. hispanicus* species complex from SE Iberia until more evidence is available to definitively determine the lineage to which the lectotype of *L. o. hispanica* belongs.

***Podarcis lusitanicus* Geniez, Sá-Sousa, Guillaume, Cluchier & Crochet, 2014**

This species exemplifies the recent and gradual taxonomical changes brought by the accumulation of genetic/genomic information and integrative taxonomy. Earlier considered as an evolutionary lineage of the formerly widespread *P. hispanicus* (PINHO *et al.*, 2007, 2008; KALIONTZOPOULOU *et al.*, 2011), the type 1B lineage of *P. hispanicus* was elevated to species rank, *Podarcis guadarramae* (Boscá, 1916), based on high levels of genetic divergence in nuclear DNA, and the high level of intraspecific divergence observed in this taxon led also to the recognition of two subspecies (GENIEZ *et al.*, 2014): *P. g. guadarramae* (Boscá, 1916), which maintained the valid nomen for “*Podarcis hispanicus* type 1” (*sensu lato*), and *P. g. lusitanicus* Geniez, Sá-Sousa, Guillaume, Cluchier, Crochet,

2014 as a new taxon, inhabiting northern Portugal and northwestern Spain (RATO *et al.*, 2025). Recently, a phylogenomic study on the contact zone between *P. g. guadarramae* and *P. g. lusitanicus*, located across the Portuguese (Sabugal, Nave, Alfaiates and Rebolosa) and Spanish (Navasfrías, Fuenteguinaldo, El Bodón and Ciudad Rodrigo) border, unveiled a narrow hybrid zone (< 4 km wide) between subspecies, thus showing signs of strong reproductive isolation. This led to the consideration of both lineages as different species (CAEIRO-DIAS *et al.*, 2021) despite the lack of clear morphological differentiation (GENIEZ *et al.*, 2014). Notably, the phylogenetic reconstruction recovered *P. lusitanicus* as sister to *Podarcis bocagei* (Seoane, 1884) rather than to *P. guadarramae*, although the possible effect of ancient hybridization to explain these relationships could not be disregarded. The split among the three taxa (*guadarramae*, *lusitanicus* and *bocagei*) was estimated to have taken place at least in the Pliocene.

***Blanus oxyurus* (Wagler, 1824)**

The existence of two cryptic species of the genus *Blanus* Wagler, 1830 in the Iberian Peninsula is well accepted. Although their distribution ranges are still to be clearly defined along their broad potential contact areas, two evolutionary lineages have been identified using both mitochondrial and nuclear markers (ALBERT *et al.*, 2007, SAMPAIO *et al.*, 2015). One of them, initially named *Blanus mariae* Albert & Fernández, 2009, seems restricted to the southwestern part of the Iberian Peninsula (roughly from western Andalucía, Spain, to the Lisbon District, Portugal), while the

other has been assigned to localities in central and eastern areas of Iberia (CERÍACO & BAUER, 2018). However, the lack of morphological diagnostic characters, and of clear information regarding the type material associated with other *Blanus* names for this region, has generated a nomenclatural problem still to be solved.

The designation of a neotype from near Lisbon for *Blanus cinereus* (Vandelli, 1797) by CERÍACO & BAUER (2018) restricted that name to the southwestern lineage, rendering *Blanus mariae* a junior synonym of the former. Three other names may be available for the central-eastern lineage, *Blanus rufus* (*Amphisbaena rufa* Hemprich, 1820), *Blanus oxyurus* (*Amphisbaena oxyura* Wagler, 1824), and *Blanus vandellii* Ceríaco & Bauer, 2018.

In the case of *Blanus rufus*, the holotype is still available, but its type locality is specified to be somewhere in southern Spain, which makes it impossible to assign it to any of the two lineages with certainty (CERÍACO & BAUER, 2018). To our knowledge, no molecular data are available from this specimen. Regarding *Blanus oxyurus*, the type material is original from Spain without further detail (WAGLER, 1830), and is currently lost (CERÍACO & BAUER, 2018). Considering this, CERÍACO & BAUER (2018) treated both names as *nomia dubia* and proposed a new name for this lineage, *Blanus vandellii* Ceríaco & Bauer, 2018, with a holotype from Carvoeiro, Mação, in central Portugal. Pending new evidence, this new name has not been unanimously accepted, and the species was named *Blanus rufus* (Hemprich, 1820) in the most recent update of the Species list of the European herpetofauna (SPEYBROECK *et al.*, 2020).

Considering all this, it is surprising that CERÍACO & BAUER (2018) decided to create a new name, thus not solving the existing nomenclatural uncertainty. For instance, designating a neotype for *Amphisbaena oxyura* from any central or eastern Spanish locality would have allowed the use of this available name, as they did in the case of *Blanus cinereus*. Given the need for nomenclatural stability in this species, and considering that the holotype is lost (HOOGMED & GRUBER, 1983; FRANZEN & GLAW, 2007; CERÍACO & BAUER, 2018), we take advantage of this update and designate a neotype of *Amphisbaena oxyura* Wagler, 1824, from Casa de Campo, Madrid, Spain (MNCN 31125), where the central-eastern lineage is present. Therefore, the name *Blanus oxyurus* (Wagler, 1824) is fully available for the central-eastern lineage of Iberian *Blanus*, and it has priority over *Blanus vandellii* Ceriaco & Bauer, 2018. This should bring stability to this case, at least until molecular data is obtained from the holotype of *Amphisbaena rufa*, which could be placed either as a junior synonym of *Blanus cinereus* or as a senior synonym of *B. oxyurus*, in which case *B. rufus* will have priority over *B. oxyurus*.

Description of the neotype for Amphisbaena oxyura Wagler, 1824

The neotype, MNCN31125, which bears the labels "Casa de Campo (M) [=Madrid], 26-5-79 [=26-May-1979], P=7 gr, N 3410, ten. cautividad 6-6-79 [=maintained in captivity, 06-June-1979]" // MNCN 31125 // *Neotypus* des. by Sánchez-Vialas, Buckley, Recuero, Martínez-Freiría, Velo-Antón, Bisbal-Chinesta, and Martínez-Solano, 2024//, is housed at the MNCN Herpeto-

logical Collection and is preserved in 70° ethanol.

