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PHYLOGENY OF ANOLES

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ABSTRACT: I present a phylogenetic analysis of the lizard genus *Anolis* using new morphological data in combination with diverse data from the literature. Ninety-one characters of osteology and external anatomy were completely or partially scored for 174 *Anolis* species and seven outgroups. These data were combined with data from chromosomes, DNA sequences, allozymes, and immunology and analyzed with parsimony to produce an estimate of *Anolis* relationships. The genus *Anolis* was supported as monophyletic. *Anolis occultus* is sister to the rest of the genus. A South American and Southern Lesser Antillean clade is sister to the Greater Antillean and Northern Lesser Antillean *Anolis* and a clade of mainland species. Successive clades of Caribbean Alpha *Anolis* are sister to the Beta *Anolis* (*Norops*) clade. Within the Betas, the Jamaican Betas are sister to the remaining Betas, and the Cuban Betas are sister to the monophyletic mainland forms. Other higher-level groupings of previous authors were not supported, but members of some previously-recognized lower-level groups formed clades: *roquet* series, *"Phenacosaurus"*, *cybotes* series, *cristatellus* species group, *bimaculatus* series/species group, *hendersoni* species group, *chlorocyanus* series, *equestris* series, *grahami* series, *sagrei* series, *crassulus* species group, *gadovii* species group, *laeviventris* species group, *nebulosus* species group.

Key words: anoles; *Anolis*; morphology; phylogeny.

THE EXTRAORDINARILY SPECIES-RICH, biogeographically complex, ecologically diverse neotropical group of lizards called anoles (genus *Anolis*) has long captivated the interest of vertebrate biologists. Hundreds of studies have documented the behavioral, ecological, and morphological diversity in these lizards, which are probably among the best-studied vertebrates. *Anolis* lizards have been used to address fundamental biological issues such as community ecology (e.g., Williams, 1983), biogeography (e.g., Lazell, 1972), sexual dimorphism (e.g., Fitch, 1975), competition (e.g., Pacala and Roughgarden, 1982), energetics (e.g., Naganuma and Roughgarden, 1990), functional morphology (e.g., Losos, 1990), adaptive radiation (e.g., Williams, 1972), ecomorphology (e.g., Collette, 1961), character displacement (e.g., Schoener, 1970), social behavior (Stamps, 1973), perception (e.g., Fleishman et al., 1993), reproduction (e.g., Sexton et al., 1971), and communication (e.g., Rand and Williams, 1970).

Many aspects of comparative biology have been recorded for numerous anole species (e.g., Fitch, 1975), and it is clear that proper interpretation of comparative data requires knowledge of phylogeny (e.g., Felsenstein, 1985*a*). Recent papers on the comparative biology of *Anolis* have incorporated information on phylogeny (e.g., Losos et al., 1998). However, comparative studies of the entire genus have not been possible due to the lack of a comprehensive phylogeny.

The phylogeny of *Anolis* is a notoriously difficult problem (Williams, 1989). *Anolis* is the largest amniote genus, containing approximately 369 species (personal observation). The great size of the genus and the perceived morphological conservativeness have hindered the reconstruction of *Anolis* phylogeny. Hillis (1996) referred to the genus as "a huge group where all the species look virtually the same". Richard Etheridge's (1959) analysis of 150 species for his Ph.D. dissertation remains the most comprehensive treatment of anole evolution. Considering the wealth of comparative data currently available for *Anolis*, the availability of much new osteological material (Williams, 1989), and the effect that species sampling can have on hypotheses of relationship (e.g., Gauthier et al., 1988) and comparative biology (e.g., Ackerly, 2000), an update of Etheridge's (1959) landmark work is long overdue.

The goal of this paper is to estimate the phylogeny of *Anolis*. I collected morphological

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data and analyzed these in combination with diverse types of data from the literature.

Previous Hypotheses of Anole Relationships

Etheridge (1959) divided *Anolis* into two major sections based on a single osteological character (absence of caudal transverse processes in "Alpha" *Anolis*, presence in "Beta" *Anolis*), and identified several informal groups called series within these sections. Williams (1976*a*,*b*) further subdivided the genus into subsections, subseries, species groups, and superspecies. Although based on available data, this work was not a formal phylogenetic analysis. Still, the informal groups proposed by Williams often have been treated as clades (Guyer and Savage, 1992). The contents of many of the Williams groups were rearranged by Gorman and collaborators (e.g., Gorman and Kim, 1976; Gorman et al., 1983), Lieb (1981), and Shochat and Dessauer (1981). Shochat and Dessauer (1981) used immunological data to present the first challenge to the Alpha-Beta dichotomy, suggesting that Alpha and Beta species from the Caribbean are more closely related to each other than to other *Anolis*.

Implicitly or explicitly, each of the above studies accepted most of the Etheridge and Williams framework. Guyer and Savage (1986) broke from this perspective and attempted to apply a rigorous and modern phylogenetic approach to Etheridge's (1959) data. However, the study and resulting taxonomic rearrangement suggested by Guyer and Savage (1986; see also Savage and Guyer, 1989) were severely criticized by Williams (1989) and Cannatella and de Queiroz (1989) for its problematic data, methods, and classification (e.g., one of their proposed genera is not monophyletic in their preferred tree). Guyer and Savage (1992) demonstrated that many of their results were robust to these criticisms, and their taxonomy has been followed by some researchers, especially those working on Central American forms (e.g., Kohler and McCranie, 2001). Still, the Guyer and Savage treatment, like more recent papers addressing large-scale *Anolis* phylogeny (e.g., Burnell and Hedges, 1990; Poe, 1998; Jackman et al., 1999), suffers from its paucity of characters and the number of taxa included. Guyer and Savage (1992) suggested generic rearrangement for over 300 species based on an analysis of 27 species, and the most comprehensive modern treatment, by Jackman et al. [1999], analyzed only about 15% of the species of *Anolis*. Four of the Guyer and Savage genera have been shown to be paraphyletic (Poe, 1998; Jackman et al., 1999), and recognition of their remaining genus *Norops* would necessitate an entirely new *Anolis* taxonomy. Thus, their generic-level taxonomy is not followed here. However, unless otherwise noted, their infrageneric taxonomy (Savage and Guyer, 1989) is employed because it is the most comprehensive treatment and its groups are similar or identical to those recognized by other authors (e.g., Burnell and Hedges, 1990).

Like the majority of pre-Guyer and Savage (1989) studies, most modern work has focused on phylogenies of smaller groups of *Anolis* (e.g., Hedges and Burnell, 1990; Poe, 1998; Giannisi et al., 2000; Schneider et al., 2001; Creer et al., 2001; Nicholson, 2002). Two exceptions are Burnell and Hedges (1990), who studied 50 Caribbean species using allozyme data, and Jackman et al. (1999), who studied 44 Caribbean and 9 mainland species using DNA sequences. The Burnell and Hedges (1990) study included only 12 informative loci, and so was unable to resolve many relationships (a strict consensus of most-parsimonious trees from their data is unresolved but for two clades). The Jackman et al. (1999) study found well-supported species groups that were in accord with part of the Etheridge-Williams paradigm and a monophyletic Beta section. But in spite of a relatively large number of data (861 parsimony-informative sites), deep relationships were only weakly resolved.

Materials and Methods

Taxa

At least two species were included from each of the infrageneric groups of Savage and Guyer (1989) except for the *laevis* series and the *onca* series, for which only one species was included. More than two species were included for all of the better-studied groups for which several species were available. Representatives of the formerly recognized anoline genera *Chamaeleolis*, *Chamaelinorops* (synon-

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ymized with *Anolis* by Hass et al., 1993), and *Phenacosaurus* (synonymized with *Anolis* by Poe, 1998; see also Etheridge, 1959) also were included. This selection of species spans the geographic and phenotypic diversity in *Anolis* and allows testing of the monophyly of almost all named genera and smaller groups of *Anolis*. A total of 174 *Anolis* species was analyzed.

Species from the genera *Enyalius*, *Urostrophus*, *Anisolepis*, *Polychrus*, and *Leiocephalus* were included as outgroups. Frost and Etheridge (1989) and Frost et al. (2001) found these genera to be close relatives of *Anolis*. *Leiocephalus* was included because it has been scored for the DNA sequence data of Hass et al. (1993) and Jackman et al. (1999), respectively. Schulte et al. (2003) found additional taxa to be close relatives of *Anolis* (e.g., *Liolaemus* of their Trodidurinae*). However the interrelationships among putative *Anolis* relatives were resolved with only weak support (e.g., decay index of 1 supporting some Trodidurines as sister taxa to *Anolis* + *Leiocephalus*). Under these conditions of weak support, choice of outgroup becomes somewhat arbitrary. Although the outgroup sample of this paper is not comprehensive, all seven outgroup species included in this paper have been found to be close relatives of *Anolis* in other phylogenetic analyses.

Characters

Non-morphological characters.—Non-morphological data is included from chromosomes, allozymes, DNA, and immunology. Three chromosome characters could be scored for 97 *Anolis* species and two outgroup species. Chromosome data were taken from Webster (1974), Webster et al. (1972), and Gorman (1973). Allozyme data are incorporated from Gorman and Kim (1976) for the *bimaculatus* series (nine species; six parsimony-informative loci), Gorman et al. (1983) for the *cristatellus* series (10 species; 16 loci), Lieb (1981) for the *gadovii* and *nebulosus* series (7 species; 13 loci), Yang et al. (1974) for the *roquet* series (7 species, 9 loci), and Burnell and Hedges (1990) for 44 Caribbean species (12 loci). These data were coded with the locus as the character and the modal allele as the character state. Each study was coded separately. Although many of these studies analyze the same loci, there is very little overlap in taxonomic coverage. Data from Hedges and Burnell (1990) on the Jamaican *grahami* series and from Case and Williams (1987) for seven *Anolis* species is omitted because of extensive overlap in taxa and loci with the other studies.

The cytochrome *b* mitochondrial DNA sequence data of Giannisi et al. (2000) were included for the *roquet* series (7 species; 97 parsimony-informative characters). Cytochrome *b* data also were included from Schneider et al. (2001) for the *bimaculatus* series (9 species, 193 parsimony-informative characters), although this could not be aligned with the *roquet* series data because of the great divergence between these groups (see Poe [2000] for an example of long branch attraction between these groups). The 16S mitochondrial DNA sequence data from Hass et al. (1993) for 25 *Anolis* species and two outgroups were included (67 parsimony-informative sites). Jackman et al.'s (1999) mitochondrial DNA sequence data from the NADH dehydrogenase subunit 2 gene and five transfer RNAs was combined with recent mitochondrial data from Glor et al. (2001), Jackman et al. (2002), Losos et al. (2003), and Harmon et al. (2003) for a total of 859 parsimony-informative characters for 98 *Anolis* species and one outgroup. Nicholson's (2002) nuclear ITS data were included for 42 *Anolis* species (317 parsimony-informative characters). A single character reflecting immunological distance was coded for eight species (Hass et al., 1993). Only parsimony-informative characters are analyzed and discussed in the character list (see below).

Morphological characters.—Morphological data were obtained by examination of museum specimens and from the literature. Skull characters were taken from Poe (1998) and new characters were discovered during examination of specimens. States for skull characters were recorded from dry skulls. Postcranial osteological characters are from Etheridge (1959), and states for these were taken from original data sheets provided by Richard Etheridge, or from dry skeletons or dissection of preserved specimens. External characters were taken from literature sources and were discovered during examination of specimens. External character states were scored from alcohol-preserved specimens, with some exceptions discussed in the character descriptions.

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Morphological character selection criteria followed the recommendations of Poe and Wiens (2000). That is, I included characters that varied intraspecifically and continuously (as well as discrete, intraspecifically invariant characters) if they appeared to vary independently. Intraspecifically varying characters were coded with frequency coding (Wiens, 1995) if two states were recognized, or with the modal state if more than two states were recognized. The frequency approach has been shown to perform well in simulation studies (Wiens and Servedio, 1997). Characters were considered "ordered" if a morphocline of states was more believable than independent evolution of states. In the character descriptions (below), binary characters are described in terms of alternative states a and z. In Appendix 2, matrix entry a corresponds to 100% of specimens scored with the condition listed as state a in the character descriptions, entry z corresponds to 100% of specimens scored with the state listed as state z, and intermediate letters correspond to intermediate frequencies of these states (see Wiens, 1995).

Some quantitatively measured characters were corrected for size effects using linear regression (see below). In these cases, several transformations of independent and dependent variables were attempted and the transformation(s) (or nontransformation) that best met regression assumptions was used. Mensural characters were coded with Thiele's (1993) gap-weighting method, with extreme conditions coded as ordered states a and z, respectively, and interrmediate measurements coded as intermediate letters. Outgroup scores were excluded from initial assignment of gap-weighted states, so that extreme conditions in outgroups would not affect weighting of state changes between ingroup species (e.g., *Enyalius iheringi* has a relatively shorter head than any *Anolis* species). Outgroup species were assigned states that corresponded to the conditions in *Anolis* that were closest to their conditions (e.g., *Enyalius iheringi* was assigned the same state as the *Anolis* species that possesses the relatively shortest head).

The considerable size of this morphological data matrix (91 characters × 181 taxa) entreats several difficulties with characterization of variation and accurate scoring of characters. To minimize bias in scoring, I attempted to define states that could be scored unambiguously relative to observable landmarks—i.e., "contact vs. noncontact"—rather than rely on my own subjective impression of differences—i.e., "large vs. small". After initial scoring, I rechecked almost every morphological character state in the matrix relative to my own data sheets, published observations, and additional specimens, to confirm codings for particular characters. Thus the number of specimens examined is much larger than the number in Appendix 1. In many cases I re-scored the same specimens to ensure that my initial observations were repeatable. However, it of course was impossible to compare all species and specimens relative to all others simultaneously.

The morphological character matrix for this paper is an updated version of the matrix in Poe (2000). Three characters were omitted (Numbers 40, 77, 78) from Poe (2000) because of characterization difficulties that were discovered upon examination of additional specimens. Also, several matrix entries were corrected due to information from additional specimens examined.

One-hundred seventy-three of 174 *Anolis* species and all 7 outgroup species were scored for most of the 50 external characters (*Anolis* [*Phenacosaurus*] *nicefori*, included for its DNA data, was scored for only a few characters), 162 *Anolis* species and 7 outgroup species were scored for most of the 7 postcranial osteological characters, and 162 *Anolis* species and 6 outgroup species were scored for most of the 38 skull characters. Over 2000 specimens were examined for this study. Specimens examined for initial scoring are listed in Appendix 1.

Characters listed below are described if they have not appeared before in a phylogenetic analysis of *Anolis*. If they have been described previously, the reference is given. Many characters, such as keeling of scales, are of traditional importance for *Anolis* (indeed, for lizard) systematics, and it is difficult to find the absolute first reference where this character has been used. Most of such "public domain" characters are listed without reference, with no claim implied for proprietary originality. Character state assignments for each species are listed in Appendix 2 for the morphological characters (Nos. 1–91). States for other

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characters have been published previously; references for these are given.

