On the presence of *Alsodes coppingeri* (Anura, Alsodidae) in Argentina, with comments on southern *Alsodes*

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**ABSTRACT**

The occurrence of *Alsodes coppingeri* is confirmed in Argentina for the first time, from Santa Cruz Province, close to the Lago del Desierto. Specimens of this species were identified according to external morphology and DNA sequences. These new records in Argentina are at the same latitude than the type locality (Puerto Rio Frío, Chile) about 100 km eastwards in a straight-line, but at the opposite side of the Andes mountain range and the Southern Continental Ice Fields. Five localities from Chile (Caleta Tortel, Canal Michel, Laguna Calquenes, Puerto Yungay, and Villa O’Higgins) are around 100 km north from our records, in a lower region of the Andes located between the Northern and Southern Continental Ice Fields. This region with discontinuous permanent ice sheet-cover may have acted as a corridor for amphibian species that are currently distributed on both sides of the Andes range.

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**KEYWORDS** Santa Cruz; geographic distribution; conservation; Austral Temperate Forest; Patagonia

**ARTICLE HISTORY**

Received 8 March 2021
Accepted 12 January 2022

**INTRODUCTION**

The temperate forests at the southern cone of South America present high levels of anuran endemisms, with moderate to low species richness, as can be seen in the Patagonia region [1–4]. Recent studies discussed the diversity and phylogenetic relationships of endemic Patagonian anurans [e.g. 5–8]. These studies, together with additional updates on their distribution ranges, provide essential information for the implementation of conservation programs [9–12]. However, there are still significant gaps regarding species distribution and taxonomy.

One of these problematic and poorly known taxa is *Alsodes coppingeri* ( Günther 1881). This species was described into the genus *Cacotus* from Puerto Río Frío, Wellington Island, Chile. Soon afterwards it was named *Borborocoetes coppingeri* [13] and later transferred to the genus *Euposphus* by Codocoe [14] and Capurro [15] without justifications. Curiously, these last authors independently cited Puerto Montt (Chile) as the type locality of the species. Some morphological features were described for *Euposphus coppingeri*, including observations on the holotype and specimens from different localities in Chile and Argentina [16–20]. Since Lynch [21], *E. coppingeri* was considered a junior synonym of *Alsodes monticola* Bell 1843 (the only known species of *Alsodes* at that moment), and a reassessment of its identity was overlooked for some decades. Later on, new information about the genus *Alsodes* at high latitudes was published. For instance, Díaz & Núñez [22] reported some morphological larval and adult features for *Alsodes verrucosus* from Bahía White, Wellington Island and Formas et al. [23] described *Alsodes kaweshkari* from Puerto Edén, in the same Island. Formas et al. [24] analyzed the morphology, cytogenetics and DNA sequences of adults and larvae from the type locality of *Cacotus coppingeri* Günther 1881, and resurrected the species under the combination *Alsodes coppingeri*. In addition, they considered that the descriptions of *A. coppingeri* provided by Ceí [16–18] and Grandison [19] corresponded to different species, and consequently restricted the distribution of *A. coppingeri* to its type locality. One year later, specimens of *A. australis* Formas et al. 1997 were reported from Wellington Island [25], a fourth species of *Alsodes* cited from this place.

More recently, the validity of *Alsodes coppingeri* was supported in a molecular phylogenetic analysis [5], and four additional populations other than that of the type locality were recognized for this species, some of them previously assigned to *Alsodes australis*. These new populations and additional records extended the distribution of *A. coppingeri* somewhat northwards, from Magallanes to the Aysén Region in Chile [26–28]. In Argentina, specimens of *Alsodes* from the temperate forest of Santa Cruz Province were cited as *Alsodes aff. coppingeri*, without confirmation of their specific identity and precise location of occurrence [29].

The present contribution confirm the presence of *Alsodes coppingeri* for the first time in Argentina at the eastern slopes of the Andes range. We also discuss...
about the identity and distribution of other Alsodes at these latitudes, based on external morphology and molecular characters.

