

Data Set 2. Morphological character list

A PAUP file of the morphological data, coded for each taxon, is available from the authors. Taxonomy follows ref. 4, but note that some monophyletic groups are nested within other monophyletic groups. Character states were coded for each taxon as follows:

1. Epimysium of the M. pterygomandibularis: (0) not pigmented, (1) pigmented; state 1 is unique to the *signifer* group (4).
2. Medial head of M. flexor tibialis internus covered by hypertrophied M. puboischiotibialis: (0) no, (1) yes; state 1 is unique to the *signifer* group (4).
3. Tibial blade: (0) absent, (1) present; state 1 is unique to the *montanus* group (4).
4. Enlarged spinose scales on posterior medial surface of thigh: (0) absent, (1) present; state 1 is unique to the *boulengeri* group (4).
5. Sublabials: (0) not contacting mental scale, (1) contacting mental scale; state 1 is unique to the *wiegmannii* group, *L. cuyanus*, and the *Phymaturus palluma* group (4, 5).
6. Reproductive mode: (0) oviparous, (1) viviparous; state 0 occurs in most outgroup taxa, state 1 in *Phymaturus*, some *Liolaemus*, and *Phrynosoma hernandesi*. When not specified in the literature, reproductive modes of species examined in museum collections were assigned following the strictest criteria in ref. 39.
7. Preloacal pores in males: the mean number of pores for a given species ranges from 0 (no pores) to about 11. This character was coded as continuous using gap weighting (10) for parsimony analysis (with 32 bins: a–z, 0–4) and as binary (0 = pores absent; 1

= pores present) (1, 2, 4) for Bayesian analysis. For parsimony, all other morphological and molecular characters were weighted by 32 so that the maximum weight of this character would be equivalent to that of the qualitative characters [between-character scaling (11)].

8. Dorsal scales: (0) none tridentate, (1) some or all tridentate; state 1 is present only in *L. lineomaculatus*, *L. silvanae*, and *L. hatcheri* (4).
9. Meckel's groove: (0) open, (1) fused. Fused in the *chiliensis* group, some *L. darwini*, *L. occipitalis*, *Phymaturus patagonicus* group, and Tropiduridae (4, 6).
10. Supralabials: (0) wide, (1) narrow, width equal to or less than that of lorilabials. State 1 may be associated with a smaller number of supralabials (4 vs. ≥ 5) and having the posterior supralabial elongate and posteriorly upturned (vs. vertical). State 1 occurs in the *nitidus* and *wiegmannii* groups (4).
11. Pygal region of males: (0) same size as females, (1) larger than in females; 0 = *Phymaturus*, *Ctenoblepharys*, and outgroups, 1 = *Liolaemus* (4).
12. Lateral borders of orbitonasal fenestra: (0) formed by prefrontals, (1) formed by frontal downgrowths; 0 = *Phymaturus*, *Ctenoblepharys*, and outgroups, 1 = *Liolaemus* (4).
13. Supratemporal: (0) exposed on lateral face of paraoccipital process of parietal, (1) enclosed within deep groove on ventral surface of paraoccipital process of parietal; 0 = *Phymaturus*, *Ctenoblepharys*, and outgroups (except *Oplurus* which has a different state and was coded as unknown), 1 = *Liolaemus* (3, 4).

14. Dentary: (0) short, not posterior to the posterior lingual process of coronoid, (1) long, posterior-to-posterior lingual process of coronoid; 0 = *Phymaturus*, *Ctenoblepharys*, and outgroups, 1 = *Liolaemus* (4).
15. Anterior process of angular: (0) long, to level with posterior dentary tooth, (1) short, not level with posterior dentary tooth; 0 = *Phymaturus*, *Ctenoblepharys*, and outgroups, 1 = *Liolaemus* (4).
16. Posterior coracoid fenestra: (0) absent, (1) present; 0 = *Phymaturus*, *Ctenoblepharys*, and outgroups (except *Stenocercus*), 1 = *Liolaemus* (3, 4).
17. Interclavicle median process: (0) long, (1) short; 0 = *Liolaemus*, *Ctenoblepharys*, and outgroups (except *Phrynosoma*), 1 = *Phymaturus* and *Phrynosoma* (4).
18. Sternal ribs: (0) three, (1) four; 0 = *Liolaemus*, *Ctenoblepharys* and most outgroups, 1 = *Phymaturus* and *Oplurus* (4).
19. Caudal spines: (0) small, (1) enlarged; 1 = *palluma* group of *Phymaturus* (1).
20. Subocular: (0) single enlarged scale below eye, (1) fragmented into five or more subequal scales); 1 = *palluma* group of *Phymaturus* (4) and *Phrynosoma*.
21. Superciliary scales: (0) distinctly elongate and imbricate, (1) shortened; 1 = *palluma* group of *Phymaturus* (4) and *Phrynosoma*.
22. S-condition of nasal apparatus: (0) absent; (1) present; 0 = outgroups, 1 = liolaemids (3).
23. Scapular fenestra: (0) present, (1) absent; 0 = outgroups; 1 = liolaemids (3).
24. Posterior mylohyoid foramen of lower jaw: (0) posterior to level the superior apex of the coronoid, (1) anterior or level to superior apex of coronoid; 0 = outgroups; 1 = liolaemids (3).