Several characters in addition to those used in this paper were scored but discarded due to characterization difficulties. These may be useful for analyses of smaller groups of *Anolis*, or of all of *Anolis* under some different characterization than I attempted. Some of these characters include the relative lengths of the fourth and fifth toes, color of dorsum and venter, color of dewlap, keeling of limbs, sleeping posture (limbs flexed in some species, straight in others), voice (some anoles squeak when handled), scalation posterior to supraciliaries (enlarged regular rows in some species, jumbled scales in others), structure of ilium (Lazell, 1969), middorsal crest, structure of teeth, lateral body scalation (homogeneous in some species, mixture of large and small scales in others), blue pigment at edge of mouth (Myers, 1971), number of toe lamellae, display behavior, elongate nasal appendage (Williams, 1979), and prehensality of the tail.

Character Descriptions

1. Maximum male snout-to-vent length 38 mm (a); 188 mm (z). Gap weighted. Poe (1998). Data are from the *Anolis* handlist (Williams et al., 1995).
2. Ratio of maximum female snout-to-vent length to maximum male snout to vent length 1.06 (a); 0.57 (z). Gap weighted. Poe (1998). Data are from the *Anolis* Handlist (Williams et al., 1995).
3. Length of thigh short (a); long (z). Gap weighted. The leg was measured from the ventral midline of the specimen lateral to the knee, with the limb aligned perpendicular to the body and bent at the knee. Bivariate plots of snout-to-vent length vs. femoral length demonstrated that this character is correlated with size. In order to correct for size, thigh length was regressed on (independent variable) SVL using natural-log-transformed mean values for each species as data points. Residual values of these regressions for each species were input as raw data for gap weighting. Although this character has been suggested to be an "ecomorph character" in some Caribbean forms (e.g., Williams, 1983; Losos et al., 1998) and thus subject to considerable convergence, it remains a useful and widely-used systematic character in *Anolis* from other areas (e.g., Central America; Savage and Talbot, 1978).
4. Length of head short (a); long (z). Gap weighted. Some *Anolis* species (e.g., *A. longiceps*) have long snouts whereas others (e.g., *A. capito*) have short snouts. Head length was measured from the anterior of the ear opening to the tip of the snout. Head length was found to be correlated with SVL. Head length was regressed on SVL using natural-log-transformed mean values for each species as data points. Residuals were gap-weighted. This character also is a likely "ecomorph character" (Williams, 1983; Losos et al., 1998). However, many species (e.g., *A. porcatus* and *A. allisoni*) apparently share similar head shapes owing not to convergence but rather to common ancestry.
5. Width of head narrow (a); broad (z). Gap weighted. *Anolis* species may have broad (e.g., *A. cybotes*) or narrow (e.g., *A. sheplani*) heads. Head width was measured between the posteroventral corners of the orbits (generally the widest part of the skull). Head width was regressed on SVL using mean raw values for each species as data points. Raw values were found to better meet regression assumptions than transformed values. Residuals for each species were gap weighted. Surprisingly, this character does not appear to be strongly correlated with character 4 (head length) after correction for size.
6. Height of ear small (a); large (z). Gap weighted. Ear size varies strikingly in *Anolis*. Some species (e.g., *A. vermiculatus*) have a prominent oval tympanum, whereas in others (e.g., *A. darlingtoni*) the ear opening is barely visible. This character was found to be correlated with size. In order to correct for size, ear height was regressed on head length using natural-log-transformed mean values for each species as data points. Residuals for each species were gap weighted. Differences in ear shape also occur, but these were difficult to characterize.
7. Interparietal scale large (a); about equal to surrounding scales (z). Gap weighted. In some *Anolis* species (e.g., *A. argenteolus*), the interparietal is several times the size of

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the surrounding scales. In others (e.g., *A. fraseri*), the interparietal is approximately the same size as the surrounding scales. On each specimen examined, I measured the length of the interparietal and the length of the second-largest scale in lateral contact with the interparietal, excluding the supraorbital semicircles. Mean values of these measurements were compiled for each species, natural-log transformed, and analyzed with linear regression using interparietal length as the independent variable. Residuals were gap weighted.

8. Length of tail. Gap weighted. Data were taken from Williams et al. (1995), who recognized five states: Tail length about equal to SVL (a); about 1.5 times SVL (h); about two times SVL (m); about 2.5 times SVL (s); more than 2.8 times SVL (z). Gap-weighted. Species reported to vary for this character were assigned the median score. As with characters 3 and 4, this character has been suggested to be an "ecomorph character" for some species (e.g., Williams, 1983; Losos et al., 1998). However, there are obvious cases where similarities in tail length are due to phylogeny rather than adaptive response (e.g., similarly-sized tails in *A. clivicola* and *A. alutaceus*), so I include this character in phylogenetic analysis.
9. Toepads overlapping first phalanx (0); not distinct from first phalanx (1); absent (2). Unordered. Williams et al. (1995). State 2 is added to Poe's (1998) character 2.
10. Enlarged postanal scales present in males (a); absent in males (z). Frequency coded. Data and character are from the *Anolis* Handlist (Williams et al., 1995).
11. Row of large spinose middorsal caudal scales separated by smaller smooth scales absent (a); present (z). Frequency coded. This character is a modification of Poe's (1998) character 12 (see also Hedges et al., 1989) to note the condition on the tail (derived condition seen in *A. insolitus*, *A. sheplani*, and *A. placidus*) rather than on the body (derived condition seen only in *A. sheplani* and *A. placidus*).
12. Tail crest absent (a); present in largest adult males (z). Frequency coded. Presence and size of tail crest appears to be largely size and sex dependent. Thus, the character is evaluated only in large adult males.
13. Number of rows of enlarged middorsal scales 0–4 (a); 5 or more (z). Frequency coded. Most species of *Anolis* have either two rows of middorsal scales slightly larger than the surrounding scales (e.g., *A. cybotes*) or a middorsal band of 7 or more abruptly enlarged scales (e.g., *A. semilineatus*).
14. Each ventral scale is bordered posteriorly by two scales (a); by three scales (z). Frequency coded. State "a" includes species with rectangular ventrals in transverse rows (e.g., *A. carolinensis*). State "z" includes species with the posterior border of the ventral rounded or pointed such that scales appear to be in diagonal overlapping rows (e.g., *A. cybotes*).
15. Base of tail round (a); laterally compressed (z). Frequency coded. On each specimen, cross-sectional height and width of the tail were examined at the point where the knee would reach the tail if the leg were folded back. If the height of the tail is greater than the greatest width, state z is assigned.
16. Male dewlap extends posterior past arms (0); to arms or shorter (1); absent (2). Ordered. This character and data were taken directly from the *Anolis* Handlist (Williams et al., 1995; supplemented by examination of specimens) however coding is slightly different. Williams et al. (1995) characterized *Anolis* dewlaps as "large" if the dewlap extends posteriorly past the arms, "intermediate" if it reaches the arms, "small" if it does not reach the arms, and "absent" if nonexistent. Because the arms are a convenient landmark for state delimitation and "intermediate" and "small" are morphologically very similar conditions in *Anolis*—there is more variation within the state "large" than between the other states—I lump the middle two conditions into state (1). Species with only "large" scores in Williams et al. (1995) are assigned state (0); other species are assigned state (1), except for two species (*A. bartschi*, *A. vermiculatus*) for which dewlap is absent in males, which are assigned state (2).
17. Female dewlap extends posterior past

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arms (0); to arms or shorter (1); absent (2). Ordered. Many female *Anolis* species completely lack a dewlap. Coding is as for male dewlap.

18. Tail uniformly patterned (a); base of tail purple, posterior part green or brown (z). Frequency coded. Underwood and Williams (1959).
19. Mean number of dorsal scales in 5% of SVL 2.5 (a); 17 (z). Gap weighted. Number of scales in 5% of SVL is counted just lateral to the dorsal midline. Many authors (e.g., Lazell, 1972) have used some measure of scale size as a systematic character.
20. Mean number of ventral scales in 5% of SVL 2.75 (a); 14.3 (z). Gap weighted. Number of scales in 5% of SVL is counted longitudinally on the posterior belly area.
21. Scales on dewlap in rows of single scales (a); with at least one double row (z). Frequency coded. Species with scattered dewlap scales or dewlap's mostly lacking scales are coded as "?".
22. Middorsal caudal scale rows single (a); double (z). Frequency coded. Williams et al. (1970).
23. Axillary pocket absent (a); deep, tubelike (z). Frequency coded.
24. Scales of midnuchal area similar to middorsal scales (a); in continuous row of bulbous scales distinct from dorsal scales (z). Frequency coded. *Anolis darlingtoni* and *A. insolitus* possess state z.
25. Transparent scales in lower eyelid absent (a); present (z). Frequency coded. Williams and Hecht (1955). *Anolis argenteolus* has two transparent scales in the lower eyelid, *A. lucius* has three, and other *Anolis* have none.
26. Mental scale partially divided (a); completely divided (z). Frequency coded. In some anole species (e.g., *A. griseus*) the mental is longitudinally split posteriorly but not anteriorly (state a); in others (e.g., *A. carolinensis*) this division is complete (state z).
27. Mental scale broader than rostral scale (a); rostral broader than mental (z). Frequency coded. The comparison is made along the rim of the mouth. In most species (e.g., *A. sagrei*), the mental extends farther posteriorly along the mouth than the rostral (state a) whereas in others (e.g., *A. baleatus*) the rostral is broader (state z).
28. Subocular scales and supralabial scales in contact (a); separated by one or more rows of scales (z). Frequency coded.
29. Mean number of scales across the snout 2.5 (a); 19 (z). Gap weighted. This is a minimum count, made between the second canthals. Poe (1998) used median values from the *Anolis* Handlist (Williams et al., 1995) for this character. Specimens were scored for the data for this paper.
30. Mean number of postmental scales 3.25 (a); 9.75 (z). Gap weighted. Poe (1998) used median values from the *Anolis* Handlist (Williams et al., 1995) for this count. Specimens were scored for the data for this paper.
31. Posterior border of mental scale concave (a); straight or convex (z). Frequency coded.
32. Supraorbital semicircles separated by one or more rows of scales (a); in contact (z). Frequency coded.
33. Preoccipital scale absent (a); present (z). Frequency coded. The preoccipital is an enlarged scale directly anterior to the interparietal.
34. Middorsal scales of the snout not in regular pattern (a); arranged in two parallel rows that extend from the level of the second canthals to the nares (z). Frequency coded.
35. Posterodorsal edge of rostral smooth (a); cleft (z). Frequency coded.
36. Anteromost aspect of rostral scale is even with lower jaw (a); overlaps lower jaw (z). Frequency coded. Although extensive interspecific variation occurs in this character and scoring for most specimens is straightforward, continuous variation precludes erection of a simple character state boundary. Operationally, I compared borderline specimens to USNM (National Museum of Natural History) 347286 (*A. oxylophus*). If overlap was equal to or greater than that seen on this specimen, state z was assigned.
37. Color of iris dark brown (0); yellow (1); blue or grey (2); green (3) red. Unordered. Data for this character were taken from the literature, mainly from Schwartz and

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Henderson (1991) and the *Anolis* Handlist (Williams et al., 1995).

38. Modal number of supraciliary scales zero (0); one (1); two (2); three (3). Ordered. Supraciliaries are elongate scales along the dorsal rim of the orbit.
39. Modal nasal scale type: anterior nasal in contact with rostral (0); divided anterior nasal in contact with rostral (1); circumnasal separated from rostral by one scale, not in contact with supralabial (2); external naris separated from rostral by two scales, not in contact with supralabial (3); external naris separated from rostral by three or more scales, not in contact with supralabial (4); circumnasal in contact with rostral (5); circumnasal in contact with supralabial, separated from rostral by one scale (6); circumnasal in contact with supralabial, separated from rostral by two or more scales (7). Most of these conditions are described and figured in Williams et al. (1995). States 3 and 4 generally involve circumnasal scales but occasionally incorporate an anterior nasal.

	0	1	2	3	4	5	6	7
[0]	0	1	1	1	2	2	2	2
[1]	1	.	1	1	2	2	2	2
[2]	1	1	.	1	2	1	1	2
[3]	1	1	1	.	1	2	2	1
[4]	2	2	2	1	.	3	2	1
[5]	2	2	1	2	3	.	1	2
[6]	2	2	1	2	2	1	.	1
[7]	2	2	2	1	1	2	1	.

Each species is coded with its modal state. Transformations are weighted according to the following step matrix. Change costs were multiplied by 1000 in the analyses to maintain comparability with other characters (see below).

40. Keeling of dorsals, ventrals, supradigitals, and head scales. Unordered. Even weak keeling was scored as "keeled." I originally took data on the keeling of each of these regions with the expectation that each would be a separate character. However it became apparent in the course of this study that there are strong constraints on which combinations of scalation are possible. For example, 89% of *Anolis* species in this study display one of only four of the sixteen possible combinations of keeling (states 0, 1, 2, and c; see below). This distribution is very different from that expected if there is random covariation (results not shown). For the purposes of this study, each unique combination of scalation is treated as a separate state. The following states are listed in order of whether keels (k) or smooth scales (s) are observed on head scales, ventrals, dorsals, and supradigitals, respectively. For example, "sssk" means that all surfaces except supradigitals are smooth. (0) kkkk; (1) ssss; (2) kskk; (3) kksk; (4) kkks; (5) kkss; (6) ksks; (7) kssk; (8) ksss; (9) skkk; (a) skks; (b) sksk; (c) sskk; (d) sssk; (e) ssks; (f) skss.
41. Scales in supraocular disc vary continuously in size and are bordered medially by an unbroken row of small scales (0); vary continuously in size and are bordered medially by an incomplete row of small scales (1); with one to three abruptly enlarged scales and bordered medially by an unbroken row of small scales (2); with one to three abruptly enlarged scales and bordered medially by an incomplete row of small scales (3); about equal in size (4). Species are assigned their modal condition. "Abruptly enlarged" is operationally defined as a difference in size by a factor of two. Thus, species with states 2 and 3 display two discrete size classes of scales in the supraocular disc—a group of one or more scales that are all at least twice the size of the next largest scale, and a series of smaller scales that vary in size continuously down to the smallest scales present.

	0	1	2	3
[0]	.	1	1	2
[1]	1	.	2	1
[2]	1	2	.	1
[3]	2	1	1	.

Character changes were weighted according to the following step matrix. Change costs were multiplied by 1000 in the analyses to maintain comparability with other characters (see below).

42. Lining of throat light (a); black (z). Frequency coded. Character and data are from Underwood and Williams (1959).
43. Fold of skin extending over dorsal rim of

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ear opening absent (a); present (z). Frequency coded.