Materials and methods

We carried out field work in search for Alsodes at Lago del Desierto area, in Santa Cruz Province, Argentina (49° 04’S; 72° 53’W), from 1996 to 2019. All specimens were deposited in the herpetological collection of Instituto de Diversidad y Evolución Austral (CNP.A), Chubut Province, Argentina. Collection and handling of specimens followed standard practices suggested by Heyer et al. [30], under the permits (year 1997 and No 491755/16) provided by Dirección de Fauna Silvestre of Santa Cruz Province, Argentina.

To determine the specific identity, we obtained DNA sequences from two adults (CNP.A 2884 and CNP.A 4390) and observed morphological features of all specimens following Formas et al. [23,24] and Díaz & Nuñez [22]. Genomic DNA was extracted from tissues preserved in alcohol at −20°C using the phenol/chloroform protocol [31]. Partial PCR amplification of cytochrome b (Cyt b) and cytochrome oxidase I (COI) were obtained for both specimens, and 12S, tRNAVal and 16S (12S-tRNAVal-16S) only for CNP.A 2884. The primers used were as follows: MZV59/tRNAval-H, L1091/H3296, 125M/165a-H, and 16SC/16SD for 12S-tRNAVal-16S, MVZ15/MVZ16 for Cyt b, and LCO1490/HCO2198 and T3-AnF1/T7-AnR1 for COI [32–39]. The PCR products were purified with Gene clean III (MP Biomedicals) or MilliPore Montage 96-well and sequenced on an ABI 3130 capillary genetic analyzer (Applied Biosystems, Inc.). Sequencing reactions were performed following the standard protocol for Big Dye Terminators v3.1 (Applied Biosystems) in both directions, using DNABaser v. 3 (Heracle BioSoft, Pitesti, Romania) for contigs.

The sequences were included in a phylogenetic analysis, selecting terminals in accordance to relationships proposed by the extensive phylogenetic study published by Blotto et al. [5]. Already available DNA sequences of Alsodes 12S-tRNAVal-16S, Cyt b, and COI were also used [5,24,28]. The fragments of 12S-tRNAVal-16S, Cyt b, and COI were aligned with ClustalW [40], executed in BioEdit [41] under default parameters, and later concatenated using SequenceMatrix 1.8 [42]. We performed a maximum parsimony analysis in TNT software [43] choosing the “implicit enumeration” option. A preliminary analysis showed that the monophyly of Alsodes coppingeri is supported by two mutational steps in the COI fragment. For this reason, a second analysis was run including only the sequences of A. coppingeri for which COI was available; the excluded samples were used only for comparisons of genetic distances (Appendix A). Support values were estimated on tree running of 1,000 replicates under parsimony jackknife [44] with default TNT settings, and 0.36 of removal probability. Uncorrected p-distances were obtained employing the software MEGA 7 [45].

Results

On 9 December 1996 two metamorphs (CNP.A 2763 and 2764), one male adult (CNP.A 2884), and two tadpoles (CNP.A 4086) of Alsodes sp. were found in a small stream that crosses Provincial Road N° 23 in the vicinity of the Lago del Desierto (49° 05’ 09’S; 72° 53’ 44’’W; 506 m a.s.l. ± 500 m). On 27 January 1997 another male was collected (CNP.A 2885) on the forest floor and four tadpoles of Alsodes sp. (CNP.A 4911) in a small stream on the east slope of Vespignani Mountain (49° 04’ 43’S; 72° 54’ 31”W; 750 m a.s.l.). On 20 January 2018 an adult male was found (CNP.A 4390), plus another on 22 March 2019 (CNP.A 4623) and 18 tadpoles (CNP.A 4624), all of them in the same stream that crosses Provincial Road N° 23 where the so-called Salto del Anillo waterfall is formed (49° 07’ 07’S; 72° 55’ 29’’W; 451 m a.s.l.). All these findings occurred in streams located within the humid forests of Nothofagus beeches, on the eastern slope of the Crestón and Vespignani range, and Campo Rio Toro, between 400 and 750 m a.s.l. (Figure 1; Table 1). Around Lago del Desierto, the forest is composed by N. pumilio (lenga) and some patches of N. betuloides (coihue de Magallanes), with an underwood composed by Embothrium coccineum (notro), Chiliotricium rosmarinifolium (romerillo), Gaultheria mucronata (chaura), Empetrum rubrum (murtilla), and Myoschilos oblongum (codocoipo) and a herbaceous layer rich in pterido-phytes and bryophytes, which can spread over fallen and standing trunks. In poorly drained sites, the hydrophytic herbaceous communities were predominant and the tree Nothofagus antarctica (pire) was present often as bushes. The frogs were found under rocks and trunks covered with bryophytic vegetation present on stream banks, while tadpoles were collected in low flow current sections of small to medium-sized streams (Figure 2).

