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

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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 linages / 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).

Bufotes viridis (Laurenti, 1768)

The systematics of Eurasian green toads (genus *Bufotes* 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 *Bufotes balearicus* (Boettger, 1880) (DUFRESNES *et al*., 2019) or as *Bufotes 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. parvipalmata* applies, and a second lineage comprising all other populations from Cantabria to the Pyrenees, corresponding to *R. temporaria* Linnaeus, 1758. The split between *R. parvipalmata* 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 Boscá (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* Ceríaco & 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 Herpetological Collection and is preserved in 70º 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 Ceríaco & 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-

enees, 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 waltl* 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 almogavarii* 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 cultripes* (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 *Bufotes* Rafinesque, 1815
Bufotes boulengeri (Lataste, 1879)
***Bufotes 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

- *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 pseudostriatus* 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 edwarsianus* (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 boldface). 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 calyptratus* 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 (Moureau de Jonnès, 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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