44. Modal number of enlarged sublabial scales zero (0); one (1); two or more (2). Ordered. Sublabials are scales in the gular region, medial and running parallel to the infralabials (e.g., Williams et al., 1995). These are counted back from the mental, and are considered to be "enlarged" if at least twice the size of any medial scale.
45. Frontal depression present (a); absent, top of snout is flat (z). Frequency coded. Although there are clear differences between several species in degree of frontal depression (e.g., *A. garmani* has a very flat head, *A. reconditus* has a pronounced depression), I found it impossible to erect a satisfactory objectively recognizable character state boundary for this character. Thus, any borderline species are assigned "?".
46. Interparietal scale separated from supraorbital semicircles by one or more rows of scales (a); in contact with supraorbital semicircles (z). Frequency coded.
47. Modal postxiphisternal inscriptional rib formula 4: 3 (0); 5: 1 (1); 4: 2 (2); 5: 0 (3); 4: 1 (4); 3: 2 (5); 4: 0 (6); 3: 1 (7); 2: 2 (8); 1: 3 (9); 2: 1 (a); 5: 2 (b). Etheridge (1959). Data is from original data sheets provided by Richard Etheridge. Character changes

	0	1	2	3	4	5	6	7	8	9	a	b
[0]	.	2	1	3	2	2	3	3	3	3	4	1
[1]	2	.	1	1	1	2	2	2	3	4	3	1
[2]	1	1	.	2	1	1	2	2	2	3	3	1
[3]	3	1	2	.	1	2	1	2	3	4	3	2
[4]	2	1	1	1	.	1	1	1	2	3	2	2
[5]	2	2	1	2	1	.	2	1	1	2	2	2
[6]	3	2	2	1	1	2	.	1	2	3	2	3
[7]	3	2	2	2	1	1	1	.	1	2	1	3
[8]	3	3	2	3	2	1	2	1	.	1	1	3
[9]	3	4	3	4	3	2	3	2	1	.	2	4
[a]	4	3	3	3	2	2	2	1	1	2	.	4
[b]	1	1	1	2	2	2	3	3	3	4	4	.

are weighted according to the following stepmatrix, adapted from Jackman et al. (1999) Change costs were multiplied by 1000 in the analyses to maintain comparability with other characters (see below).

48. Modal number of sternal ribs two (0); three (1); four (2). Ordered. Etheridge and de Queiroz (1988). Data is from Etheridge and de Queiroz (1988), Frost and Etheridge (1989), and Williams (1989).
49. Caudal vertebrae are Alpha type (0); Beta type (1); *Chamaelinorops* type (2); *Basiliscus* type (3); *Sceloporus* type (4). Etheridge (1959). Unordered. Data is from data sheets provided by Richard Etheridge for *Anolis* and from Etheridge and de Queiroz (1988) for outgroups.
50. Interclavicle arrow-shaped (a); T-shaped (z). Frequency coded. Etheridge (1959). Data is from data sheets provided by Richard Etheridge and from Williams (1989).
51. Modal number of presacral vertebrae 24 (0); 23 (1); 22 (2). Ordered. Etheridge (1959). Data is from original data sheets provided by Richard Etheridge.
52. Modal number of lumbar vertebrae three (0); four (1); five (2); six (3). Ordered. Etheridge (1959). Data is from original data sheets provided by Richard Etheridge.
53. Modal number of caudal vertebrae anterior to first autotomic vertebrae eleven (0), ten (1), nine (2), eight (3), seven (4), six (5), five (6). Ordered. Etheridge (1959). Data is from original data sheets provided by Richard Etheridge. Species that lack autotomy were coded "?".
54. Caudal autotomy septa present (a); absent (z). Frequency coded. Etheridge (1959). Data is from Etheridge (1959) and Williams (1989).
55. Supraoccipital cresting continuous across supraoccipital (0); lateral processes distinct from supraoccipital crest (1); single narrow central process (2). Unordered. Species are assigned their modal condition. State 2 is added to character 105 of Poe (1998).
56. Dorsal surface of skull smooth (a); rugose with bony tubercles (z). Frequency coded. In most *Anolis* the surface of the skull is smooth. But in some species (e.g., *A. equestris*) the rugosity is developed into hard pustulate tubercles. Individual specimens were assigned whatever condition predominates on the surface of the skull. Species with pronounced wrinkling but

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not pustules (e.g., *A. darlingtoni*) were coded as intermediate (state n).

57. Parietal crests form a trapezoid (0); V (1); Y (2); Y with parietal spur (3). Ordered. Etheridge (1959; see also Poe [1998]). Each species is coded with its modal state.
58. Anterolateral corners of parietal crests reach posterolateral corners of frontal (a); reach medial to posterolateral corners of frontal (z). Frequency coded.
59. Parietal casque absent (a); present (z). Frequency coded. In some species (e.g., *A. equestris*) the roof of the parietal extends posterolaterally, shelf-like, over the supratemporal processes of the parietal to form a casque (state z).
60. Pineal foramen at parietal/frontal suture (a); in parietal (z). Frequency coded. Etheridge (1959).
61. Supratemporal processes leave supraoccipital exposed above (a); extend over supraoccipital (z). Frequency coded. Etheridge (1959; see also Poe [1998]).
62. Postfrontal present (a); absent (z). Frequency coded Poe (1998).
63. Prefrontal contacts nasal (a); is separated from nasal by frontal and maxilla (z). Frequency coded Poe (1998).
64. Frontal sutures only with nasals anteriorly (0); is separated from nasals by open gap (1); contacts premaxilla and nasals anteriorly (2). Unordered. Poe (1998). State 2 is added to Poe's (1998) character 94. Species are assigned their modal state.
65. Parallel crests extending longitudinally down nasals from frontal to nares absent (a); present (z). Frequency coded.
66. Anterior edge of nasal forms posterior border of naris (a); does not reach naris (z). Frequency coded. Species for which the nasal forms a partial medial border to the naris are coded with the intermediate state (n).
67. Dorsal process of jugal terminates on posterior or medial aspect of postorbital (a); on lateral aspect of poorbital (z). Frequency coded. Poe (1998).
68. Contact between jugal and squamosal absent (a); present (z). Frequency coded. Poe (1998).
69. Posteroventral corner of jugal is anterior to posterior edge of jugal (a); posterior to posterior edge of jugal (z). Frequency coded. In species with state z (e.g., *A. cybotes*), the posterior edge of the jugal is concave; species with state a (e.g., *A. limifrons*) have a straight or convex posterior jugal.
70. Epipterygoid contacts parietal (a); does not contact parietal (z). Frequency coded. Poe (1998).
71. Pterygoid teeth present (a); absent (z). Frequency coded. Etheridge (1959; see also Poe [1998]).
72. Lateral edges of vomer smooth (a); with posteriorly directed lateral processes (z). Frequency coded. This character is similar to Poe's (1998) character 102 (palatine-vomer suture). However in this paper I combine states 0 (transverse suture, no processes) and 1 (posterolateral suture, no processes) into state (a) because the wider sample of taxa examined for this paper demonstrated continuous variation that made objective distinction between states 0 and 1 of Poe (1998) impossible.
73. Maxilla extends posteriorly to ectopterygoid (a); beyond ectopterygoid (z). Frequency coded. Poe (1998).
74. Basipterygoid crest absent (a); present (z). Frequency coded. Poe (1998). Jackman et al. (1999) called this structure a parabasisphenoid.
75. Quadrate lateral shelf absent (a); present (z). Frequency coded. Poe (1998).
76. Black pigment on skull absent (a); present over most bones on the dorsal surface of the skull (z). Frequency coded. Specimens were scored as state z if a majority of dorsal skull bones had black pigment; other conditions were scored as state a.
77. Premaxilla overlaps nasals laterally or is flush with them (a); nasal overlaps lateral edge of premaxilla (z). Frequency coded.
78. Posterior of skull slopes superiorly or is flat (a); slopes inferiorly (z). Frequency coded. If the posterior edge of the parietal is inferior to its anterior edge, a score of (z) is assigned.
79. Crenulation along lateral edges of parietal absent (a); present (z). Frequency coded. Poe (1998).
80. Parietal roof flat (a); convex (z). Frequency coded. Poe (1998).

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81. Posteriormost tooth is at least partially posterior to anterior mylohyoid foramen (a); posteriormost tooth is at least partially anterior to anterior mylohyoid foramen (m); posteriormost tooth is completely anterior to anterior mylohyoid foramen (z). Coding follows the frequency analysis of Poe (1998).
82. Angular process of articular present, large (a); reduced or absent (z). Frequency coded. Williams (1989; see also Poe [1998]).
83. Posterior suture of dentary pronged (a); blunt (z). Frequency coded. Poe (1998).
84. Anteriormost aspect of posterior border of dentary is anterior to mandibular fossa (a); within mandibular fossa (z). Frequency coded. Poe (1998).
85. Splenial present, large (0); absent (1); present as anteromedial sliver (2). Unordered. Etheridge (1959; see also Poe [1998]). Each species is coded with its modal state. Although some *Anolis* species in the *bimaculatus* series demonstrate a fourth state—splenial present as ventral fragment—none of these species has this state as its modal condition.
86. Anteromedial process of coronoid extends anteriorly (a); ventral aspect of anteromedial process projects posteriorly (z). Frequency coded. Poe (1998).
87. Surangular foramen completely in surangular (a); bordered laterally by dentary (z). Frequency coded. Poe (1998).
88. Coronoid labial process absent (a); present (z). Frequency coded. Poe (1998; see also Etheridge and de Queiroz [1988]).
89. Posterolateral aspect of coronoid terminates anterior to supra-angular foramen (a); extends into or beyond supra-angular foramen (z). Frequency coded.
90. Jaw sculpturing in large adult males absent (0); *Chamaeleolis* type (1); *krugi* type (2); *cristatellus* type (3); *cybotes* type (4); wrinkled (5). Unordered. See Etheridge (1959) for descriptions of these conditions. Data for this character is from personal observation, supplemented by an unpublished manuscript by Ernest Williams and Susan Case provided by Ernest Williams. Each species is coded with its modal state.
91. Angular bone present (a); absent (z). Frequency coded. Etheridge (1959).

92–104. Allozyme loci. Lieb (1981).
105–116. Allozyme loci. Burnell and Hedges (1990).
117–183. Ribosomal RNA sequence sites from the 16S region. Hass et al. (1993). Sequences were downloaded form Genbank and aligned using Clustal W (Thompson et al., 1994) and by eye.
184–189. Allozyme loci. Gorman and Kim (1976).
190–205. Allozyme loci. Gorman et al. (1983).
206. Number of macrochromosomes 12 (0); 14 (1); 16 (2); 17 (3); 18 (4); 19 (5); 20 (6); 22 (7); 24 (8). Unordered. Webster (1974); Webster et al. (1972); Gorman (1973).
207. Number of microchromosomes 8 (0); 10 (1); 12 (2); 14 (3); 16 (4); 18 (5); 20 (6); 22 (7); 24 (8). Unordered. Webster (1974); Webster et al. (1972); Gorman (1973).
208. Sex chromosomes heterogeneity absent (0); XY (1); XXY (2). Unordered. Webster (1974); Webster et al. (1972); Gorman (1973).
209–217. Allozyme loci. Yang et al. (1974).

	1	2	3	4	5	6	7	8
[1]	.	712	1000	806	849	813	777	784
[2]	712	.	619	525	504	619	633	705
[3]	1000	619	.	820	655	597	734	763
[4]	806	525	820	.	424	388	604	755
[5]	849	504	655	424	.	223	583	683
[6]	813	619	597	388	223	.	489	727
[7]	777	633	734	604	583	489	.	791
[8]	784	705	763	755	683	727	791	.

218. Immunological distance. Hass et al.'s (1993) table 2 of immunological distances was entered as a step matrix (scaled such that maximum change was at equivalent parsimony cost to a change at a DNA site):

    1: *A carolinensis*, 2: *A. cuvieri*, 3: *A. cybotes*, 4: *A. valencienni*, 5: *A. cristatellus*, 6: *A. evermanni*, 7: *A. bimaculatus*, 8: *A.roquet* (this species was assigned the state for *A. extremus*, a species not included here that is sister to *A. roquet* based on chromosome [Gorman and Atkins, 1967] and DNA [Giannisi et al., 2000] data).

219–411. Mitochondrial DNA sequence sites

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from the cytochrome *b* region. Schneider et al. (2001). Sequences were downloaded from Genbank and aligned using Clustal W (Thompson et al., 1994) and by eye.

412–508. Mitochondrial DNA sequence sites from the cytochrome *b* region. Giannasi et al. (2000). Sequences were downloaded form Genbank and aligned using Clustal W (Thompson et al., 1994) and by eye. Their *Anolis oculatus* outgroup sequence was excluded because this sequence has been shown to suffer from long branch attraction relative to the *roquet* series (Poe, 2000).

509–820. Nuclear DNA sequence sites from the internal transcribed spacer region (Nicholson, 2002). Alignment used was provided by Nicholson (personal communication).

821–1680. Mitochondrial DNA sequence sites from NADH dehydrogenase subunit 2 and five transfer-RNA genes. Jackman et al. (1999). Glor et al. (2001). Losos et al. (2003). Harmon et al. (2003). Sequences were provided by Rich Glor. I used the alignment and site-exclusion scheme recommended by Glor (personal communication).

Analyses

I performed parsimony analyses of the morphological data in combination with the chromosome, DNA, immunological, and allozyme data using PAUP* 4 (Swofford, 2000). Parsimony was selected as an optimality criterion because it performed well in simulation studies of various types of characters (e.g., DNA, Huelsenbeck and Hillis, 1993; intraspecifically varying characters, Wiens and Servedio, 1997) and because the evolutionary process assumptions of this method seem reasonable for data matrices such as this one that incorporate several diverse types of data. Furthermore, most other optimality criteria (e.g., likelihood-based methods) are not yet suitable for matrices like this one that include weighted, ordered, and step-matrix characters.

More than 2000 searches for optimal trees were performed. For each search, taxa were added in random order to construct an initial tree, and the tree-bisection-reconnection (TBR) algorithm was used to find optimal trees for that replicate. Several additional searches were performed with an optimal tree (rather than a random-addition tree) as the starting tree and retention of trees slightly longer than the optimal tree for swapping; this approach allowed discovery of shorter trees than those found during initial rounds of swapping.

With some exceptions (noted in the character descriptions), characters were weighted such that a change between extreme states occurred at a parsimony cost of 1000. Binary morphological characters scored with frequency coding were coded with 26 ordered states (a–z), with change between adjacent states at a cost of 40 (= 1000/25). Thus, change from 0 to 100% "fixation" costs 1000 (see Wiens, 1995). Gap-weighted characters were scaled such that changes between extreme values (a ⇔ z) cost 2000. This scaling was adopted rather than a scaling of 1000 because the latter coding would effectively downweight gap-weighted characters relative to all other characters. This downweighting would occur because taxa are scored on a continuous (mensural) scale and only the extreme values are at maximum parsimony cost (see Thiele, 1993). This means that changes between any two taxa except between the two (or few) taxa with the highest and lowest measurements costs less than the maximum. If the maximum is set at 1000, then virtually all changes for these characters will cost less than change between non-gap coded characters, and these characters will contribute very little to tree construction.