Adult specimens presented the external characters of A. coppingeri provided by Formas et al. [24]: snout profile truncate, legs with uniform coloration, almost unwebbed feet reduced to 3, 4, and 5 toes; but all presented fringes on the toes and also a tarsal fringe. Two of them had uniform brownish coloration, and the other two were uniformly grayish. The male CNP.A 4390 (SVL 58.69 mm) had well-developed fringes on toes, and marked secondary sexual characters, such as: hypertrophy of the forearms, spiny pectoral patches and nuptial pads on the fingers 1 and 2, scattered spines on the inner surface of the fingers 3 and 4, keratinous surfaces on outer bilobated metacarpal tubercle, on the dorsal and ventral surfaces of hands and feet, ventral surface of jaws, dorsal surface of the
head, and flanks (Figure 3). The size, the well-developed fringes on toes, and the secondary sexual characters of this specimen resembles the description of *A. kaweshkari* (see drawings in Formas et al. [23]), but the presence of a deep notch at the anterior edge of the outer metacarpal tubercle (present in three of four specimens analyzed) resembles *A. verrucosus* reported from Wellington Island [22]. The size of the four male specimens was larger (43.22–58.69 mm) than that given by Formas et al. [24] (43.2–44.0 mm) for *A. coppingeri*. In addition, the two metamorphs found by us have more than mid-webbed feet, a character that shown a wide plasticity.

The tadpole morphology agrees with the description of *A. coppingeri* provided by Formas et al. [24]. They are exotrophic larvae, with dorsolateral eyes, an emarginated oral disc with a single row of marginal papillae with a wide rostral gap, one single row of mental intramarginal papillae; tooth row formula 2 (2)/3 (1), spiracle sinistral with a protruding distal end, wide and dextral vent tube, low and straight fins with sub-parallel margins, and rounded tail tip.

For the phylogenetic analysis, we obtained a molecular matrix of 4085 DNA base pairs (bp): 2424 bp for 12S-5S-*tRNA^Val^, 16S, 658 bp for *COI*, and 1003 bp for *Cyt b* (most of samples have a fragment smaller than 400 bp; see Appendix A). The maximum parsimony analysis under “implicit enumeration” found a single shortest tree of 767 steps. Sequences of the two specimens of *Alsodes* provided herein were recovered in a clade along with other sequences of *A. coppingeri*, supported by two mutational transformations in *COI* fragments, as the sister taxon of *A. verrucosus*. We included a small fragment (304 bp) of *Cyt b* belonging to the holotype of *A. kaweshkari*, but this species was recovered nested in another clade together with *A. gargola* in a close relationship. In Figure 4, we show the maximum parsimony tree with jackknife supports, in which all relationships are consistent with those previously obtained by Blotto et al. [5].

The uncorrected p-distances between samples of *A. coppingeri* were extremely low, ranging between 0.0% and 0.04% for 2355 bp of 12S-*tRNA^{Val}*, 16S (N = 7); 0.0% when we compared only 308 bp of *Cyt b* (N = 10); and 0.0% in 658 bp of *COI* (N = 7). In the same way, the uncorrected p-distances between *A. coppingeri* and *A. verrucosus* were as follows: 0.13% to 0.21% for 12S-*tRNA^{Val}*, 16S; 0.65% for *Cyt b*; and 0.61% for *COI*. Appendix A shows the GenBank accession numbers of all samples used in the comparisons, some of them not included in the phylogenetic analysis.