Adult specimen; total length 217 mm; snout-vent length 193 mm; tail length 24 mm; head length 90 mm; head width 65 mm; six precloacal pores (3 + 3); 123 body annuli and 23 caudal annuli; 14 dorsal and 18 ventral segments per annuli at mid-body; four supralabials. As the general morphological shape and coloration of this species are very conservative across their populations, for the general morphological description of the neotype, we refer to the works of ALBERT & FERNÁNDEZ (2009) and CERÍACO & BAUER (2018).

Synonymic list

Blanus oxyurus (Wagler, 1824)

?*Amphisbaena rufa* Hemprich, 1820: 130

Amphisbaena oxyura Wagler, 1824: 72

Blanus vandellii Ceriaco & Bauer, 2018: 23

Natrix helvetica (Lacépède, 1789)

Morphological and molecular studies on the group of the Western Palearctic grass snakes, *Natrix natrix sensu lato*, have led to the recognition of *Natrix astreptophora* (López-Seoane, 1884) and *Natrix helvetica* (Lacépède, 1789) as full species (POKRANT *et al.*, 2016; KINDLER *et al.*, 2017). Recent genomic inferences on species in the genus *Natrix* Laurenti, 1768 support the validity of these taxa, despite broad interspecific gene flow (SCHÖNERBERG *et al.*, 2023). *Natrix astreptophora*, distributed in most of the Iberian Peninsula and the Maghreb, was formally recognized in the previous list of the Spanish herpetofauna (CARRETERO *et al.*, 2018). *Natrix helvetica*, distributed in western Europe, reaches its south-western distribution limit in the Pyr-

nees, and was recognized of probable occurrence in Spain in the previous list of the Spanish herpetofauna (considered in that work as *Natrix natrix helvetica*; CARRETERO *et al.*, 2018), based on a specimen photographed in the Aran Valley that showed the typical coloration of this species (see POTTIER, 2016). Later, ASZTALOS *et al.* (2020) studied in greater depth the contact zone between *N. astreptophora* and *N. helvetica* along the Pyrenees, with an extensive sampling, particularly in the French side, and using several molecular markers (mitochondrial DNA and microsatellites). This study confirmed the presence of *N. helvetica* in Spain, through the detection of one specimen in the north of Irún (Guipúzkoa) (ASZTALOS *et al.*, 2020). It is likely that *N. helvetica* also entered Spain through other areas in the Pyrenees, since ASZTALOS *et al.* (2020) showed the occurrence of the species in areas close to the border with France in the western and central Pyrenees. Nevertheless, further studies, extending the geographical coverage of samples in the southern range of the Pyrenees, are required to assess the distribution of *N. helvetica* in Spain.

UPDATED TAXONOMIC LIST

(Names in boldface indicate changes with respect to the previous list)

- Class Amphibia Linnaeus, 1758
- Order Caudata Scopoli, 1777
- Family Salamandridae Goldfuss, 1820
- Genus *Chioglossa* Bocage, 1864
- Chioglossa lusitanica* Bocage, 1864
- Genus *Calotriton* Gray, 1858
- Calotriton asper* (Dugès, 1852)
- Calotriton arnoldi* Carranza & Amat, 2005
- Genus *Pleurodeles* Michahelles, 1830
- Pleurodeles waltli* Michahelles, 1830
- Genus *Salamandra* Garsault, 1764**
- Salamandra algira* Bedriaga, 1883
- Salamandra salamandra* (Linnaeus, 1758)
- Genus *Triturus* Rafinesque, 1815
- Triturus marmoratus* (Latreille, 1800)
- Triturus pygmaeus* (Wolterstorff, 1905)
- Genus *Ichthyosaura* Sonnini de Manoncourt & Latreille, 1801
- Ichthyosaura alpestris* (Laurenti, 1768)
- Genus *Lissotriton* Bell, 1839
- Lissotriton boscai* (Lataste, 1879)
- Lissotriton helveticus* (Razoumowsky, 1789)
- Order Anura Duméril, 1805**
- Family Alytidae Fitzinger, 1843
- Genus *Alytes* Wagler, 1829
- Alytes algomavarii* Arntzen & García-París, 1995**
- Alytes cisternasii* Boscá, 1879
- Alytes dickhilleni* Arntzen & García-París, 1995
- Alytes muletensis* (Sanchiz & Adrover, 1979)
- Alytes obstetricans* (Laurenti, 1768)
- Genus *Discoglossus* Otth, 1837
- Discoglossus galganoi* Capula, Nascetti, Lanza, Bullini & Crespo, 1985
- Discoglossus pictus* Otth, 1837
- Discoglossus scovazzi* Camerano, 1878
- Family Pelobatidae Bonaparte, 1850
- Genus *Pelobates* Wagler, 1830
- Pelobates cultripipes* (Cuvier, 1829)
- Family Pelodytidae Bonaparte, 1850
- Genus *Pelodytes* Bonaparte, 1838