Support for individual clades was evaluated using the bootstrap (Felsenstein, 1985*b*). For bootstrap analysis, 100 replicate matrices of the same size as the original were constructed by sampling characters with replacement. Replicate matrices were analyzed with parsimony using one round of random taxon addition and TBR branch swapping, and resulting trees were summarized by mapping bootstrap values greater than 50% onto the optimal parsimony tree.

For comparison, I also performed a parsimony analysis of the morphological data alone using the same tree-searching strategies described for the combined matrix.

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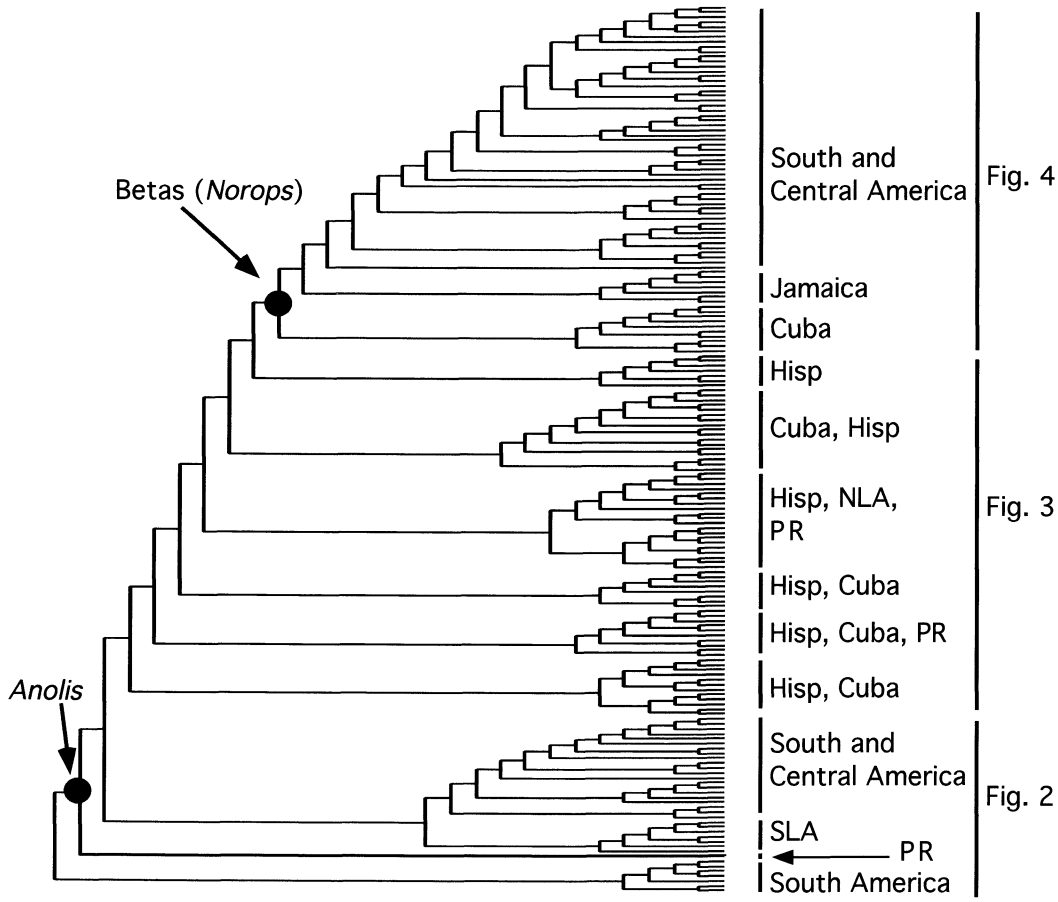

FIG. 1.—Overview of *Anolis* phylogeny recovered in this paper. NLA = Northern Lesser Antilles. PR = Puerto Rico. Hisp = Hispaniola.

RESULTS AND DISCUSSION

Optimal Tree

Analysis of the entire matrix produced one optimal tree of length 16834634 with consistency index (CI; Kluge and Farris, 1969) of 0.20 and retention index (RI; Farris, 1989) of 0.46 (Figs. 1–4). Very few clades are well-supported. This result is unsurprising, as many taxa were scored for only the 91 morphological characters, or even fewer for those species for which a dry skeleton was unavailable (e.g., *A. roosevelti*). Although these morphological characters appear to be adequate phylogenetic markers (RI for morphological characters on the combined tree is 0.54), there simply was not enough of them to resolve the relationships of 174 taxa with great confidence. An analysis of a more restricted sample of taxa (i.e., those that are "completely" scored) undoubtedly would produce higher bootstrap levels; however this tactic seems unlikely to result in a better estimate of relationships (e.g., Gauthier et al., 1988).

Many clades in the optimal tree are concordant with previously-held ideas of anole relationships (see below). For purposes of mapping character changes, this tree was rooted on the branch leading to *Leiocephalus*. Rather than review character support for each of the 179 clades in this tree, I only discuss support for clades that are likely to be of special interest, such as previously named or well-studied groups and clades that are con-

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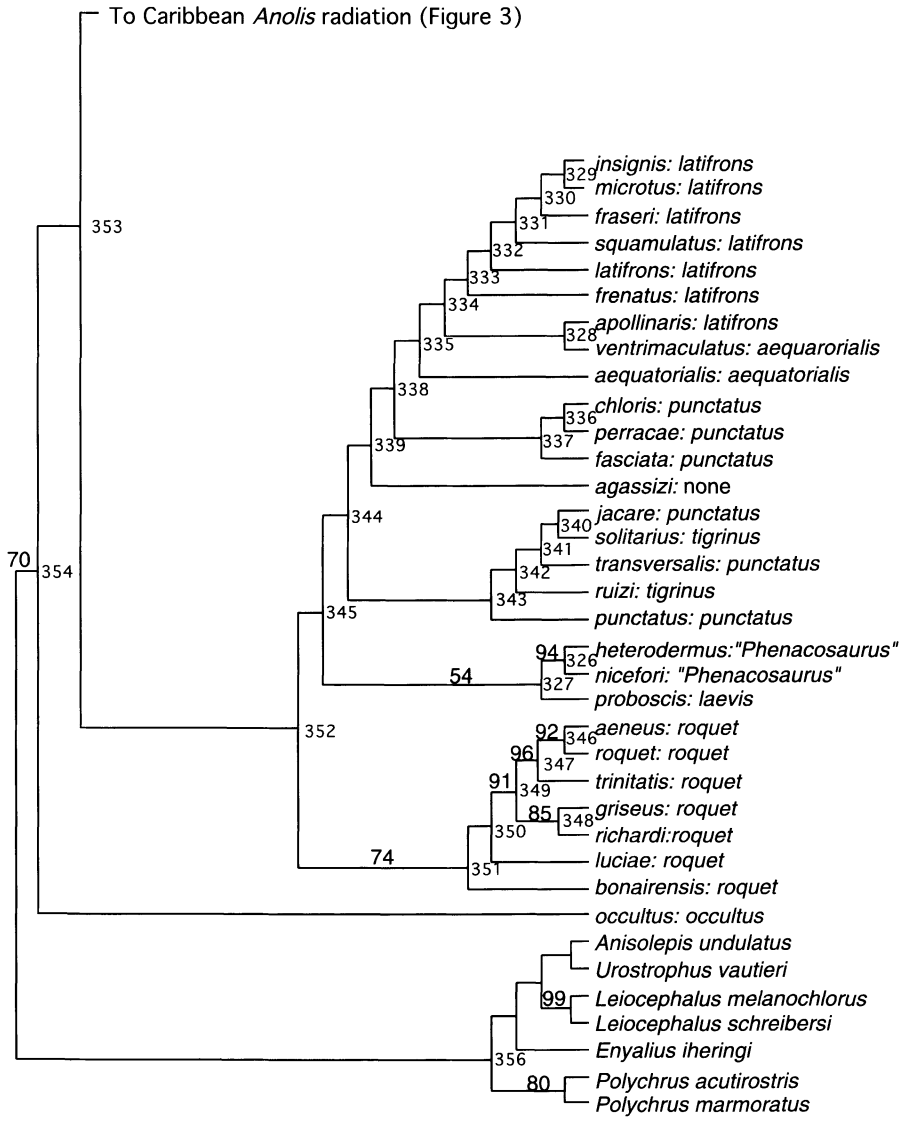

FIG. 2.—Phylogenetic estimate for basal *Anolis*. Species names are followed by series groupings according to Savage and Guyer (1989). Numbers above clades are bootstrap values. Numbers to the right of splits indicate nodes for purposes of listing apomorphic support in Appendix 3.

gruent with geographic breaks. I list all morphological support for discussed clades. See Appendix 2 for a complete list of morphological support for all clades under accelerated transformation optimization (ACCTRAN; Swofford, 2000). A full list of all changes (i.e., including DNA, allozyme, and chromosome data, under delayed or accelerated transformation optimization) is available on request.

The monophyly of *Anolis* (node 354 of Fig. 2; 70% bootstrap) is supported by 18 unambiguous synapomorphies (11 morphological), including greater sexual size dimorphism (character 2: a → e), longer snout (4: e → i), smaller ear (6: v → r), larger interparietal (7: v → p), presence of toepads (9: 2 → 0), reduced size of dorsal scales (19: n → s), more postmentals (30: a → f), Alpha type caudal vertebrae (49: 3 → 0), prefrontal bone

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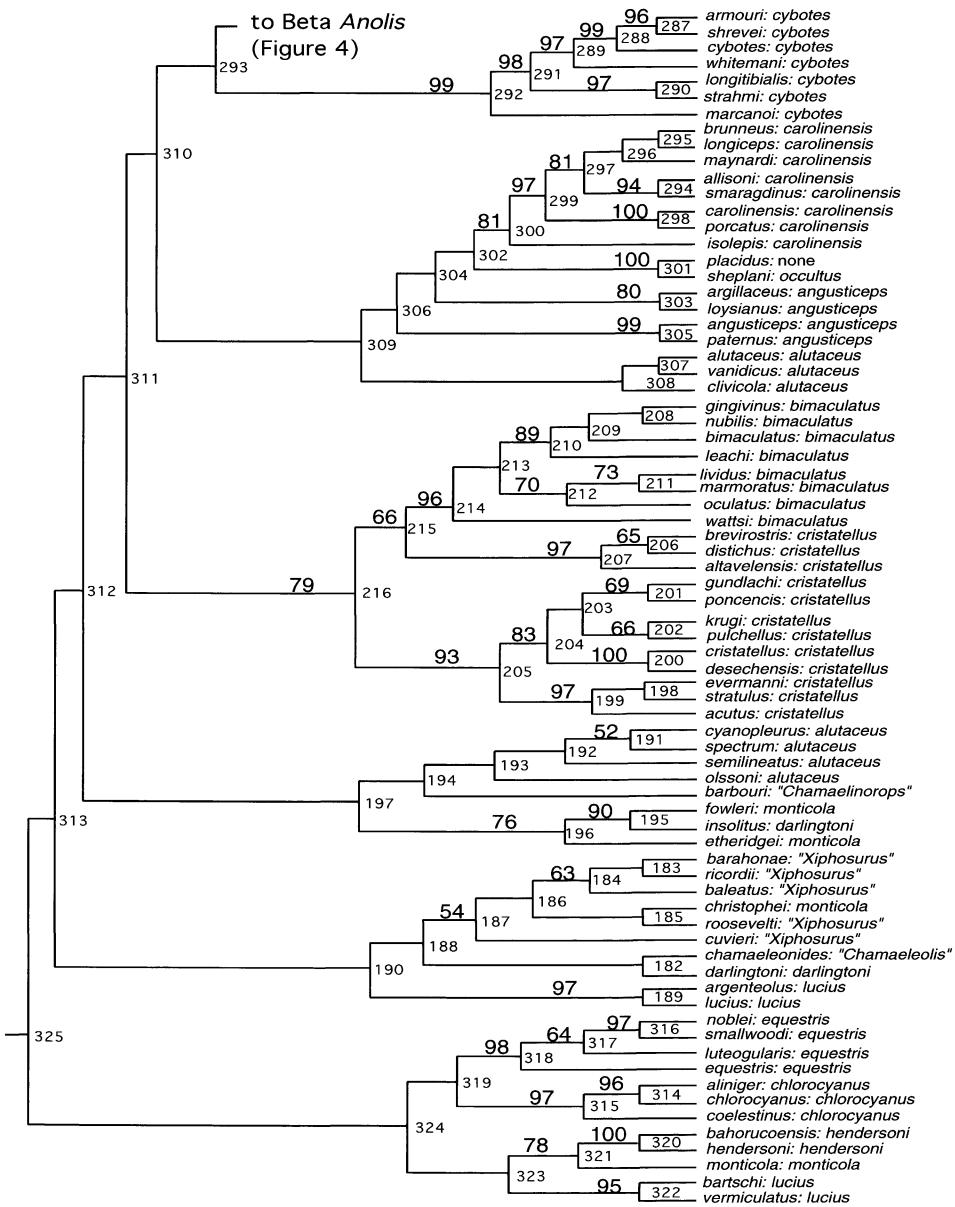

FIG. 3.—Phylogenetic estimate for Caribbean Alpha *Anolis*. Species names are followed by series groupings according to Savage and Guyer (1989). Numbers above clades are bootstrap values. Numbers to the right of splits indicate nodes for purposes of listing apomorphic support in Appendix 3.

separated from nasal (63: a → i), lengthened dentary (84: f → z), and loss of angular (91: a → z).

Anolis occultus, the most basal species, has been difficult to place due to its confusing mosaic of plesiomorphic and derived characters. Its placement here requires extensive homoplasy; 16 unambiguous morphological autapomorphies and 131 unambiguous DNA autapomorphies occur on the *A. occultus* branch.