**Discussion**

DNA sequences showed that the specimens found around Lago del Desierto, including the mentioned *Alsodes aff. coppingeri* from Santa Cruz Province [29], belong to the species *A. coppingeri*, confirming its
presence in Argentina for the first time. All samples of this species used in the phylogenetic analysis were recovered as a well-supported clade, sister of *A. verrucosus*. The node *A. coppingeri + A. verrucosus* was weakly supported, but when other DNA markers were used for both species, a well-supported relationship was obtained [5]. *Alsodes verrucosus* is a poorly defined species, with a non-detailed description, without assignment of type specimens, and a vaguely defined type locality that corresponds to a vast area, the Andes Range of Cautín Province in Chile [46, p. 83]. The exemplars of *A. verrucosus* we used were sampled from Puyehue (Osorno Province), about 200 km south of Cautín Province [see 5]. From this last locality, karyotype and tadpoles were already described [47,48]. In Chile, this species was also recently recorded from Cayutué, Llanquihue Province [49], and even for Wellington Island [22]. In Argentina, it was cited from Río Negro Province [50], a population not even detected again, and also from Neuquén Province [51,52] from where specimens seems to correspond to *A. neuquensis* [see appendix S3 in 5]. Caution must be taken regarding comparisons with *A. verrucosus* unless they include specimens from Cautín. The samples of *A. coppingeri* (Caleta Tortel) and *A. verrucosus* (Puyehue) available to us are about 800 km apart. However, their low genetic divergence suggests that future studies are needed to establish species boundaries, including intermediate populations previously assigned to either one of these two species [14,17], as well as specimens previously assigned to *A. verrucosus* from Wellington Island [22,53].

As early mentioned, *A. kaweshkari* was described in these high austral latitudes. The Cyt b sequences of *A. kaweshkari* we obtained did not provided differentiation from *A. gargola* of Futaleufú, Chile, as considered in Blotto et al. [5]. This unexpected result deserves further consideration. The other *Alsodes* species mentioned for Wellington Island is *A. australis* [25], but we could not study the three specimens attributed to the species that have been collected to make direct comparisons with neither *A. coppingeri* nor *A. verrucosus*. Asencio et al. [25] only considered *A. kaweshkari* to be present in the Island. It is worth of mention that the authors referred to Wellington Island as the type locality of *A. australis*, which is in fact more than 300 km away northwards from this site, at Puente Traihuanca, in the Aysén Region of Chile [54]. Due to these inaccuracies, the taxonomic identity of *A. australis* from Wellington Island should be re-evaluated.

The adult specimens collected for this work showed some remarkable morphological variation. Three of them (SVL = 43.22–48.08 mm) slightly exceed the known size range of *A. coppingeri* but share other

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**Table 2**. Geographical coordinates for all populations know of *Alsodes coppingeri* in Chile and new records from Argentina. Type locality in bold. From Chile also was reported in Puyuhuapi, Aysén Province [14], and Peninsula Muñoz Gamero, Última Esperanza Province [19], but both localities require new studies.