- Pelodytes ibericus* Sánchez-Herráiz, Barbadillo, Machordom & Sanchiz, 2000
Pelodytes punctatus (Daudin, 1802)
- Family Bufonidae Gray, 1825**
 Genus *Sclerophrys* Tschudi, 1838
Sclerophrys mauritanica (Schlegel, 1841)
- Genus Bufo Garsault, 1764**
Bufo spinosus Daudin, 1803
- Genus *Epidalea* Cope, 1864
Epidalea calamita (Laurenti, 1768)
- Genus *Bufo* Rafinesque, 1815
Bufo boulengeri (Lataste, 1879)
***Bufo viridis* (Laurenti, 1768)**
- Family Hylidae Rafinesque, 1815**
 Genus *Hyla* Laurenti, 1768
Hyla meridionalis Boettger, 1874
Hyla molleri Bedriaga, 1889
- Family Ranidae Batsch, 1796**
 Genus *Rana* Linnaeus, 1758
Rana dalmatina Fitzinger, 1838
Rana iberica Boulenger, 1879
***Rana parvipalmata* López-Seoane, 1885**
Rana pyrenaica Serra-Cobo, 1993
Rana temporaria Linnaeus, 1758
- Genus *Pelophylax* Fitzinger, 1843
***Pelophylax* kl. *grafi* (Crochet, Dubois, Ohler & Tunner, 1995)**
Pelophylax perezi (Seoane, 1885)
Pelophylax saharicus (Boulenger, 1913)
- Class Reptilia Laurenti, 1768
- Order Chelonii Brongniart, 1800**
- Family Cheloniidae Oppel, 1811
 Genus *Caretta* Rafinesque, 1814
Caretta caretta (Linnaeus, 1758)
- Genus Chelonia Brongniart, 1800**
Chelonia mydas (Linnaeus, 1758)
- Genus *Eretmochelys* Fitzinger, 1843
Eretmochelys imbricata (Linnaeus, 1766)
- Genus *Lepidochelys* Fitzinger, 1843
Lepidochelys kempii (Garman, 1880)
Lepidochelys olivacea (Eschscholtz, 1829)
- Family Dermochelyidae Fitzinger, 1843 (1825)**
 Genus *Dermochelys* Blainville, 1816
Dermochelys coriacea (Vandelli, 1761)
- Family Emydidae Rafinesque, 1815
 Genus *Emys* Duméril, 1805
Emys orbicularis (Linnaeus, 1758)
- Family Geoemydidae Theobald, 1868
 Genus *Mauremys* Gray, 1869
Mauremys leprosa (Schweigger, 1812)
- Family Testudinidae Batsch, 1788
 Genus *Testudo* Linnaeus, 1758
Testudo graeca Linnaeus, 1758
Testudo hermanni Gmelin, 1789
- Order Squamata Oppel, 1811
- Family Chamaeleonidae Rafinesque 1815**
 Genus *Chamaeleo* Laurenti, 1768
Chamaeleo chamaeleon (Linnaeus, 1758)
- Family Gekkonidae Oppel, 1811
Genus Hemidactylus Oken, 1817
Hemidactylus turcicus (Linnaeus, 1758)
- Family Sphaerodactylidae Underwood, 1954
 Genus *Saurodactylus* Fitzinger, 1843
Saurodactylus mauritanicus (Duméril & Bibron, 1836)
- Family Phyllodactylidae Gamble et al., 2008
 Genus *Tarentola* Gray, 1825
Tarentola angustimentalis Steindachner, 1891

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- Tarentola boettgeri* Steindachner, 1891
Tarentola delalandii (Duméril & Bibron, 1836)
Tarentola gomerensis Joger & Bischoff, 1983
Tarentola mauritanica (Linnaeus, 1758)
- Family Scincidae Oppel, 1811
- Genus *Chalcides* Laurenti, 1768
Chalcides bedriagai (Boscá, 1880)
Chalcides coeruleopunctatus Salvador, 1975
Chalcides colosii Lanza, 1957
Chalcides mauritanicus (Duméril & Bibron, 1839)
Chalcides minutus Caputo, 1993
Chalcides ocellatus (Forsskal, 1775)
Chalcides parallelus (Doumergue, 1901)
Chalcides pseudostratus Caputo, 1993
Chalcides sexlineatus Steindachner, 1891
Chalcides simonyi Steindachner, 1891
Chalcides striatus (Cuvier, 1829)
Chalcides viridanus (Gravenhorst, 1851)
- Genus *Eumeces* Wiegmann, 1834
Eumeces algeriensis Peters, 1864
- Family Lacertidae Oppel, 1811
- Genus *Acanthodactylus* Wiegmann, 1834
Acanthodactylus erythrurus (Schinz, 1833)
- Genus *Algyroides* Bibron & Bory de Saint-Vincent, 1833
***Algyroides hidalgoi* Boscá, 1916**
- Genus *Iberolacerta* Arribas, 1997
Iberolacerta aranica (Arribas, 1993)
Iberolacerta aurelioi (Arribas, 1994)
Iberolacerta bonnali (Lantz, 1927)
Iberolacerta cyreni (Müller & Hellmich, 1937)
- Iberolacerta galani* Arribas, Carranza & Odierna, 2006
Iberolacerta martinezricai (Arribas, 1996)
Iberolacerta monticola (Boulenger, 1905)
- Genus *Lacerta* Linnaeus, 1758
Lacerta agilis Linnaeus, 1758
***Lacerta bilineata* Daudin, 1802**
Lacerta schreiberi Bedriaga, 1878
- Genus *Podarcis* Wagler, 1830
Podarcis bocagei (Seoane, 1884)
Podarcis carbonelli Pérez-Mellado, 1981
Podarcis guadarramae (Boscá, 1916)
***Podarcis hispanicus* (Steindachner, 1870)**
Podarcis lilfordi (Günther, 1874)
Podarcis liolepis (Boulenger, 1905)
***Podarcis lusitanicus* Geniez, Sá-Sousa, Guillaume, Cluchier & Crochet, 2014**
Podarcis muralis (Laurenti, 1768)
Podarcis pityusensis (Boscá, 1883)
***Podarcis siculus* (Rafinesque, 1810)**
Podarcis vaucheri (Boulenger, 1905)
Podarcis virescens Geniez, Sá-Sousa, Guillaume, Cluchier & Crochet, 2014
- Genus *Psammodromus* Fitzinger, 1826
Psammodromus algirus (Linnaeus, 1758)
Psammodromus blanci (Lataste, 1880)
Psammodromus edwardsianus (Dugès, 1829)
Psammodromus hispanicus Fitzinger, 1826
Psammodromus occidentalis Fitze, González-Jimena, San-José, San Mauro & Zardoya, 2012
- Genus *Gallotia* Boulenger, 1916