The basal clade of *Anolis* (node 352) that is sister to the Caribbean *Anolis* radiation includes the South American giant anoles (*latifrons* series) and *punctatus*- and *tigrinus*-group species, the well-studied Southern

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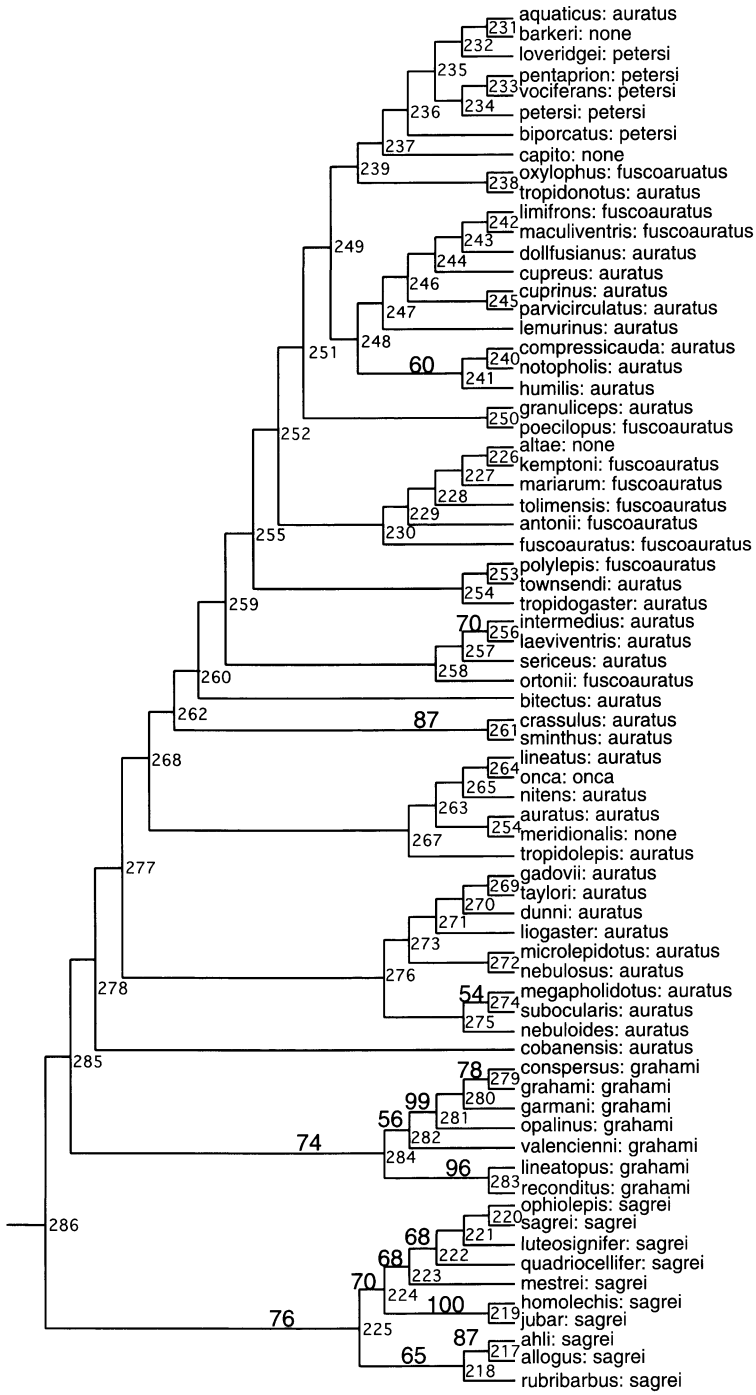

FIG. 4.—Phylogenetic estimate for Beta *Anolis*. Species names are followed by series groupings according to Savage and Guyer (1989). Numbers above clades are bootstrap values. Numbers to the right of splits indicate nodes for purposes of listing apomorphic support in Appendix 3.

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Lesser Antillean *roquet* group (node 351), and the anoles formerly placed in the genus *Phenacosaurus*. All these species have been considered primitive or basal since Etheridge's (1959) work. The *roquet* group clade (node 351; 74% bootstrap) is supported by six unambiguous morphological synapomorphies: greater sexual size dimorphism (2: j → m), smaller interparietal (7: n → k), more postmentals (30: m → o), posterior border of mental straight (31: w → z), supraorbital semicircles in contact (32: a → z), interparietal in contact with supraorbital semicircles (46: a → z). The unusual Ecuadorian anole *A. proboscis* is sister to the phenacosaur clade. Monophyly of the phenacosaurs (node 326; bootstrap 94%) is supported by six unambiguous morphological changes: reduced interparietal (7: n → y), fewer scales across snout (29: h → d), interparietal in contact with supraorbital semicircles (46: a → t), 5: 1 rib formula (47: 6 → 1), two sternal ribs (48: 1 → 0), 23 presacral vertebrae (51: 0 → 1). Node 352 corresponds to Guyer and Savage's (1986) *Dactyloa* but for the inclusion of "*Phenacosaurus*" (*heterodermus*, *nicefori*).

The grouping (Fig. 3: node 353) of the Caribbean Alpha *Anolis* with the Beta *Anolis* clade is supported by five morphological changes: longer head (4: o → r), broader head (5: j → l), rib formula 3:1 (47: 6 → 7), parietal crests Y-shaped (57: 1 → 2), supratemporal processes extend over supraoccipital (61: f → z). Within this clade are clades that include all or most of the members of the relatively well-studied Northern Antillean Alpha series. The clade of Cuban giants of the *equestris* series (node 318; 98% bootstrap) is supported by 92 unambiguous synapomorphies, including 24 morphological changes: larger size (1: m → z), broader head (5: l → q), smaller ear (6: l → i), smaller interparietal (7: s → t), round tail (15: m → a), large male dewlap (16: 1 → 0), large female dewlap (17: 1 → 0), larger dorsal scales (19: r → k), completely divided mental (26: i → u), rostral broader than mental (27: a → w), fewer scales across snout (29: i → d), fewer postmentals (30: l → j), zero supraciliaries (38: 1 → 0), nasal type 3 (39: 0 → 3), supraocular scales about equal in size (41: 0 → 4), three lumbar vertebrae (52: 1 → 0), nine anterior aseptate caudal vertebrae (53: 4 → 2), pustulate dorsal surface of skull (56: d → z), parietal casque (59: a → z), nasal does not reach naris (66: a → z), vomers with posteriorly directed processes (72: a → z), maxilla extends beyond ectopterygoid (73: q → u), reduced posterior extent of dentary (84: z → a), presence of splenial (85: 1 → 0). The Hispaniolan *chlorocyanus* series (node 315; 97% bootstrap) is supported by 46 unambiguous synapomorphies, including eight morphological changes: shorter thigh (3: o → n), compressed tail (15: m → z), posterior border of mental concave (31: t → d), greater keeling (40: 1 → 2), parietal crests V-shaped (57: 2 → 1), supraoccipital exposed (61: z → a), maxilla extends to ectopterygoid (73: q → a), black pigment on skull (76: a → z). Monophyly of the Hispaniolan *hendersoni* series (node 320; 100%) is supported by 48 unambiguous synapomorphies, 11 of which are morphological changes: smaller size (1: g → f), longer head (4: r → y), smaller ear (6: r → q), smaller ventral scales (20: o → n), mental scale completely divided (26: i → t), more postmentals (30: m → o), rostral overlap (36: a → g), supraoccipital exposed (61: r → n), jugal squamosal contact (68: e → a), maxilla extends to ectopterygoid (73: q → g), splenial present (85: 1 → 0). The *cuvieri* series ("*Xiphosurus*") plus *A. christophei* (node 186; 54% bootstrap) is supported by 22 unambiguous synapomorphies, including presence of a tail crest (12: a → z). Within this group the three Hispaniolan species (*A. ricordi*, *A. baleatus*, *A. barahonae*) form a clade (node 184; 63% bootstrap).

The *bimaculatus*, *cristatellus*, and *distichus* groups form a clade (node 216; 79% bootstrap) supported by 25 unambiguous synapomorphies, including five morphological changes: more dorsal scales (19: t → u), fewer scales across snout (29: f → e), supraorbital semicircle contact (32: a → t), interclavicle T-shaped (50: z → a), lack of jugal-squamosal contact (68: g → a). The Northern Lesser Antillean *bimaculatus* series (node 214; 96% bootstrap) is supported by 27 unambiguous synapomorphies, including two morphological changes: dewlap scales in double rows (21: l → m), blunt posterior suture of dentary (83: g → z). The Hispaniolan *distichus* series (node 207; bootstrap 97%) is supported by 10 unambiguous synapomorphies, all of which are morphological: shorter thigh (4: s → m), broader

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head (5: o → p), shorter tail (8: p → m), fewer scales across snout (29: e → d), preoccipital scale (33: a → m), parallel rows of snout scales (34: a → z), cleft rostral (35: a → t), all scales smooth (40: 0 → 1), interparietal contacts supraorbital semicircles (46: a → g), prefrontal contacts nasal (63: z → i). The Puerto Rican *cristatellus* series (node 205; 93% bootstrap) is supported by 19 unambiguous synapomorphies, including presence of pterygoid teeth (71: z → f).

The Cuban *carolinensis* series (node 300; 81%) is supported by 28 unambiguous synapomorphies, including four morphological changes: greater SVL (1: e → f), fewer dorsals (19: s → o), supraocular scales grade continuously in size (41: 2 → 0), more anterior mandibular toothline (81: t → z).

This series of Caribbean clades also includes the unusual terrestrial Hispaniolan species *A.* ("*Chamaelinorops*") *barbouri*, which groups with some Caribbean grass *Anolis* (node 194). This species appears tenuously placed, requiring 24 unambiguous autapomorphic morphological changes along its branch (142 total).

The cybotes series is sister group to the Beta *Anolis*. This grouping (node 293) is supported by 13 unambiguous synapomorphies, including diagnol ventral scalation pattern (14: a → n). Although Etheridge (1959) considered the *cybotes* anoles to be Alpha *Anolis* (and they were coded as such in this study), he noted that the condition of their caudal vertebrae appears somewhat intermediate between true Alpha and Beta forms. The Hispaniolan *cybotes* clade (node 292; 99% bootstrap) is supported by 58 unambiguous synapomorphies, including 11 morphological changes: longer thigh (3: s → v), broader head (5: o → t), subocular scales separated from supralabials (28: a → p), supraorbital semicircles in contact (32: a → r), interclavicle T-shaped (50: z → a), anterolateral corners of parietal are medial to edges of frontal (58: a → n), postfrontal absent (62: a → z), concave posterior aspect of jugal (69: a → z), quadrate lateral shelf (75: n → z), *cybotes*-type jaw sculpturing (90: 0 → 4).

Monophyly of the Betas (node 286, Fig. 4) is supported by 27 unambiguous synapomorphies, including five morphological changes: shorter head (4: t → o), two supraciliaries (38: 1 → 2), transverse processes on caudal vertebrae (Beta condition; 49: 0 → 1), pineal foramen in parietal (60: a → z), nasal overlaps premaxilla (77: a → n). The two Caribbean Beta clades—the Cuban *sagrei* series (node 225; 76% bootstrap) and the Jamaican *grahami* series (node 284; 74% bootstrap)—are successive monophyletic outgroups to a mainland Beta clade (node 278). The *sagrei* series clade is supported by 27 unambiguous synapomorphies, including seven morphological changes:greater sexual size dimorphism (2: l → p), larger interparietal (7: n → j), shorter tail (8: p → m), tail crest (12: a → z), round tail (15: g → a), pineal foramen in parietal (60: r → z), basipterygoid crest (74: a → z). Monophyly of the *grahami* series is supported by 19 unambiguous synapomorphies, including six morphological changes: greater SVL (1: i → l), transverse ventral scales (14: n → a), presence of female dewlap (17: 2 → 1), smaller ventral scales (20: m → r), partially divided mental scale (26: g → a), wrinkled jaw sculpturing (90: 0 → 5).

Monophyly of the mainland Betas is supported by seven unambiguous synapomorphies: shorter head (4: o → n), narrower head (5: o → n), larger ventrals (19: t → r), concave mental (31: z → i), 23 presacral vertebrae (51: 0 → 1), parietal crests V-shaped (57: 2 → 1), supratemporal processes leave supraoccipital exposed (61: z → a). Within the mainland Beta clade there are few well-supported clades and few clades that correspond to recognized informal groupings. Four previously recognized species groups (Lieb, 1981; Savage and Guyer, 1989) are upheld as monophyletic: *crassulus* (node 261; 87% bootstrap), supported by eleven unambiguous morphological changes: shorter thigh (3: t → q), narrower head (5: n → o), smaller ear (6: q → o), smaller interparietal (7: p → r), longer tail (8: p → s), larger dorsal scales (19: o → l), fewer scales across snout (29: h → f), dorsal skull rugose (56: a → n), parietal crests trapezoidal (57: 1 → 0), jugal-squamosal contact (68: a → z), splenial present (85: 1 → 0); *gadovii* (node 271), supported by four unambiguous morphological changes: loss of enlarged middorsal scales (13: n → a), round tail (15: m → i), presence of female dewlap (17: 2 → 1), keeling pattern (40: 0 → c); *nebulosus* (node 272), supported by four unambiguous morphological changes: smaller size (1: f → d), shorter thigh (3: s → o), smaller

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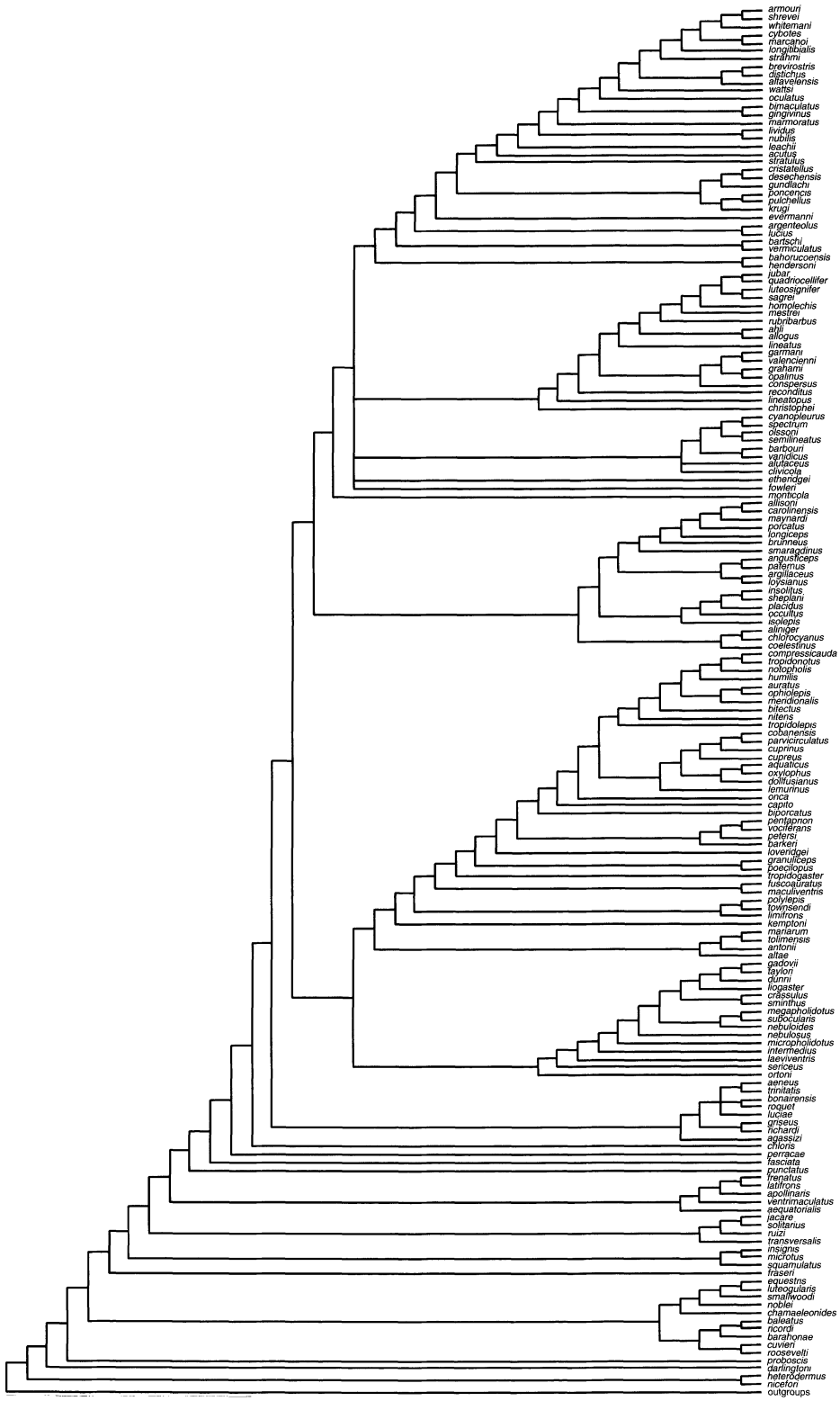

FIG. 5.—Phylogenetic estimate of *Anolis* based on morphological data analyzed alone.