| Locality            | Country | Latitude | Longitude | Source                        |
|---------------------|---------|----------|-----------|-------------------------------|
| Puerto Río Frío     | Chile   | 49° 12'S | 74° 24'W  | Günther (1881); Formas et al. (2008) |
| Caleta Lever        | Chile   | 49° 06'07"S | 74° 21'18"W | Blotto et al. (2013) |
| Caleta Tortel       | Chile   | 47° 48'5"S | 73° 32'09"W | Blotto et al. (2013), Alveal et al. (2015) |
| Puerto Yungay       | Chile   | 47° 56'13"S | 73° 20'47"W | Blotto et al. (2013) |
| Canal Michel        | Chile   | 47° 58'3"S | 73° 13'56"W | Blotto et al. (2013) |
| Laguna Caiquenes    | Chile   | 47° 49' S  | 73° 18' W  | Cisternas et al. (2013), Alveal et al. (2015) |
| Villa O’Higgins     | Chile   | 48° 22' S  | 72° 29' W  | Alveal et al. (2015); Correa et al (2018) |
| Lago del Desierto   | Argentina | 49° 05'09"S | 72° 53'44"W | This study |
| Cerro Vespignani    | Argentina | 49° 04'43"S | 72° 54'31"W | This study |
| Salto del Anillo    | Argentina | 49° 07'06"S | 72° 55'29"W | This study |

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**Figure 2**. Habitat of *Alsodes coppingeri* near to Lago del Desierto (see text). (a) Overview of the temperate forests dominated by *Nothofagus pumilio* on mountain slopes up to about 1000 m, and (b) breeding site inside the forest.
diagnostic characters of the species such as snout truncated in lateral view, uniform color on hindlimbs (without bars), reduced toe fringes and webbed feet [24]. However, the characteristics of one adult male (CNP.A 4390; SVL 58.69 mm) matched with diagnostic characters of *A. kaweshkari*: SVL 56.5–62.2 mm, toes well fringed, webbing of feet reduced but present between all toes, granular dorsolateral surfaces, the skin around the vent and posterior thighs being granular, overall grey coloration, and notable development of secondary sexual characters [23]. In spite of this, molecular data confirmed this last specimen to be *A. coppingeri*. The size range of adults found by us (43.22–58.69 mm) also overlaps with the only adult of *A. verrucosus* (43.7 mm) from Wellington Island. Double outer metacarpal tubercles were reported for this population [22], a character not found again in other specimens analyzed to date from this Island [23,24]. Remarkably, three specimens from Lago del Desierto have outer metacarpal tubercles with deep anterior notches (bilobed), without molecular data these specimens could have been assigned to *A. verrucosus*. Regarding the development of webbing, the two metamorphs from Lago del Desierto have mid- or fully webbed feet, suggesting a great intraspecific variation of this character, as observed in other *Alsodes* [appendix S3 in 5,28]. Grandison [19] described webbed feet for *A. coppingeri*, but according to Formas et al. [24] in the Grandison’s diagnosis and the morphology provided by Cei [16–18] were included specimens from a wide geographic range, many of them likely belonging to different *Alsodes* species.

The phenotypic plasticity found in the few specimens of *A. coppingeri* known from Argentina overlaps with almost all characters that were used to distinguish among *A. coppingeri*, *A. kaweshkari*, and *A. verrucosus*. A thorough taxonomic revision of these taxa is pending, which should include the specimens of *A. australis* reported from Wellington Island by Asencio et al. [25]. Regarding DNA data, all available information of *Alsodes* at latitudes above 47° S (N = 10) appear to belong to a single species, except for a Cyt b sequence of *A. kaweshkari* (see discussion in [5]). Nonetheless, cytogenetic characters may allow to distinguish among *A. coppingeri*, *A. kaweshkari*, and *A. verrucosus*. All species present Zn = 26 with bi-armed chromosomes (FN = 52), but the chromosomal configuration shows differences
between the A. coppingeri – A. verrucosus and A. kaweshkari. Both Alsodes coppingeri and A. verrucosus from Wellington Island share four large, two intermediate, and seven small chromosomes, and show the nucleolus organizer regions (NORs) located within the secondary constrictions of the short arm of pair 4; but differ in the morphology of pairs 2, 7, 8, 9, 12, and 13 [24,55]; but see the A. verrucosus chromosome configuration from Puyehue [47]. On the other hand, A. kaweshkari have five large, one intermediate, and seven small chromosomes with secondary constrictions on pairs one, four, and six [23].