- Gallotia atlantica* (Peters & Doria, 1882)
Gallotia auaritae Mateo, García-Márquez, López-Jurado & Barahona, 2001
Gallotia bravoana Hutterer, 1985
Gallotia caesaris (Lehrs, 1914)
Gallotia galloti (Oudart, 1839)
Gallotia intermedia Hernández, Nogales & Martín, 2000
Gallotia simonyi (Steindachner, 1889)
Gallotia stehlini (Schenkel, 1901)
 Genus *Scelarcis* Fitzinger, 1843
Scelarcis perspicillata (Duméril & Bibron, 1839)
 Genus *Timon* Tschudi, 1836
Timon lepidus (Daudin, 1802)
Timon nevadensis (Buchholz, 1963)
Timon tangitanus (Boulenger, 1887)
 Genus *Zootoca* Wagler, 1830
Zootoca vivipara (Jacquin, 1787)
 Family Agamidae Spix, 1825
 Genus *Agama* Daudin, 1802
Agama bibronii Duméril, 1851
Family Anguidae Gray, 1825
 Genus *Anguis* Linnaeus, 1758
Anguis fragilis Linnaeus, 1758
 Family Blanidae Wagler, 1830
 Genus *Blanus* Wagler, 1830
Blanus cinereus (Vandelli, 1797)
Blanus oxyurus (Wagler, 1824)
Blanus tingitanus Busack, 1988
 Family Trogonophidae Gray, 1844
 Genus *Trogonophis* Kaup, 1830
Trogonophis wiegmanni Kaup, 1830
 Family Colubridae Oppel, 1811
 Genus *Hemorrhois* Boie, 1826
Hemorrhois hippocrepis (Linnaeus, 1758)
 Genus *Hierophis* Fitzinger, 1834
Hierophis viridiflavus (Lacépède, 1789)
 Genus *Zamenis* Wagler, 1830
Zamenis longissimus (Laurenti, 1768)
Zamenis scalaris (Schinz, 1822)
 Genus *Coronella* Laurenti, 1768
Coronella austriaca Laurenti, 1768
Coronella girondica (Daudin, 1803)
 Genus *Macroprotodon* Guichenot, 1850
Macroprotodon brevis (Günther, 1862)
Macroprotodon cucullatus (Geoffroy-Saint-Hilaire, 1827)
Family Natricidae Bonaparte, 1840
 Genus *Natrix* Laurenti, 1768
Natrix astreptophora (López-Seoane, 1884)
Natrix helvetica (Lacépède, 1789)
Natrix maura (Linnaeus, 1758)
Family Psammophiidae Boie, 1827
 Genus *Malpolon* Fitzinger, 1826
Malpolon monspessulanus (Hermann, 1804)
 Genus *Psammophis* Boie, 1825
Psammophis schokari (Forskål, 1775)
 Family Viperidae Oppel, 1811
Genus *Vipera* Garsault, 1764
Vipera aspis (Linnaeus, 1758)
Vipera latastei Boscá, 1878
Vipera seoanei Lataste, 1879

RECENTLY INTRODUCED SPECIES

In a comprehensive review, MATEO *et al.* (2011) examined the introduced populations of reptiles and amphibians in Spain, encompassing both exotic and native species. Here, we have compiled an updated list of exotic species that have established reproductive populations in Spain. We also provide comments on those species that were not reported by MATEO *et al.* (2011) because of their more recent introduction, as well as on those that have been

subject to nomenclatural changes (in bold-face). It is worth considering the possibility that many more naturalized exotic species may expand this list in the near future as cases of reproductive populations are likely to be confirmed (e.g. ESCORIZA *et al.*, 2024), while other species may disappear from the list after eradication, or even natural extinction processes of their allochthonous populations (e.g. SANTOS *et al.*, 2015).

Caudata

Family Salamandridae

***Ommatotriton ophryticus* (Berthold, 1846) x *O. nesterovi* (Litvinchuk, Zuiderwijk, Borkin, and Rosanov, 2005)**

First reported in Spain (Pla de Busa, Lleida) as *Ommatotriton ophryticus* by FONTELLES *et al.* (2011) based on morphological traits. However, VAN RIEMSDIJK *et al.* (2017) later showed that this introduced population is of hybrid origin, consisting of hybrids between *O. ophryticus* and *O. nesterovi*.

Chelonii

Family Emydidae

Pseudemys concinna (Le Conte, 1830)

Distribution in Spain: widespread (MATEO *et al.*, 2011).

Trachemys scripta (Thunberg, 1792)

Distribution in Spain: widespread (MATEO *et al.*, 2011).

Family Geoemydidae

***Mauremys mutica* (Cantor, 1842)**

The first documented occurrence of *Mauremys mutica* in Europe was at Caldes de Malavella, Girona, reported by

POCH *et al.* (2020). Subsequently, in the same region, ESCORIZA *et al.* (2024) identified hybrids between *M. mutica* and the native *M. leprosa*.

Squamata

Family Anolidae Cocteau, 1836

***Anolis porcatus* Gray, 1840**

Distribution in Spain: Tenerife, Canary Islands (ABREU-ACOSTA *et al.*, 2023).

Family Chamaeleonidae

***Chamaeleo calypttratus* Duméril & Duméril, 1845**

Distribution in Spain: Gran Canaria, Canary Islands (PINO-VERA *et al.*, 2023).

Family Iguanidae

Iguana iguana (Linnaeus, 1758)

Distribution in Spain: Tenerife, Canary Islands (PLEGUEZUELOS, 2002; MATEO *et al.*, 2011).

Family Gekkonidae

Hemidactylus mabouia (Moureaux de Jonnés, 1818)

Distribution in Spain: Gran Canaria, Canary Islands (MATEO *et al.*, 2011).

***Saurodactylus fasciatus* Werner, 1931**

Distribution in Spain: Alborán island (RATO *et al.*, 2023).

Family Lacertidae

***Teira dugesii* (Milne-Edwards, 1829)**

Distribution in Spain: Gran Canaria, Canary Islands (LÓPEZ-DOS SANTOS *et al.*, 2013).

Family Scincidae

***Chalcides ocellatus* (Forskål, 1775)**

Distribution in Spain: Alicante (BISBAL-CHINESTA *et al.*, 2020; PÉREZ-GARCÍA *et al.*, 2022).

Family Colubridae

Lampropeltis californiae (Blainville, 1835)

Distribution in Spain: Canary Islands (PETHER & MATEO, 2007).

Family Typhlopidae Merrem, 1820

Indotyphlops braminus (Daudin, 1803)

Included in the genus *Indotyphlops* Hedges, Marion, Lipp, Marin & Vidal, 2014 based on molecular and morphological evidence by HEDGES *et al.* (2014). Distribution in Spain: Canary Islands, Balearic Islands, Almería (RATO *et al.*, 2015).