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ear (6: p → n), compressed tail (15: m → z); *intermedius* (node 256; 70% bootstrap), supported by four unambiguous morphological changes: shorter thigh (3: o → n), broader head (5: l → n), loss of female dewlap (17: 1 → 2), 23 presacral vertebrae (51: 0 → 1). The monophyly of the *intermedius* series is unsurprising considering that the two representatives of this series analyzed here have recently been suggested to be conspecific (Kohler, 2004).

Tree from Morphological Data Alone

Figure 5 shows a strict consensus of the four optimal trees resulting from analysis of the morphological data alone (length = 1512280; CI = 0.11; RI = 0.59). Many groups are monophyletic or nearly monophyletic in both the morphological and combined trees, such as the *cybotes* group, *equestris* group, *roquet* group, *cristatellus* group, *distichus* group, *carolinensis* group, and several smaller clades. The mainland Betas are monophyletic except for *A. lineatus* clustering with a clade of *grahami* and *sagrei* group *Anolis* and Cuban *A. ophiolepis* grouping with *A. auratus*.

Differences between the combined and morphological trees include the basal paraphyly of the South American and Southern Lesser Antillean anoles that are monophyletic at the base of the combined tree. The giant *equestris*, *chamaeleolis* and *cuvieri* group *Anolis* form a clade near the base of the morphological tree. The *bimaculatus* group *Anolis* are paraphyletic relative to *distichus*, *cristatellus*, and *cybotes* group *Anolis*. Although the three geographic clades of Beta *Anolis* are each nearly monophyletic, the island and mainland Beta clades are found in different parts of the morphological tree. The phenacosaurs are sister to the rest of *Anolis*. Additional data will determine whether any of these conflicting morphological clades represent real phylogenetic relationships.

Comparison with Previous Hypotheses of Anolis Relationship and Taxonomy

Etheridge (1959) was the first to present a phylogenetic treatment of *Anolis*, and virtually all studies that followed are based implicitly or explicitly on this work. Many of his results agree with the optimal tree of this paper. Notable among this concordance is the monophyly of the Beta section, the basal position of the South American and Southern Lesser Antillean Alpha *Anolis* (his *latifrons* series), the close relationship of *Phenacosaurus* with the *latifrons* series, the monophyly of the mainland Beta species, and the monophyly or near-monophyly of many of his series. Given the small character base and limited taxon sample from which he was operating, Etheridge's results are remarkably robust.

Many of the series and species groups of Williams (1976*a*,*b*) are recovered as clades in the optimal tree (see below). His subsections and most other larger groups, however, are not monophyletic. Similarly, the smaller groups recognized by Shochat and Dessauer (1981) based on immunological data are mostly monophyletic in the optimal tree, but their larger Central Caribbean Species Complex is not. And, the intraisland monophyly of Cuban and Hispaniolan species suggested by Burnell and Hedges (1990) is not evident in the optimal tree, but many of their series and species groups do form clades. This pattern of easy recovery of smaller groups but nonmonophyly of larger groups is a common theme in *Anolis* studies:

> "It is this parallelism that contributes to the notorious 'difficulty' of the genus *Anolis*. Narrow groups are rather easy to recognize (though the specific and infraspecific structure within the group may be puzzling in the extreme) but wider relationships (at least when externals only are considered) are problematical, becoming obscurer with each step more distant from the species group."
> Williams (1961)

Jackman et al. (1999) suggested that this pattern may be due to a rapid radiation at the base of the *Anolis* tree.

It is encouraging that there is no strongly supported conflict between the results presented here and those of previous studies of *Anolis* phylogeny (as measured by, e.g., bootstrap analyses of those data; results not shown; and see Crother [1999]). However with the exception of Jackman et al. (1999) and Nicholson (2002), previous studies of *Anolis*

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are based on very few characters. These studies, many of which were excellent for their times, are thus unable to produce results that are in strong conflict with the results of this paper. Nevertheless, the taxonomies produced in these studies can be compared to the phylogenetic results of this paper. Below, the *Anolis* taxonomies of Etheridge (1959), Williams (1976*a*,*b*), Savage and Guyer (1989), and Burnell and Hedges (1990) are evaluated for their concordance with the results of this paper. Note that some groups of the same name may have different compositions in each paper. Groups discussed below are considered to be monophyletic or not only relative to the species that are common to this study and the listed study. There is much overlap in content between groups in these studies. The post-Williams studies generally accept the Williams groups with only minor changes. Changes in group composition and name are difficult to track in some cases where authors made changes without analysis or justification. Among the taxonomic studies discussed below, only Burnell and Hedges (1990) performed phylogenetic analyses that could test the monophyly of Williams' groups. However, many of their named groups reflect conventions from Williams rather than their own results—e.g., six of their named groups are not monophyletic in any of their presented trees (*sagrei* series, *christophei* series, *grahami* series, *cristatellus* series, *pulchellus* group, *stratulus* group; compare their Table 1 to their Figs. 1–3) but correspond closely or completely with groups recognized by Williams (1976*a*). The decision not to accept some of the results of their phylogenetic analysis should not necessarily be construed as nonscientific. Rather, it represents a recognition by Burnell and Hedges (1990) that their limited sampling of characters allows for stochastic errors that should be evaluated in light of additional evidence.

The relatively small number of concordant clades listed below could be interpreted to suggest great conflict between the aforementioned studies and the tree of this paper. This interpretation would be incorrect. Many of the groups recognized by these authors are monophyletic but for one or a few species or otherwise have some phyletic cohesion (e.g., sequential paraphyly). And, it should be remembered that Etheridge and Williams published their taxonomies before it was common practice to associate names only with clades. Consider for example that both Williams and Etheridge recognized a genus *Tropidodactylus* (= *A. onca*) nested within *Anolis*; and both discussed the possibility of the Beta section arising from within the Alpha section while simultaneously maintaining the Alpha-Beta dichotomy taxonomically (Williams, 1976*a*: 3; Etheridge, 1959: 194).

Groups recognized by Etheridge (1959) that are monophyletic in the preferred tree: Beta section, *grahami* series, and *sagrei* series. Although monophyletic relative to the other named series, the *grahami* and *sagrei* series each include species which were taxonomically unplaced by Etheridge (*sagrei*: *A. ophiolepis*; *grahami*: *A. valencienni*) In his phylogenetic tree of Betas (Etheridge 1959: fig. 11) *A. ophiolepis* is monophyletic within the sagrei series but *A. valenciennis* is outside of the *grahami* group clade.

Groups recognized by Etheridge (1959) that are not monophyletic in the optimal tree: Alpha Section, *latifrons* series, *bimaculatus* series, *carolinensis* series, *coelestinus* series, *cristatellus* series, *angusticeps* series, *petersi* series, *fuscoauratus* series, *chrysolepis* series.

Groups recognized by Williams (1976*a*) that are monophyletic in the optimal tree: *roquet* series, *roquet* species group/superspecies, *ricordi* superspecies, *distichus* subgroup, *bimaculatus* species group, *cybotes* subseries/species group, *cristatellus* subseries, *pulchellus* species group, *equestris* species group/superspecies, *chlorocyanus* species group, *hendersoni* species group, *angusticeps* subgroup, *argillaceus* species group, *lucius* species group, *vermiculatus* species group, *sagrei* species group, *allogus* superspecies, *carolinensis* subgroup/superspecies, *grahami* superspecies.

Groups recognized by Williams (1976*a*) that are not monophyletic in the optimal tree: Alpha section, *punctatus* subsection, *luciae* species group, *luciae* superspecies, *richardi* superspecies, *cuvieri* series, *ricordii* species group, *bimaculatus* series, *stratulus* subseries, *stratulus* species group, *bimaculatus* subseries, *bimaculatus* subgroup, *bimaculatus* superspecies, *marmoratus* superspecies, *cristatellus* series, *pulchellus* subgroup, *carolinensis* sub-

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section, *occultus* series, *darlingtoni* series, *monticola* series, *monticola* species group, *carolinensis* series, *chlorocyanus* superspecies, *carolinensis* species group, *lucius* series, *alutaceus* series, *alutaceus* species group, *alutaceus* superspecies, *spectrum* superspecies, *semilineatus* species group, *grahami* series, *grahami* species group, *sagrei* series, *sagrei* superspecies, *homolechis* superspecies.

None of the species groups recognized by Williams (1976*b*) are monophyletic in the optimal tree.

Groups recognized by Savage and Guyer (1989; some mainland groupings are taken from Lieb [1981]) that are monophyletic in this analysis: *roquet* series, *cybotes* series, *cristatellus* species group, *bimaculatus* series/species group, *hendersoni* species group, *chlorocyanus* series, *equestris* series, *Norops*, *grahami* series, *sagrei* series, *crassulus* species group, *gadovii* species group, *laeviventris* species group, *nebulosus* species group, *pentaprion* subseries.

Groups recognized by Savage and Guyer (1989) that are not monophyletic in the combined tree: *Dactyloa*, *latifrons* series, *aequatorialis* series, *punctatus* series, *tigrinus* series, *Semiurus* (later recognized as *Xiphosurus*), *Ctenonotus*, *cristatellus* series, *Anolis* (*sensu stricto*), *alutaceus* series, *alutaceus* species group, *semilineatus* species group, *angusticeps* series, *carolinensis* series, *carolinensis* species group, *darlingtoni* series, *monticola* series, *lucius* series, *occultus* series, *auratus* series, *schiedi* subseries, *schiedi* species group, *laeviventris* subseries, *subocularis* species group, *nebuloides* species group, *auratus* subseries, *humilis* species group, *lemurinus* species group, *cupreus* species group, *auratus* species group, *fuscoauratus* series, *fuscoauratus* species group, *lionotus* species group, *petersi* series, *petersi* subseries.

Groups recognized by Burnell and Hedges (1990) that are monophyletic in the combined tree: *argillaceus* series, *chlorocyanus* series, *ricordi* group, *carolinensis* group, *angusticeps* group, *equestris* series, *lucius* group, *cybotes* series, *distichus* series, *vermiculatus* group, *sagrei* series, *allogus* group, *hendersoni* series, *sheplani* series, *grahami* series, *cristatellus* series, *pulchellus* group, *cristatellus* group, *bimaculatus* series, *bimaculatus* group, *gingivinus* subgroup, *marmoratus* subgroup, *stratulus* group, *roquet* series, *roquet* group, *roquet* subgroup.

Groups recognized by Burnell and Hedges (1990) that are not monophyletic in the optimal tree: *alutaceus* series, *spectrum* group, *carolinensis* series, *carolinensis* subgroup, *lucius* series, *homolechis* group, *sagrei* group, *chlorocyanus* group, *christophei* series, *cuvieri* series, *semilineatus* series, *luciae* group.

Two larger-scale phylogenetic analyses may be compared to the results of this paper. Jackman et al. (1999) and Nicholson (2002) collected and analyzed subsets of the data analyzed in this paper. The optimal tree of this paper is similar to the optimal tree of Jackman et al. (1999:Fig. 10) for shared taxa. This result is unsurprising, as the mtDNA data from that paper accounts for about 51% of scored cells in the matrix of this paper. Regarding the 52 species shared by that study and this one, the only differences between the optimal combined tree in Jackman et al. (1999:Fig. 10) and the optimal tree of this paper are that paper's 1) basal position of the *equestris* group as sister to South American Alpha *Anolis*, 2) grouping of the distichoid *Anolis* group with *cristatellus* species rather than *bimaculatus* species, 3) switched phyletic position of *A. lineatopus* and *A. valencienni*, 4) grouping of *A. bahorucoensis* with *A. bartschi* and *A. vermiculatus* rather than the Hispaniolan green *Anolis*, 5) differing placement of "*Chamaelinorops*". There are additional differences in deep relationships between Jackman et al.'s (1999) optimal tree from analysis of their DNA data alone (e.g., their placement of cybotoid *Anolis* as sister to Cuban Alpha *Anolis*). These differences are not well supported in either analysis.

The optimal tree of this paper agrees with some of the tip relationships in Nicholson (2002) such as the monophyly of *A. intermedius* and *A. laeviventris* and of *A. crassulus* and *A. sminthus*, but disagrees with that paper in deeper relationships. In particular, Nicholson (2002) found nonmonophyly for the three geographic clades of Beta *Anolis*—the Cuban *sagrei* series, the Jamaican *grahami* series, and the mainland forms—suggested by Etheridge (1959) and Jackman et al. (1999) and corroborated by the larger character and taxon sample of this paper.

Although I compared the results of this paper to earlier papers that revised *Anolis*

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phylogeny and taxonomy I did not perform statistical tests comparing results, for several reasons. First, the sample of taxa and characters in this paper is greater than that used in any previous analysis of *Anolis* relationships, making comparisons with earlier studies difficult to interpret. For example, without extensive additional analyses comparing results with and without the additional taxa of this paper, and with and without the additional characters in this paper, and under different optimality criteria, it cannot be determined whether differences are due to additional taxa, different character samples, different optimality criteria, different taxonomic philosophies, or some combination of these factors. Such analyses comparing results are valuable, but they would not (in my opinion) change the fact that the current best estimate of *Anolis* phylogeny is the tree of Figs. 2–4. Second, most named groups in *Anolis* were erected without phylogenetic analysis. There seems little to be gained in continuing to recognize or discuss these groups if they have never been supported but have been contradicted in a phylogenetic analysis. Finally, the data set of this paper subsumes all the character sets of the earlier papers. Although there is value in comparing results between different sources of data to assess degrees of conflict and support, there seems little point in making a statistical comparison between the results from some sample of characters to the results from that sample combined with another sample. The result with the larger sample seems preferable unless of course there is some problem with the added characters. That is, even if the result from the smaller sample alone "cannot be rejected" by the larger sample, I see no reason to retain such a result when an estimate based on more data exists.

Prospectus

A phylogenetic estimate of 174 *Anolis* species was produced using 91 morphological characters and 1589 characters from DNA, allozymes, chromosomes, and immunology. This estimate should facilitate several evolutionary studies of *Anolis*. First, it may form the basis for a comprehensive phylogenetic taxonomy of *Anolis*. I am currently working with collaborators to apply the principles of de Queiroz and Gauthier (1992) to classify the anoles. Second, the tree produced here may be used as a framework for comparative analyses. The copious comparative data collected for *Anolis* may be analyzed with reference to this tree to enable evolutionary interpretations. Third, the results of this paper may help guide future phylogenetic studies of *Anolis*. For example, it is clear from the results of this paper that much works remains to be done on the deep relationships of *Anolis* and on all aspects of the relationships of mainland *Anolis*. And, it is clear that the monophyly of most named groups of *Anolis* should be considered suspect until phylogenetic analysis suggests otherwise (see also Williams, 1992; Nicholson, 2002). Finally, the morphological data of this paper may be combined with new data in subsequent studies of *Anolis* phylogeny.