Like other Alsodes species, our studied larval specimens were aquatic and exotrophic tadpoles, of the lothic-benthic ecomorphological type [56], which are commonly associated with streams [e.g. 24,48,57–59]. The tadpoles found in summer ranged between 37.41 and 58.96 mm of total length and between 25 and 39 developmental stages [60]. The 18 tadpoles collected on March 22 (beginning of autumn) ranged between 25 and 26 Gosner’s stages, similar to the data presented from the Wellington Island by Formas et al. [24]. These observations allow us to infer at least one overwintering episode during larval development in streams and permanent oligotrophic ponds of the study sites, as has been proposed for other Alsodes [e.g. 61–64], rather than an acceleration of metamorphosis before the arrival of winter. This is supported by data from Laguna Caiquenes, Chile, where tadpoles of A. coppingeri were found throughout the year with metamorphosing individuals in January and March [26].

The area of Lago del Desierto represents the southern limits for the genus Alsodes in Argentina. On Wellington Island (Chile), A. coppingeri, A. verrucosus, and A. kaweshkari can be found in sympathy [22–24]. Alsodes coppingeri [as Eupsophus coppingeri] was mentioned for Peninsula Muñoz Gamero (Chile), found in a lowland area outside the forest by the “Royal Society Expedition to Southern Chile”, that would extend the distribution of the genus in Chile about 400 km south [19]. The northernmost known locality for A. coppingeri may be Puyuhuapi, Aysén Province [14], but the taxonomic identity of this population and specimens from Peninsula Muñoz Gamero requires a revision.

All known records of A. coppingeri correspond to the temperate-cold forest altitudinal range [5,24,26,27,65, this study]. At these latitudes on the western side of the Andes, the weather is cold throughout the year, with prevailing winds from the west and annual rainfall usually exceeding 4000 mm [66,67]. On the eastern side of the Andes, the temperate forest extends over slope of the Andes below 1000 m a.s.l., a narrow area bounded to the east by prevailing aridity [68–70]. In Argentina, A. coppingeri lives in sympathy with Chaltenobatrachus grandisonae and Nannophrys variegata [71], while in Chile it dwells with A. kaweshkari, A. verrucosus, Batrachyla antartandica, B. nibaldoi, B. taeniata, C. grandisonae, Eupsophus calcaratus, and N. variegata [24,26,72].

Lago del Desierto and Wellington Island at both sides of the Andes mountain range are at almost the same latitudes, about 100 km in a straight-line, with the interposition of the Southern Continental Ice Field. However, the populations of Aysén (Chile) are located close to a gap without ice cover that separates the North and South portions of the Continental Ice Field (Figure 1). It is possible that this area would act as a corridor for different amphibian species at both sides of the Andes.

The new locations of A. coppingeri in Argentina are included in the Lago del Desierto Provincial Reserve recently created in 2005, near the northern limit of Los Glaciares National Park, where the species could be present. In Chile, the species is included in the Laguna Caquenes Natural Reserve and the Bernardo O’Higgins National Park. However, the introduction of exotic salmonids in lakes and streams from both Chile and Argentina is a matter of concern, as may pose high predation pressure on tadpoles. The known geographic range of
A. coppingeri is included in the Subpolar Nothofagus Ecoregion, categorized as Vulnerable and Bioregionally Outstanding ecoregion [73]. Currently, the species is classified as Data Deficient given continuing uncertainties about its actual extent of occurrence, population status, and ecological requirements [74]; this categorization indicates the need for further field data because some potential extinction risk factors and the extent of geographic occurrence may have been overlooked [75,76].

Acknowledgments

We thank Claudio Correa and Claudio Borteiro for their valuable comments on the manuscript, and to Ricardo Ortubay, Silvia Ortubay, Daniel Wegrzyn, Sergio Rosset, Clara Volonteri, and Ximena Navoa for their help in the fieldwork. We thank Boris Blotto and José Nuñez for the information provided, and Dirección de Fauna Silvestre de Santa Cruz Province for the permits (year 1997 and No 491755 /16).

Disclosure statement

No potential conflict of interest was reported by the author(s).