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REFERENCES

- ABREU-ACOSTA, N.; PINO-VERA, R.; IZQUIERDO-RODRÍGUEZ, E.; AFONSO, O. & FORONDA, P. (2023). Zoonotic bacteria in *Anolis* sp., an invasive species introduced to the Canary Islands (Spain). *Animals* 13: 414.
- ALBERT, E.M. & FERNÁNDEZ, A. (2009). Evidence of cryptic speciation in a fossorial reptile: description of a new species of *Blanus* (Squamata: Amphisbaenia: Blanidae) from the Iberian Peninsula. *Zootaxa* 2234: 56-68.
- ALBERT, E.M.; ZARDOYA, R. & GARCÍA-PARÍS M. (2007). Phylogeographical and speciation patterns in subterranean worm lizards of the genus *Blanus* (Amphisbaenia: Blanidae). *Molecular Ecology* 16: 1519-1531.
- AMBU, J. & DUFRESNES, C. (2024). Genomic and bioacoustic variation in a midwife toad hybrid zone: A role for reinforcement? *PLoS ONE* 19: e0314477.
- AMBU, J.; MARTÍNEZ-SOLANO, I.; SUCHAN, T.; HERNANDEZ, A.; WIELSTRA, B.; CROCHET, P.A. & DUFRESNES, C. (2023). Genomic phylogeography illuminates deep cyto-nuclear discordances in midwife toads (*Alytes*). *Molecular Phylogenetics and Evolution* 183: 107783.
- AMBU, J.; MARTÍNEZ-SOLANO, I. & DUFRESNES, C. (2024). A new subspecies of midwife toad (Anura, Alytidae, *Alytes* Wagler, 1830) discovered by genomic taxonomy. *Alytes* 41: 18-39.
- ASZTALOS, M.; SCHULTZE, N.; IHLOW, F.; GENIEZ, P.; BERRONEAU, M.; DELMAS, C.; GUILLER, G.; LEGENTILHOMME, J.; KINDLER, C. & FRITZ, U. (2020). How often do they do it? An in-depth analysis of the hybrid zone of two grass snake species (*Natrix astreptophora* and *Natrix helvetica*). *Biological Journal of the Linnean Society* 131: 756-773.
- BASSITTA, M.; BUADES, J.M.; PÉREZ-CEMBRANOS, A.; PÉREZ-MELLADO, V.; TERRASA, B.; BROWN, R.P.; NAVARRO, P.; LLUCH, J.; ORTEGA, J.; CASTRO, J.A.; PICORNELL, A. & RAMON, C. (2020). Multilocus and morphological analysis of south-eastern Iberian Wall lizards (Squamata, *Podarcis*). *Zoologica Scripta* 49: 668-683.
- BISBAL-CHINESTA, J.F.; TAMAR, K.; GÁLVEZ, Á.; ALBERO, L.; VICENT-CASTELLÓ, P.; MARTÍN-BURGOS, L.; ALONSO, M.; SÁNCHEZ, R.; ORTEGA, C.; GÓMEZ, A.; CANDEL, D.; CERVERA, M.; CARRANZA, S. & BLAIN, H.A. (2020). Trade and stowaways: molecular evidence for human-mediated translocation of eastern skinks into the western Mediterranean. *Amphibia-Reptilia* 41: 49-62.
- BOSCA, E. (1916a). Un género nuevo para la fauna herpetológica de España y especie nueva o poco conocida. *Boletín de la Sociedad Española de Historia Natural* 16: 294-297.
- BOSCA, E. (1916b). Dos observaciones a propósi-

- to de *Lacerta muralis* en España. *Boletín de la Sociedad Española de Historia Natural* 16: 327-330.
- BOULENGER, G.A. (1885). *Catalogue of the Lizards in the British Museum (Natural History)*. Vol. 1. *Geckonidae, Uroplatidae, Pygopodidae, Eublepharidae, Agamidae*. British Museum (Natural History), Department of Zoology, London, UK.
- CAEIRO-DIAS, G.; ROCHA, S.; COUTO, A.; PEREIRA, C.; BRELSFORD, A.; CROCHET, P.A. & PINHO, C. (2021). Nuclear phylogenies and genomics of a contact zone establish the species rank of *Podarcis lusitanicus* (Squamata, Lacertidae). *Molecular Phylogenetics and Evolution* 164: 107270.
- CARRETERO, M.A.; AYLLÓN, E. & LLORENTE, G. (2009). *Lista Patrón de los Anfibios y Reptiles de España (Actualizada a Enero de 2009)*. Asociación Herpetológica Española, Madrid, Spain.
- CARRETERO, M.A.; AYLLÓN, E. & LLORENTE, G. (2011). *Lista Patrón de los Anfibios y Reptiles de España (Actualizada a Julio de 2011)*. Asociación Herpetológica Española, Madrid, Spain.
- CARRETERO, M.A.; MARTÍNEZ-SOLANO, Í.; AYLLÓN, E. & LLORENTE, G. (2014). *Lista Patrón de los Anfibios y Reptiles de España (Actualizada a Diciembre de 2014)*. Asociación Herpetológica Española, Madrid, Spain.
- CARRETERO, M.A.; MARTÍNEZ-SOLANO, Í.; AYLLÓN, E. & LLORENTE, G. (2018). *Lista Patrón de los Anfibios y Reptiles de España (Actualizada a Diciembre de 2018)*. Asociación Herpetológica Española, Madrid, Spain.
- CERÍACO, L.M. & BAUER, A.M. (2018). An integrative approach to the nomenclature and taxonomic status of the genus *Blanus* Wagler, 1830 (Squamata: Blanidae) from the Iberian Peninsula. *Journal of Natural History* 52: 849-880.
- CORDERO, G.A.; MALIUK, A.; SCHLINDWEIN, X.; WERNEBURG, I. & YARYHIN, O. (2021). Phylogenetic patterns and ontogenetic origins of limb length variation in ecologically diverse lacertine lizards. *Biological Journal of the Linnean Society* 132: 283-296.
- DE QUEIROZ, K. (1998). The general lineage concept of species, species criteria, and the process of speciation, In D.J. Howard & S.H. Berlocher (eds.) *Endless Forms: Species and Speciation*. Oxford University Press, New York, USA, pp. 57-75.
- DE QUEIROZ, K. (2007). Species concepts and species delimitation. *Systematic Biology* 56: 879-886.
- DENZER, W. (2021). The correct name for the North African rock lizard is *Agama bibronii* A. Duméril in Duméril & Duméril, 1851, not *Agama impalearis* Boettger, 1874 (Reptilia, Squamata). *Bionomina* 25: 76-80.
- DUFRESNES, C. & HERNANDEZ, A. (2021). Phylogeographic advances in midwife toads (*Alytes*) support the existence of a novel taxon endemic to the Central Pyrenees. *Journal of Zoological Systematics and Evolutionary Research* 59: 2170-2179.
- DUFRESNES, C. & MARTÍNEZ-SOLANO, I. (2020). Hybrid zone genomics supports candidate species in Iberian *Alytes obstetricans*. *Amphibia-Reptilia* 41: 105-112.
- DUFRESNES, C.; BONATO, L.; NOVARINI, N.; BETTO-COLLIARD, C.; PERRIN, N. & STÖCK, M. (2014). Inferring the degree of incipient speciation in secondary contact zones of closely related lineages of Palearctic green toads (*Bufo viridis* subgroup). *Hereditas* 113: 9-20.
- DUFRESNES, C.; MAZEPA, G.; JABLONSKI, D.; CALIARI OLIVEIRA, R.; WENSELEERS, T.; SHABANOV, D.A.; AUER, M.; ERNST, R.; RAMÍREZ-CHAVES, H.E.; MULDER, K.P.; SIMONOV, E.; TIUTENKO, A.; KRYVOKHYZHA, D.; WENNEKES, P.L.; ZINENKO, O.I.; KORSHUNOV, O.V.; AL-JOHANY, A.M.; PEREGONTSEV, E.A.; BETTO-COLLIARD, C.; DENOËL, M.; BORKIN, L.J.; SKORINOV, D.V.; PASYNKOVA, R.A.; MAZANAIEVA, L.F.; ROSANOV, J.M.; DUBEY, S. & LITVINCHUK, S.N. (2019). Fifteen shades of green: the evolution of *Bufo* toads re-visited. *Molecular Phylogenetics and Evolution* 141: 106615.
- DUFRESNES, C.; NICIEZA, A.G.; LITVINCHUK, S.N.;