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dae): are the data available to reclassify the anoles? Pp. 434–478. *In* C. A. Woods (Ed.), Biogeography of the West Indies: Past, Present, and Future. Sandhill Crane Press, Gainesville, Florida, U.S.A.

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APPENDIX 1

The following specimens were examined for morphological characters. Not all characters were scored on all specimens. Specimens that were checked for only one or a few characters to confirm codings are not listed here. Acronyms are as follows: MCZ = Museum of Comparative Zoology, Harvard. USNM = National Museum of Natural History, Smithsonian Institution. UTEP = University of Texas at El Paso. UTA = University of Texas at Arlington. TNHC = Texas Memorial Museum, University of Texas at Austin. KDQ = field numbers of Kevin de Queiroz. REE = Private collection of Richard Etheridge. UMMZ = University of Michigan Museum of Zoology. All species listed are *Anolis* unless otherwise noted. Numbers preceded by "s" are skeletal specimens.

acutus 78929–30, 78934, 78938; MCZ 139194, 139202, 139209–10, s131556. *Aeneus* USNM 79162–4, 166641–4, 166648, MCZ 81290, 81293, s154140. *aequatorialis* USNM 285994, 286298–9; MCZ 164440, 91830, 171148, s100507, s107699, s156811, s176457. *agassizi* USNM 22101, 22103, 22134; MCZ 130567–8, 130573, s27120, s18088. *ahli* USNM 22728, 120742, 140476, s497942; MCZ 19905, 63678, 63681, s63677. *aliniger* MCZ 79343, 128208, 170725–7, 143370, 170721, s152346–7. *allisoni* USNM 138133, 138136, 138141, 172476, 335766, 337628–30, s26732, s213699; MCZ 26725, 60884, 60889. *allogus* USNM 220674, 220677, 220679, 220686, 335767–8, s220605; MCZ 63730, 63732–3, 8544, 63739. *altae* USNM 297705; MCZ 92930, 92932, 92934, 29385. *altavelensis* MCZ 45949, 79368, 79370–2, s45948, s79369. *alutaceus* USNM 337634–6, 337638, 194290; MCZ 42455–6, 93480, s21860. *angusticeps* USNM 51847, 160920, 160922, 337640–1, 337644, 515896; MCZ 42317–8, 93455–7, 11146, s93354, s59245, s59248–50. *antonii* MCZ 58308, 156626, 166505, 166519, s160178. *apollinaris* MCZ 123975, 156308, s156308. *aquaticus* USNM 219547–8, 219548, 219550–1; MCZ 92901, 110571; 174135, s109968. *argenteolus* USNM 220695–6, 315895–7, s220611–2; MCZ 73966, 73968, 55808, 173627. *argillaceus* USNM 63225–6, 83929, 220700–1; MCZ 173783, 173888–9, s42528, s42559, s173782. *armouri* USNM 198558–9, 198561–2, 259363, 328981, 329119, s117204; MCZ 169767, 169772, 169776, 169780. *auratus* USNM 98897, 120566–8, 120570–1, 291131, 291185, 317869; MCZ s77430, s77448, s133473–5, s133480–1, s133483–4; TNHC 24132, 24139. *bahorucoensis* USNM 146616, 286871, 314283, 314288–91, s329000; MCZ A-93291, A-93295, s132831. *baleatus* USNM 193975, 193990, s329014, (one USNM skeleton of unrecorded number); MCZ 125630, 132356, 125630, 125632–3, s7831, s57114. *barahonae* USNM 259365, s259474–5; MCZ A-90263–4, A-90268, s173169. *barbouri* USNM 314427–8, 329277; MCZ 171030, 171042, 171052, s171839, s177862. *barkeri* MCZ 58221, 85008, 92103, s92103. *bartschi* USNM 252464, 335783–6, s252475–6; MCZ 44767, 44762, 44766, 44768. *bimaculatus* USNM 236180–3, 336060, 336063, 336068, 336070; MCZ 75469–70, 75472, 81298, s10380, s10401, s145813–4, s28717. *biporcatus* USNM 219885, 338186–7, 338189–90; MCZ 128511–2, 174134, 174438, s24396, s32206, s85556. *bitectus* USNM 285673, 285770; MCZ 151624, 154581, 151313, 151616, 151316, 151715, 151623–4, 154581, s15459, s176380. *bonairensis* 79260, 79263–4, 79267; MCZ 82981–2, 141508, 141512, s147324, s147335. *brevirostris* USNM 260253–7, 286874, 328554–328556, s259476; MCZ 128241, 128244–5, 128238; . *brunneus* USNM 81649, 10957; MCZ 42042, 42044–5. s152529–30. *capito* USNM 298109, 342275, 342276, 342278; MCZ 133796–7, s132836, s132838, s132839. *carolinensis* USNM 131648–50, 17696, 286914–6, 315496; MCZ s57012, s57385, sPI, sPII, sPIII. *chamaeleonides* USNM 27497, 156786; MCZ 57933, 59331, 159586, s7895; REE s488. *chlorocyanus* USNM 239374, 329137, 260267–8, s259482; MCZ 62931, 62934, 59753, A-93137, A-93148, s62881, s62890. *chloris* USNM 124239, 285810, 285812, 285816, 285810–1; MCZ 14699, s101290, s119691, s164507. *christophei* USNM 161606, 260288–9, 329029–30, 329038; MCZ 107058, 125509–10, 125523, A-93189, s79352. *chrysolepis* USNM 162725, 162727–8, 162730–1, 288859, 321066–7; MCZ 65350, 152114, 152107, 65360, s16786. *clivicola* USNM 120749–50; MCZ 111205, 111209, 111219, 111224, s42458, s42462. *cobanensis* UTA 29428, 29760, 29762, 37594, 39944, s29428, s29760. *coelestinus* USNM 239376–7, 259373, 259376, 239376, 329048–9; MCZ 59802, 62878, 65595, A-93267, A-93270, s131572, s131574, s131994–5, s131999, s132000. s144795, s144780, s144780. *compressicauda* UTEP 7842, 7851, 7855, s7842, s7851. *conspersus* USNM 236614–6, s213687; MCZ 87424, 87416–7, 87408, 87421, 87423. *crassulus* USNM 27626, 140284, 140286–7; MCZ s93675, UTA 7156, 29446, 29448–9, 39837. *cristatellus* USNM 86539–40, 115879, 314228, 314230, 327096–7; MCZ 57856, 96265, 96256, 96269, s35673, s35678, s130048, s131583, s132018–9, s140247. *cupreus* USNM 74511–2, 342280, 342284–5; MCZ s129776, s15412; UTA 19804, 19896–8, 19907–8. *cuprinus* 4974, 8269–70, s8269. *cuvieri* USNM 12448–9, 12495, 26843; MCZ 35971, 35974, 35977, s35979, s35981–7. *cyanopleurus* 63223, 83928, 220702, s220621; MCZ 42499, 42516, 120099, 12337, s42530, s177825. *cybotes* USNM 220910, 220913, 314318, 314321–2, 260384, 260399, 260411; MCZ s119698, s131601, s131605, s131297, s132864–5, s134012. *dollfusianus* USNM 35675, 46880–1, 85675. *darlingtoni* USNM 286899; MCZ 38251, s173207. *desechensis* USNM 220943, 220948, 220966, 220964, 220977, s221709, MCZ

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118862, ,161973–4, 161977, s118863, KDQ 1884, 1886. *distichus* USNM 250500, 259402, 259407–9, 260500, 260503, 314333–4; MCZ s142512, s152483, s152488, s152491, s140063, s140234, s140237, s142514, s145319, s142512. *dollfusianus* USNM 35674, 46880; UTA 19913, 19944, 19959, 19966, 19973, s19913, s19944. *dunni* MCZ 78696–7, 78720, 78726, s78699, s78701. *equestris* USNM 164272, 337647–8; MCZ 143902–4, 143908, s55630, s55633, s66843, s131609–10. *etheridgei* USNM 260330, 260532, 260519–20, 260545, s221831; MCZ 107034, 107048, 128282, s107037. *evermanni* USNM 48763, 286824, 304651–2, 327112, 327114; MCZ 148431, 148435, 148437, 148443, s132035, s132042. *fasciatus* USNM 142255, 286278; MCZ 143961, 151645, 154126, s147010, s1417012. *fowleri* USNM 194002–3; MCZ 125640, 135386, s135388, s166996. *fraseri* USNM 60521, 234610, 234612–13; MCZ 127689, 164608, 176453-4s107694, s147042. *frenatus* USNM 48954, 150094, 150096; 133839–40, s20609, s20611, s22296. *fuscoauratus* USNM 258138, 288868, 288874, 288876–7, 288882–3, 303477; MCZ 173950–1, 173953, 178321–2, 178326, s53248, s140041. *gadovii* MCZ 39707, 93669, s171206; UTEP 11839–40. *garmani* USNM 252142, 252460–1, 252130, 337569, 337572; MCZ s131620; TNHC 50091; KDQ s157. *gingivinus* USNM 315526, 315567–9, 315547, s315641, MCZ 75606, 75608, 75617, 75631. *grahami* USNM 337577–8, 337583–4; MCZ 175345, 175345–7, 175349, 52302, s138508–11, s52305, s154134–5. *granuliceps* USNM 151603–5, 151631, 234695–6; MCZ 87247, 153157, 153159, 153167–8, s124808, s124816, s124818. *griseus* USNM 314519, 314536, 314542–3; MCZ 6164, 82926, 82929, s81333, s82009, s82013, s82927–8, s82931. *gundlachi* USNM 25600, 26900, 26902–3; MCZ 139557–60, 150968, s132057, s140265. *hendersoni* USNM 146619, 239393–4; MCZ 62956, 62960, 62965–6, s66037–8, s66056, s66030, s66042, s66045, s66050, s66069, s131628; RE s1491. *heterodermus* USNM 95922, 127100–1; MCZ 104409, 78519, 78522, s110133–8, s145325. *homolechis* USNM 220704, 220706, 315917, 315922, 315927, 315931, s26674, s317837; MCZ 63935, 63929–31, 63939. *humilis* USNM 244866, 338206, 338532–3, 338536–7, s319209, 338541–2; MCZ 128746, 128773, 128793, 177875, s131630. *insignis* USNM 347482; MCZ 15439, 347482, s15439. *insolitus* USNM 286903–4, 286885, 286888–9; MCZ 128303, 128306–7, 128311, s107015, s107017–8. *intermedius* USNM 75441, 80912, 165357–8; MCZ 109944–5, 110800, 171136, s16787. isolepis 42489, 45704, 74034–5. *jacare* MCZ 8079, 112097, s20639, s112096. *jubar* USNM 335797, 335800, 337659–60, s284467; MCZ 160638–9, 141466, 141474, s42478. *kemptoni* MCZ 46247, 50148, 165220, s165219. *krugi* USNM 304660, 327129, 327132, 336301–2; MCZ 150595, 150598–601, 162840–1, s132080, s132090. *laeviventris* USNM 84277–8, 2850, 175182, 175165, 224807, 344798, 344800–1. *latifrons* USNM 124267–8, 161222, MCZ 77402, 77404, 77408, 77411, s77410, s77407. *leachi* USNM 509076–8, 521114–5, s224022; MCZ 16167, 75779, 82108, s75781. *lemurinus* USNM 220012, 266271–2, 266277, s319210, 338192–6; MCZ 55088, 133931, 174439, 174176. *limifrons* USNM 330177, 338217, 338219, 338223, 338225, 338227–8, s313770, s319219; MCZ 92429, 92941, 92950, 92952–4; TNHC 32131, 34434. *lineatopus* USNM 83749, 83751, 233895, 252271, 252274, 252279, s244595; MCZ 73180–1, 52234, 175538; TNHC 24402. *lineatus* USNM 266290, 266292–3, 266296, s266292; MCZ 144611, 144613, 144615, 144625, s69532, s76644. *liogaster* USNM 304814–5, 304817; MCZ 85021–2, . *lividus* USNM 199004–5, 199007, 199010, 199014, 236477, s236515; MCZ 82023–5, s57383. *longiceps* USNM 8089, 65495–6; MCZ 16794, 16797–8, 16804, s29066, s16794. *longitibialis* USNM 259419, 314388–9; MCZ 128342, 132370, 151834, 151831, 151837, s31774. *loveridgei* USNM 344802–4; MCZ 38700, 38831, s38832. *loysiana* USNM 26690, 26695, 515908–10; MCZ 74036, 74038–40, 74046, s74041. *luciae* USNM 198828–9, 198831, 198858, 198860, 128831; MCZ 6173–4, 171329, 171335, s71691, s71796. *lucius* USNM 128117, 337664–6, 337669–70; MCZ 19917, 19920, 68029, 93483, s55801–3, s67990, s68012, s68014, s68020–22. *luteogularis* USNM 51841, 75811–4, 167301–2; MCZ 119385, 35507–9, s55576; KDQ s1842. *luteosiginifer* USNM 107946, 107948–50, 107952; MCZ 156600, 156609–12, 156583, 156622, 156616. *maculiventris* USNM 234723–5, 234616; MCZ 159589, 160216, s158380. *marcanoi* USNM 224962–3, 314390–2; MCZ 107075, 131876, 143244, s143247. *mariarum* USNM 120746–7; MCZ 32303–7, s166479–80 . *marmoratus* USNM 283143–4, 283172–3, 283165–6, s283222; MCZ 70723–4, 70730, s152457. *maynardi* USNM 81729, 108004, 108006–7, 236622; MCZ 176355, 92719–21, 16804, 16797–8, 178385, 176355, s92721. *megapholidotus* UTA 4291–2. *meridionalis* USNM 148771; MCZ 10617, 19772, 79125, 79130, 79132, 10617, s18089–90. *microlepidotus* UTEP 7770. *monticola* USNM 329227, 329239–41, 329243; MCZ 124910–1, 124915, s120013, s124866, s124878, s124888, s124891, s124917, s124921, s124935–6(??)'. *meridionalis* USNM 148771. *mestrei* USNM 337673–4, 515912; MCZ 63686, s75018. *microtus* USNM 31282; MCZ 15424, s15424. *nebuloides* USNM 304887; MCZ 92967–9, s92965–7, s100379. *nebulosus* USNM 304838–9, 304858–9, 346532–3; MCZ 126159, 133848, 133860–1, 154476, s133998–9, s134009. *noblei* USNM 29784, s220622; MCZ 2665, 359325–6, s127832. *notopholis* USNM 124243–5; MCZ 112291, 112294, 112296–7, 112302, 112304, 112300, 112303, s131935, s132827–8. *nubilis* USNM 140263–6; MCZ 82934–7, s57384. *occultus* USNM 327133–5; MCZ 83664, 80303, 92724, 92728, s83657, s83660, s131667, s146683–4. *oculatus* USNM 160550–1, 160566–8, 160570, s218288; MCZ 60216, 60219, 60227. *olssoni* USNM 197366–7, 314398, 314404, 314408, 314398, s65663, s65678; MCZ 12495, 131137, 131140, 131144. *onca* USNM 107321, 151517–8, 112400–1, 112406–7, s57386, s110066, s140261–2, s140264, s144822, s145312. *opalinus* USNM 252188, 252191, 337603, s244599, 337599, 337602–3; MCZ 51966.1–3, 179706, s102095, s144260. *ophiolepis* USNM 57043–4, 110112, 150226, 157246, 315940–1, 315943, 315946, 515913, s315939; MCZ 93498–500, 60933, 68175–6. *ortonii* USNM 298884, 316711, 316714, 316716, 321079; MCZ 84046, s127688, s141214. *oxylophus* USNM 321732–3, 347285–6, s313779; MCZ s56131; TNHC 23363, 24116. *parvicirculata* UTEP 7976, 8220, 8222, 8330, 9362, s8218, s8222. *paternus* USNM 498070–1, s498070; MCZ 11141, 11147, 160645, s59326. *pentaprion* USNM 67349, 298136, 344805; MCZ s20603; TNHC 54776. *peraccae* USNM 234753, 234761, 234763, 285819–20; MCZ 170479, 170487, 170495, 170482, s156782, s175914. *petersi* USNM 3595, 25059–60, 136013–4;

