

Table S1. Genbank accession numbers for the taxa sampled in this study. Collections abbreviations: AC – Alessandro Catenazzi Field Series; CFBHT – Celio F. B. Haddad Field Series; CORBIDI – Centro para Ornitología y Biodiversidad, Lima; CBF – Colección Boliviana de Fauna; KU – Kansas University, Lawrence; MNCN – Museo Nacional de Ciencias Naturales, Madrid; MUBI – Museo de Biodiversidad del Perú, Cusco; MUSM – Museo de Historia Natural de la Universidad de San Marcos, Lima. Numbers in bold are sequences generated in this study.

| Taxon | 16S | 12S | COI | RAG1 | Tyr | Voucher_Nbr |
|-------------------------------------|-----------------|----------|-----------------|-----------------|----------|-----------------|
| <i>Barycholos pulcher</i> | EU186709 | na | na | na | EU186765 | KU 217781 |
| <i>Barycholos ternetzi</i> | JX267466 | na | na | JX267543 | JX267680 | CFBH 19426 |
| <i>Bryophryne bakersfield</i> | KT276291 | KT276283 | na | na | na | MHNC 6007 |
| <i>Bryophryne bustamantei</i> | KT276293 | KT276286 | na | KT276280 | KT276296 | MHNC 6019 |
| <i>Bryophryne cophites</i> | KY652641 | na | KY672976 | KY672961 | KY681062 | AC 270.07 |
| <i>Bryophryne hanssaueri</i> | KY652642 | na | KY672977 | KY681084 | KY681063 | MUSM 27567 |
| <i>Bryophryne nubilosus</i> | KY652643 | na | KY672978 | KY681085 | KY681064 | MUSM 27882 |
| <i>Eleutherodactylus bilineatus</i> | JX267324 | na | na | JX267556 | JX267691 | MNRJ 46476 |
| <i>Euparkerella brasiliensis</i> | JX267468 | na | na | JX267545 | JX267682 | na |
| <i>Holoaden bradei</i> | EF493366 | EF493378 | na | EF493449 | EU186779 | USNM 207945 |
| <i>Holoaden luederwaldti</i> | EU186710 | EU186728 | na | EU186747 | EU186768 | MZUSP 131872 |
| <i>Microkayla quillei</i> | AY843720 | AY843720 | na | na | DQ282995 | AMNH A165108 |
| <i>Microkayla iatamasi</i> | AM039644 | AM039712 | na | na | na | MTD TD 1231 |
| <i>Microkayla saltator</i> | AM039642 | AM039710 | na | na | na | MTD TD 1229 |
| <i>Microkayla teqta</i> | MF186400 | MF186318 | na | na | MF186552 | MNCN 45702 |
| <i>Microkayla wettsteini</i> | EU186696 | EU186696 | na | EU186755 | EU186776 | KU 183049 |
| <i>Noblella heyeri</i> | JX267541 | JX267463 | na | na | na | QCAZ 31471 |
| <i>Noblella lochites</i> | EU186699 | EU186699 | na | EU186756 | EU186777 | KU 177356 |
| <i>Noblella losamigos</i> | MN100040 | na | na | na | na | MUSA 6302 |
| <i>Noblella losamigos</i> | MN056358 | na | MN356098 | na | na | MUBI 17413 |
| <i>Noblella losamigos</i> | MN366392 | na | MN356099 | na | na | MVZ:Herp:292687 |
| <i>Noblella losamigos</i> | KY652644 | na | na | KY672962 | KY681065 | MUSA 6973 |
| <i>Noblella madreseiva</i> | MN056356 | na | na | na | na | CORBIDI 15770 |
| <i>Noblella madreseiva</i> | MN064565 | na | na | MN356100 | na | CORBIDI 15769 |
| <i>Noblella myrmecoides</i> | MN056357 | na | na | na | na | CORBIDI PV45 |
| <i>Noblella myrmecoides</i> | JX267542 | JX267464 | na | na | na | QCAZ 40180 |
| <i>Noblella pygmaea</i> | KY652645 | na | KY672979 | KY681086 | KY681066 | MUSM 24536 |
| <i>Noblella sp.</i> | AM039646 | AM039714 | na | na | na | MTD 45180 |
| <i>Noblella sp. R</i> | KY652646 | | KY672980 | KY681087 | KY681067 | MUSM 27582 |

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|--------------------------------------|----------|----------|----------|----------|----------|---------------|
| <i>Noblella thiuni</i> | MK072732 | na | na | na | na | CORBIDI 18723 |
| <i>Phrynopus inti</i> | MF651902 | MF651909 | na | MF651917 | na | MUSM 31968 |
| <i>Phrynopus peruanus</i> | MG896582 | MG896605 | MG896615 | MG896626 | MG896631 | MUSM 38316 |
| <i>Psychrophrynella chirihampatu</i> | KU884559 | na | na | na | na | CORBIDI 16495 |
| <i>Psychrophrynella glauca</i> | MG837565 | na | na | na | na | CORBIDI 18729 |
| <i>Psychrophrynella</i> sp. P | KY652660 | na | KY672992 | KY681089 | KY681081 | AC 116.09 |
| <i>Psychrophrynella</i> sp. R | KY652661 | na | KY672993 | KY681090 | KY681082 | AC 148.07 |
| <i>Psychrophrynella usurpator</i> | KY652662 | na | KY672994 | KY672975 | KY681083 | AC 186.09 |