- RODRIGUES, N.; JEFFRIES, D.L.; VENCES, M.; PERRIN, N. & MARTÍNEZ-SOLANO, I. (2020). Are glacial refugia hotspots of speciation and cyto-nuclear discordances? Answers from the genomic phylogeography of Spanish common frogs. *Molecular Ecology* 29: 986-1000.
- DUFRESNES, C.; BRELSFORD, A.; JEFFRIES, D.L.; MAZEPA, G.; SUCHAN, T.; CANESTRELLI, D., NICIEZA, A.; FUMAGALLI, L.; DUBEY, S.; MARTÍNEZ-SOLANO, I.; LITVINCHUK, S.N.; VENCES, M.; PERRIN, N.; CROCHET, P.A. (2021). Mass of genes rather than master genes underlie the genomic architecture of amphibian speciation. *Proceedings of the National Academy of Sciences* 118: e2103963118.
- DUFRESNES, C.; AMBU, J.; GALÁN, P.; SEQUEIRA, F.; VIESCA, L.; CHODA, M.; ÁLVAREZ, A.; ALARD, B.; SUCHAN, T.; KÜNZEL, S.; MARTÍNEZ-SOLANO, I.; VENCES, M. & NICIEZA, A. (2024). Delimiting phylogeographic diversity in the genomic era: application to an Iberian endemic frog. *Zoological Journal of the Linnean Society* 202: zlad170.
- ESCORIZA, D.; POCH, S.; JABLONSKI, D.; MARTINEZ-SILVESTRE, A.; SOLER, J.; DONAIRE-BARROSO, D. & PIRIS, A. (2024). Morphological and genetic evidence of hybridisation between *Mauremys mutica* (Cantor, 1842) and *Mauremys leprosa* (Schweigger, 1812) in northeast Spain. *Amphibia-Reptilia* 45: 479-484.
- FONTELLES, F.; GUIXÉ, D.; MARTÍNEZ-SILVESTRE, A.; SOLER, J. & VILLERO, D. (2011). Hallada una población introducida de *Ommatotriton ophryticus* en el Prepirineo catalán. *Boletín de la Asociación Herpetológica Española* 22: 153-156.
- FRANZEN, M. & GLAW, F. (2007). Type catalogue of reptiles in the Zoologische Staatssammlung München. *Spixiana* 30: 201-274.
- GENIEZ, P.; CLUCHIER, A.; SÁ-SOUSA, P.; GUILLAUME, C.P. & CROCHET, P.A. (2007). Systematics of the *Podarcis hispanicus*-complex (Sauria, Lacertidae) I: Redefinition, morphology and distribution of the nominotypical taxon. *The Herpetological Journal* 17: 69-80.
- GENIEZ, P.; SÁ-SOUSA, P.; GUILLAUME, C.; CLUCHIER, A. & CROCHET, P.-A. (2014). Systematics of the *Podarcis hispanicus* complex (Sauria, Lacertidae) III: valid nomina of the western and central Iberian forms. *Zootaxa* 3794: 1-51.
- GEORGALIS, G.; VILLA, A.; IVANOV, M.; VASILYAN, D. & DELFINO, M. (2019). Fossil amphibians and reptiles from the Neogene locality of Maramena (Greece), the most diverse European herpetofauna at the Miocene/Pliocene transition boundary. *Palaeontologia Electronica* 22: 1-99.
- GERCHEN, J.F.; DUFRESNES, C. & STÖCK, M. (2018). Introgression across hybrid zones is not mediated by large X effects in green toads with undifferentiated sex chromosomes. *American Naturalist* 192: 178-188.
- HARRIS, D.J. & SÁ-SOUSA, P. (2002). Molecular phylogenetics of Iberian wall lizards (*Podarcis*): is *Podarcis hispanica* a species complex? *Molecular Phylogenetics and Evolution* 23: 75-81.
- HEDGES, S.B.; MARION, A.B.; LIPP, K.M.; MARIN, J. & VIDAL, N. (2014). A taxonomic framework for typhlopoid snakes from the Caribbean and other regions (Reptilia, Squamata). *Caribbean Herpetology* 49: 1-61.
- HOOGMOED, M. & GRUBER, U. (1983). Spix and Wagler type specimens of reptiles and amphibians in the Natural History Museum in Munich (Germany) and Leiden (Netherlands). *Spixiana* 9: 319-415.
- KALIONTZOPOULOU, A.; PINHO, C.; HARRIS, D.J. & CARRETERO, M.A. (2011). When cryptic diversity blurs the picture: a cautionary tale from Iberian and North African *Podarcis* wall lizards. *Biological Journal of the Linnean Society* 103: 779-800.
- KINDLER, C.; CHÈVRE, M.; URSENBACHER, S.; BÖHME, W.; HILLE, A.; JABLONSKI, D.; VAMBERGER, M. & FRITZ, U. (2017). Hybridization patterns in two contact zones of grass snakes reveal a new central European snake species. *Scientific Reports* 7: 7378.
- LÓPEZ-DOS SANTOS, N.; LÓPEZ-JURADO, L.F.; HER-