Funding

This work was supported by the Agencia Nacional de Promoción Científica y Tecnológica [PICT 2012-2315, PICT 2016-4066]; Universidad Nacional de la Patagonia “San Juan Bosco” [PI 1394, PI 1488, PI 1676]; CONICET [PIP 11220120100510, PIP 1122020102610]; Universidad Nacional del Comahue [Proyecto B 034].

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## APPENDIX A. List of species, voucher numbers, locality (Country: Province/Region: Locality), and GenBank accession numbers of the corresponding sequences employed in this study. Species in bold were used in phylogenetic analysis; (–) denotes fragment no available; Asterisk (*) denotes specimens from type locality.

| Species          | Voucher     | Locality          | 12S-trRNA<sub>Val</sub> Cyt b | Source                      |
|------------------|-------------|-------------------|-------------------------------|-----------------------------|
| Alsodes coppingeri | IZUA3545    | CH: XII: Caleta Lever | JX204156 JX203943 – | Blotto et al. (2013)        |
| Alsodes coppingeri | IZUA3546    | CH: XI: Puerto Yungay | JX204157 JX203944 JX203876 | Blotto et al. (2013)        |
| Alsodes coppingeri | IZUA3547    | CH: Caleta Tortel  | JX204158 JX203945 JX203877 | Blotto et al. (2013)        |
| Alsodes coppingeri | IZUA3548    | CH: Cano Michel    | JX204159 JX203946 JX203878 | Blotto et al. (2013)        |
| Alsodes coppingeri | IZUA3552    | CH: XII: Puerto Rio Frío | JX204160 JX203947 JX203879 | Blotto et al. (2013)        |
| Alsodes coppingeri | IZUA3553    | CH: XII: Puerto Rio Frío | JX204161 JX203948 JX203880 | Blotto et al. (2013)        |
| Alsodes coppingeri | CNPA2884    | ARG: Santa Cruz, Lago del desierto | OL614073 OL614076 OL614074 | This Study                  |
| Alsodes coppingeri | CNPA4390    | ARG: Santa Cruz, Lago del desierto | – OL614077 OL614075 | This Study                  |
| Alsodes coppingeri | DBGUCH0710100 | CH: XII: Villa O'Higgins | – MH378969 – | Correa et al (2018)         |
| Alsodes coppingeri | IZUA3298    | CH: XII: Puerto Rio Frío | – EU022573 | Forms et al (2008)          |
| Alsodes g JSJX | IZUA3571    | CH: X: Futaleufú  | JX204162 JX203949 JX203881 | Blotto et al. (2013)        |
| Alsodes igneus   | IZUA3557    | CH: X: Tolhuaca    | JX204172 JX203959 JX203889 | Blotto et al. (2013)        |
| Alsodes nodosus  | IZUA3558    | CH: V: Zapallar    | JX204174 JX203960 – | Blotto et al. (2013)        |
| Alsodes kaweshkari | IZUA1624    | CH: XII: Puerto Edén | – EU022576 | Forms et al. (2008)         |
| Alsodes pehuenche | IZUA3560    | AR: Mendoza: Valle Pehuenche | JX204177 JX203963 JX203894 | Blotto et al. (2013)        |
| Alsodes valdiviesis | IZUA3569    | CH: XIV: Cordillera Pelada | JX204188 JX203973 JX203904 | Blotto et al. (2013)        |
| Alsodes verrucosus | IZUA3574    | CH: X: Puyehue     | JX204190 JX203975 JX203906 | Blotto et al. (2013)        |
| Alsodes verrucosus | IZUA3576    | CH: X: Puyehue     | JX204191 JX203976 JX203907 | Blotto et al. (2013)        |
| Alsodes verrucosus | IZUA3577    | CH: X: Puyehue     | JX204192 JX203977 JX203908 | Blotto et al. (2013)        |
| Eupsophus emiliopugini | IZUA3585    | CH: X: La Picada   | JX204204 JX203988 JX203921 | Blotto et al. (2013)        |