SPECIES LIST OF THE SPANISH HERPETOFAUNA

- NÁNDEZ-PENATE, A. & MATEO, J.A. (2013). Una nueva población de lagartija de Madeira (*Teira dugesii*) en Las Palmas de Gran Canaria. *Boletín de la Asociación Herpetológica Española* 24: 102-103.
- LÓPEZ SEOANE, V. (1885). On two forms of *Rana* from NW Spain. *The Zoologist, London* 9: 169-172.
- MATEO, J.A.; AYRES, C. & LÓPEZ-JURADO, L.F. (2011). Los anfibios y reptiles naturalizados en España: Historia y evolución de una problemática creciente. *Boletín de la Asociación Herpetológica Española* 22: 2-42.
- MELVILLE, R.V. (1971). Opinion 952. *Agama bi-bronii* Duméril, 1851 (Reptilia): validated under the Plenary Powers. *Bulletin of Zoological Nomenclature* 28: 20-21.
- MERTENS, R. (1955). Die Amphibien und Reptilien Südwestafrikas. Aus den Ergebnissen einer im Jahre 1952 ausgeführten Reise. *Abhandlungen der Senckenbergischen Naturforschenden Gesellschaft* 490: 1-172.
- MONTORI, A.; LLORENTE, G.A.; ALONSO-ZARAZAGA, M.A.; ARRIBAS, O.; AYLÓN, E.; BOSCH, J.; CARRANZA, S.; CARRETERO, M.A.; GALÁN, P.; GARCÍA-PARÍS, M.; HARRIS, D.J.; LLUCH, J.; MÁRQUEZ, R.; MATEO, J.A.; NAVARRO, P.; ORTIZ, M.; PÉREZ-MELLADO, V.; PLEGUEZUELOS, J.M.; ROCA, V.; SANTOS, X. & TEJEDO, M. (2005). *Lista Patrón Actualizada de la Herpetofauna Española. Conclusiones de Nomenclatura y Taxonomía para las Especies de Anfibios y Reptiles de España*. Asociación Herpetológica Española, Barcelona, Spain.
- PÉREZ-GARCÍA, J.M.; FERRÁNDEZ, M.; BOTELLA, F.; GRACIÀ, E. & ORIHUELA-TORRES, A. (2022). Range extension of the ocellated skink, *Chalcides ocellatus* (Forsskål, 1775), in southern Spain provides a warning on its invasion potential. *BioInvasions Record* 11: 560-570.
- PETHER, J. & MATEO, J.A. (2007). La culebra real (*Lampropeltis getulus*) en Gran Canaria, otro caso preocupante de reptil introducido en el Archipiélago Canario. *Boletín de la Asociación Herpetológica Española* 18: 20-23.
- PINHO, C.; FERRAND, N. & HARRIS, D.J. (2006). Reexamination of the Iberian and North African *Podarcis* (Squamata: Lacertidae) phylogeny based on increased mitochondrial DNA sequencing. *Molecular Phylogenetics and Evolution* 38: 266-273.
- PINHO, C.; HARRIS, D.J. & FERRAND, N. (2007). Comparing patterns of nuclear and mitochondrial divergence in a cryptic species complex: the case of Iberian and North African wall lizards (*Podarcis*, Lacertidae). *Biological Journal of the Linnean Society* 91: 121-133.
- PINHO, C.; HARRIS, D.J. & FERRAND, N. (2008). Non-equilibrium estimates of gene flow inferred from nuclear genealogies suggest that Iberian and North African wall lizards (*Podarcis* spp.) are an assemblage of incipient species. *BMC Evolutionary Biology* 8: 63.
- PINO-VERA, R.; ABREU-ACOSTA, N. & FORONDA, P. (2023). Study of zoonotic pathogens in alien population of veiled chameleons (*Chamaeleo calyptratus*) in the Canary Islands (Spain). *Animals* 13: 2288.
- PLEGUEZUELOS, J.M.; MÁRQUEZ, R. & LIZANA, M. (2002). *Atlas y Libro Rojo de los Anfibios y Reptiles de España*. Dirección General de Conservación de la Naturaleza-Asociación Herpetológica Española, Madrid, Spain.
- PLEGUEZUELOS, J.M. (2002). Las especies introducidas de anfibios y reptiles, In J.M. Pleguezuelos, R. Márquez & M. Lizana (eds.) *Atlas y Libro Rojo de los Anfibios y Reptiles de España*. Dirección General de Conservación de la Naturaleza -Asociación Herpetológica Española, Madrid, Spain, pp. 501-532.
- POCH, S.; SUNYER, P.; PASCUAL, G.; BOIX, D.; CAMPOS, M.; CRUSET, E.; QUER-FEO, C.; FUENTES, M.A.; MOLINA, A.; PORCAR, A.; PÉREZ-NOVO, I.; POU-ROVIRA, Q.; RAMOS, S. & ESCORIZA, D. (2020). Alien chelonians in north-eastern Spain: new distributional data. *The Herpetological Bulletin* 151: 1-5.
- POKRANT, F.; KINDLER, C.; IVANOV, M.; CHEYLAN, M.; GENIEZ, P.; BÖHME, W. & FRITZ, U. (2016). Integrative taxonomy provides evidence for

- the species status of the Ibero-Maghrebian grass snake *Natrix astreptophora*. *Biological Journal of the Linnean Society* 118: 873-888.
- POTTIER, G. (2016). *Les Reptiles des Pyrénées. Patrimoines Naturels*, 73. Muséum National d'Histoire Naturelle, Paris, France.
- RATO, C.; SILVA-ROCHA, I.; GONZÁLEZ-MIRAS, E.; RODRÍGUEZ-LUQUE, F.; FARIÑA, B. & CARRETERO, M.A. (2015). A molecular assessment of European populations of *Indotyphlops braminus* (Daudin, 1803). *Herpetozoa* 27: 179-192.
- RATO, C.; SILLERO, N.; CEACERO, F.; GARCÍA-MUÑOZ, E. & CARRETERO, M.A. (2021). A survival story: evolutionary history of the Iberian *Algyroides* (Squamata: Lacertidae), an endemic lizard relict. *Biodiversity and Conservation* 30: 2707-2729.
- RATO, C.; SREELATHA, L.B.; MATEO, J.A. & CARRETERO, M.A. (2023). Alien but not that one: a molecular reassessment of the Alborán Island's *Saurodactylus* Fitzinger, 1846 gecko. *BioInvasions Records* 12: 313-320.
- RATO, C.; SREELATHA, L.B.; GÓMEZ-RAMÍREZ, F. & CARRETERO, M.A. (2025). A Pleistocene biogeography in miniature: the small-scale evolutionary history of *Podarcis lusitanicus* (Squamata, Lacertidae). *Journal of Biogeography* 52: 186-198.
- RENOULT, J.P.; GENIEZ, P.; BACQUET, P.; BENOIT, L. & CROCHET, P.A. (2009). Morphology and nuclear markers reveal extensive mitochondrial introgressions in the Iberian wall lizard species complex. *Molecular Ecology* 18: 4298-4315.
- RENOULT, J.P.; GENIEZ, P.; BACQUET, P.; GUILLAUME, C.P. & CROCHET, P.A. (2010). Systematics of the *Podarcis hispanicus*-complex (Sauria, Lacertidae) II: the valid name of the north-eastern Spanish form. *Zootaxa* 2500: 58-68.
- RUBIO, J.L. & ALONSO-LUMBREROS, A. (2021). Cannibalism in the Spanish *Algyroides* (*Algyroides hidalgoi*, Lacertidae): eco-evolutionary implications? *Herpetological Conservation and Biology* 16: 386-393.
- SAMPAIO, F.L.; HARRIS, D.J.; PERERA, A. & SALVI, D. (2015). Phylogenetic and diversity patterns of *Blanus* worm lizards (Squamata: Amphisbaenia): insights from mitochondrial and nuclear gene genealogies and species tree. *Journal of Zoological Systematics and Evolutionary Research* 53: 45-54.
- SÁNCHEZ-VIALAS, A.; CALVO-REVUELTA, M.; RUBIO, J.L.; PALACIOS, F. & GARCÍA-PARÍS, M. (2018). Taxonomic and nomenclatural status of Iberian *Algyroides* (Lacertidae). *Amphibia-Reptilia* 40: 91-102.
- SANTOS, X.; AYLLÓN, E.; ARRIBAS, O.; BERTOLERO, A.; BOSCH, J.; CABIDO, C.; CARRANZA, S.; CARRETERO, M.A.; DÍAZ-PANIAGUA, C.; EGESERRANO, A.; GARIN-BARRIO, I.; GIMÉNEZ, A.; GOSÁ, A.; GRACIÁ, E.; GUICKING, D.; LLORENTE, G.A.; MARTÍNEZ-SOLANO, I.; MATEO, J.A.; MONTORI, A.; PALOMAR, G.; PERERA, A.; PINYA, S.; PRETUS, J.L.; PUJOL-BUXÓ, E.; RATO, C.; RECUERO, E.; SANZ-AZKUE, I.; SILVA-ROCHA, I.; VASCONCELOS, R.; VELO-ANTÓN, G.; VÖRÖS, J. & PLEGUEZUELOS, J.M. (2015). Síntesis de las introducciones de anfibios y reptiles en España. *Boletín de la Asociación Herpetológica Española* 26: 98-108.
- SCHÖNEBERG, Y.; WINTER, S.; ARRIBAS, O.; DI NICOLA, M.R.; MASTER, M.; OWENS, J.B.; ROVASTOS, M.; WÜSTER, W.; JANKE, A. & FRITZ, U. (2023). Genomics reveals broad hybridization in deeply divergent Palearctic grass and water snakes (*Natrix* spp.). *Molecular Phylogenetics and Evolution* 184: 107787.
- SPEYBROEK, J.; BEUKEMA, W.; DUFRESNES, C.; FRITZ, U.; JABLONSKI, D.; LYMBERAKIS, P.; MARTÍNEZ-SOLANO, I.; RAZZETTI, E.; VAMBERGER, M.; VENCES, M.; VÖRÖS, J. & CROCHET, P.A. (2020). Species list of the European herpetofauna – 2020 update by the Taxonomic Committee of the Societas Europaea Herpetologica. *Amphibia-Reptilia* 41: 139-189.
- STIMSON, A.F. (1969). *Agama bibronii* Duméril, 1851 (Reptila: Sauria): proposed validation under the plenary powers. Z.N.(S.). *Bulletin of Zoological Nomenclature* 25: 186-187.
- UETZ, P.; FREED, P.; AGUILAR, R.; REYES, F.; KUDEIRA, J. & HOŠEK, J. (2024). *The Reptile Database*. Available at <http://www.reptile->

SPECIES LIST OF THE SPANISH HERPETOFAUNA

database.org. Retrieved on 08 September 2024.

VAN RIEMSDIJK, I.; VAN NIEUWENHUIZE, L.; MARTÍNEZ-SOLANO, I.; ARNTZEN, J.W. & WIELSTRA, B. (2018). Molecular data reveal the hybrid nature of an introduced population of banded newts (*Ommatotriton*) in Spain. *Conser-*

vation Genetics 19: 249-254.

WAGLER, J.G. (1830). *Natürliches System der Amphibien, mit vorangehender Classification der Säugthiere und Vögel*. G. J. Cotta'schen Buchhandlung, Munich - Stuttgart - Tübingen, Germany.