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MCZ 57277, 93673, s93673, 58224, s58224. *placidus* USNM 286865–8; MCZ s102839, s173209. *poecilopus* USNM 50149, 148507–8, 150107; MCZ 139348, 177829, 177836, s177850. *polylepis* USNM 129920, 219562–3, 219565; MCZ s132870, s132873, s133825, s133828, s132871–2, s133827, s132869, s133824–5, s132870, s132873; TNHC 54595, 54686. *poncensis* MCZ 34855–6, 34858, 34860–3, 61995, s62006, s158326. *porcatus* USNM 224966, 220716, 315953, 315956, 515914, 337675, 515914, s220369, s317842; MCZ 55554–6, 132241, s10884. *proboscis* USNM 207671–2, s207673; MCZ 54300. *pulchellus* USNM 58863, 115859–60, 115862–3, 221425, 221435–6, 221441–2; MCZ 36085, 36126, 36137, 179264–6, 179307, s131921, s131968. *punctatus* USNM 159179, 159180–1, 159183, 222333; MCZ 156842, 157244, s20630, s84050, s84052, s92537, s153994. *quadriocellifer* USNM 515915, 515919–20, 51591?; MCZ 90611, 11867, 11907, s93577. *reconditus* USNM 252143, 328369, 328373, 337608, 337610, s244600; MCZ 143869–70, 66932, 68958, s68956. *richardi* USNM 167484, 227922–3, 306096, 319169–71; MCZ 81954–5, 81957, s56851, s61028. *ricordii* USNM 123347, 123974, 123988, 286907, s72632; MCZ 8619, 68479, 132329–30, s72632, s80937, s80940, s119715. *roosevelti* UMMZ 73644; MCZ 36138. *roquet* USNM 10130, 139909–10, 79040–1, 79044, 79048, 82269–70, 82553–4, s66857, s148400. *rubribarbus* MCZ 28762, 28766–7, 63663, 63665, s63664, s17685. *ruizi* USNM 127103–4, 234061; MCZ s46446. *sagrei* USNM 245314, 301979, 337612–3, 337681, 337692; MCZ s61106–7, s68149, s71577, s71590, s142509, s142511, s171990, s177997, s142511, s142509, s177990; TNHC 55301–2. *sheplani* USNM 194015–6, 314419–20; MCZ 125641–2, s140021, s125691. *semilineatus* USNM 74888, 260549, 260555–6; MCZ 57671, 57673–4, 57678, s63427, s63430–1, s64842, s64862, s79316, s152521–2; RE s1490. *sericeus* USNM 209827–8, 32145, 121406–8, 32147; MCZ 100367, 27612–3, 126152, s22964, s27604. *shrevei* USNM 329261, 329263–5, 329268, 329270; MCZ 44365–7, 44369, s7820, s132819, s147436. *smallwoodi* USNM 286820, 315963–4, 335858–9, s319278; MCZ 57928, 42551, 68921. *smaragdinus* USNM 5147.1–4, s102337; MCZ 37983, 42018–20, 37983, 49737–8, s141787, TNHC 50097. *sminthus* MCZ 32348, 49951, 57280, s57280. *squamulatus* USNM 216911–2; MCZ 80903, 136172, 131674, 159123, s159123, s66895. *strahmi* USNM 314421; MCZ 146827, 151859–61, s146829, 146834. *solitarius* MCZ 12053, 24893, s24393; ICN s6153, s6179. *spectrum* USNM 340219; MCZ 160656–7. *stratulus* USNM 115876, 115882, 115887–8, 212319, 221444–5, s221177; MCZ 18490, 36153, 361823–4, s131985, s132100. *subocularis* USNM 46678, 46680, 46755, 47851, 133743, 133746, 133761; MCZ 32080, 167240–1, 56003, s167239, s167242. *taylori* MCZ 57279, 132358–9, 132361; MCZ s171147. *tolimensis* USNM 120755; MCZ 160156, 160158–9. *townsendi* USNM 80045–6, 31052, 31055; MCZ 139131, 139151, 139138, 139140, 139145, 139152, s139134, s139141,. *transversalis* USNM 200680, 234798, 234802, 332989; MCZ 11983, s45777, s84351, s151750. *trinitatis* USNM 314550, 314553, 314556–7, 314560–1, s314572; MCZ 82087, 82089–90. *tropidogaster* USNM 120600–1, 120604, 120606, 120701, 153964, 267829–30; MCZ 160180, 160184–6, 160188, s78498, s131688. *tropidolepis* USNM 244951; MCZ 92977–81, 92984, s54998. *tropidonotus* USNM 217595, 217598, 224813, 342339, 342344, 342352; MCZ s38817, s38821, s177987, TNHC 32616–7, RE s1207. *valencienni* USNM 252153–4, 286860, 337615; MCZ 180571, 52001–2, 53267, s7341, s7358, s45139, s68761, s73535, s140103, s145320–1; TNHC 50087. *vanidicus* USNM 337695, 337697–9, 337701, s337700; MCZ 74080, 74082, 22768, s22764–5. *ventrimaculatus* MCZ 127711–12, 137321, 137324, s127711, s137323. *vermiculatus* USNM 337702–3, 335855–6, s220645; MCZ 38425–8, s119659, s119719. *vociferans* MCZ 38686, 165523. *wattsi* USNM 218463, 218462–5, 509081, s218334; MCZ 127572–5. *whitemani* USNM 224967–8, 224970, 260558, 329275, s259509; MCZ 60055, 62827, 62829, 156206, s62831.

Anisolepis undulatus MCZ 84031–2, s59273, s59274, s84033, s133191. *Enyalius iheringi* MCZ s6316. *Leiocephalus melanochlorus* MCZ 74605–6, s37528. *Leiocephalus schreibersi* MCZ 64908, 64918. *Polychrus acutirostris* MCZ 24882, 47024. *Polychrus marmoratus* MCZ 163953, 164694, s6101, s46441, s74149, s74150, s74153, s147437, s74151, s74152, s131670–2, s173135. *Urostrophus vautieri* MCZ 5566, 154237, s7319, s84036.

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Appendix 2

Data matrix of morphological character states. "Character type" refers to ordered (o), unordered (u), or other transformation series. "Parsimony transition cost" is the parsimony cost of change between states ("1K" = 1000).

Character number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Character type	o	o	o	o	o	o	o	o	u	o	o	o	o	o	o	o	o
Parsimony transition cost	80	80	80	80	80	80	80	80	1K	40	40	40	40	40	40	1K	1K
(*Cm.*) *chamaeleonides*	y	f	j	u	n	o	r	h	0	a	a	a	a	a	a	0	0
(*Cr.*) *barbouri*	d	k	t	r	o	n	u	x	1	a	a	a	a	z	z	1	1
(*Ph.*) *heterodermus*	l	g	f	o	g	g	y	h	0	a	a	a	a	a	a	1	1
(*Ph.*) *nicefori*	i	g	?	?	?	?	z	m	0	a	a	a	a	a	a	1	1
acutus	j	o	r	u	o	s	n	p	0	a	a	a	a	a	g	1	1
aeneus	l	p	n	m	l	q	o	p	0	z	a	a	a	a	z	0	1
aequatorialis	o	h	w	i	f	t	u	z	1	a	a	a	a	a	z	0	1
agassizi	t	n	v	i	d	u	p	s	0	a	a	a	a	a	z	1	1
ahli	h	l	t	o	o	y	f	m	0	a	a	a	a	m	a	0	1
aliniger	h	g	n	s	p	k	v	p	0	a	a	a	a	a	z	1	2
allisoni	o	p	n	y	m	o	n	s	0	a	a	a	a	a	z	1	2
allogus	i	m	v	o	n	x	i	p	0	a	a	z	a	m	a	0	1
altae	c	a	o	l	m	p	n	s	0	?	a	a	a	a	z	1	1
altavelensis	f	j	s	m	p	r	m	m	0	a	a	a	a	a	a	1	2
alutaceus	a	f	r	s	k	q	m	v	0	a	a	a	z	a	z	0	2
angusticeps	f	k	h	w	l	f	j	m	0	a	a	a	a	a	z	0	2
antonii	g	f	r	k	l	o	n	s	0	a	a	a	i	a	z	1	2
apollinaris	q	i	t	j	g	j	u	z	0	a	a	a	a	a	z	0	2
aquaticus	k	i	w	i	h	u	a	p	0	z	a	a	a	w	a	0	2
argenteolus	g	j	t	q	k	w	h	s	0	a	a	a	a	a	m	0	2
argillaceus	e	m	m	t	p	l	l	p	0	a	a	a	a	m	a	1	2
armouri	j	k	s	v	x	?	n	m	0	a	a	a	a	z	m	0	2
auratus	f	h	n	i	i	l	m	z	1	a	a	a	z	z	u	1	2
bahorucoensis	f	j	s	y	l	q	l	v	0	a	a	a	f	a	p	1	2
baleatus	y	k	q	q	j	r	s	p	0	a	a	z	a	a	a	0	0
barahonae	w	h	p	q	i	q	r	s	0	a	a	z	a	a	a	0	0
barkeri	p	n	q	a	a	v	o	p	1	?	a	a	a	a	a	0	1
bartschi	l	j	w	o	k	z	g	v	0	a	a	a	a	a	z	2	2
bimaculatus	s	y	s	q	r	q	o	p	0	a	a	a	a	a	k	1	2
biporcatus	p	f	p	n	k	q	r	v	0	z	a	a	a	g	m	1	1
bitectus	f	e	v	i	h	q	k	p	0	z	a	a	z	z	m	1	1
bonairensis	k	m	r	q	l	r	i	p	0	z	a	a	a	a	z	1	1
brevirostris	f	e	t	o	q	t	g	h	0	a	a	a	a	a	k	1	2
brunneus	l	h	n	y	k	e	m	s	0	a	a	a	a	a	z	1	?
capito	o	c	x	h	l	w	q	p	0	z	a	a	a	a	z	1	1
carolinensis	k	n	m	w	p	i	n	p	0	a	a	a	a	g	z	1	1
chloris	i	g	p	k	g	n	m	p	0	a	a	a	a	a	z	0	2
chlorocyanus	m	n	m	q	k	l	s	s	0	a	a	a	a	a	z	1	1
christophei	e	i	t	p	m	t	o	m	0	a	a	a	a	a	g	0	1
clivicola	e	h	t	t	p	p	r	v	0	a	a	a	z	a	t	0	2
cobanensis	h	n	v	n	m	t	n	s	0	z	a	a	a	n	k	0	2
coelestinus	m	o	n	r	l	o	m	s	0	a	a	a	a	a	z	1	1
compressicauda	f	e	v	p	o	z	r	p	0	z	a	a	z	z	a	0	2
conspersus	j	p	q	q	m	q	m	p	0	a	a	a	a	a	m	1	1
crassulus	f	d	q	m	p	o	r	s	0	a	a	a	z	z	d	1	1
cristatellus	m	h	t	q	r	s	k	s	0	a	a	z	a	e	i	0	1
cupreus	g	h	s	l	l	r	n	s	0	z	a	a	a	v	t	0	2
cuprinus	j	m	v	k	m	s	q	s	0	z	a	a	i	i	z	0	2
cuvieri	u	h	u	u	p	s	n	s	0	a	a	z	a	a	a	0	0
cyanopleurus	c	i	r	q	i	q	p	x	0	a	a	a	z	z	k	0	2
cybotes	m	l	u	u	t	v	q	p	0	a	a	a	a	z	f	0	2
darlingtoni	l	?	k	y	j	f	r	h	0	a	a	a	a	a	a	0	?
desechensis	g	m	t	r	o	r	i	p	0	a	a	z	a	a	k	0	1
distichus	h	j	u	m	p	v	g	h	0	a	a	a	a	a	i	1	2
dollfusianus	c	h	s	l	m	r	k	p	0	z	a	a	a	z	z	0	2
dunni	h	k	r	j	m	p	f	s	0	a	a	a	a	a	g	0	1
equestris	z	h	o	s	q	h	t	s	0	a	a	a	a	a	a	0	0

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Appendix 2

Continued.

Character number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Character type	o	o	o	o	o	o	o	o	u	o	o	o	o	o	o	o	o
Parsimony transition cost	80	80	80	80	80	80	80	80	1K	40	40	40	40	40	40	1K	1K
etheridgei	c	f	z	q	o	v	h	x	0	a	a	a	a	a	m	1	2
evermanni	l	o	r	q	m	s	o	m	0	a	a	a	a	a	g	0	1
fasciatus	k	f	s	d	b	r	o	s	0	a	a	a	a	a	z	0	2
fowleri	l	f	s	p	p	m	w	x	0	a	a	a	a	a	z	0	1
fraseri	q	c	n	l	f	r	r	s	0	a	a	a	a	a	i	0	0
frenatus	v	k	t	h	a	u	m	s	0	a	a	a	a	a	m	0	1
fuscoauratus	d	a	r	l	j	q	g	p	0	?	a	a	a	a	z	1	2
gadovii	m	j	v	j	i	t	f	p	0	a	a	a	a	a	g	0	1
garmani	t	r	q	q	o	q	t	v	0	a	a	z	a	a	a	0	2
gingivinus	k	o	s	v	r	p	p	p	0	a	a	a	a	q	m	1	1
grahami	l	j	p	s	p	n	f	p	0	a	a	a	a	m	a	1	2
granuliceps	d	d	w	k	l	v	b	v	0	?	a	a	a	m	z	1	1
griseus	u	u	t	o	o	v	i	v	0	z	a	a	a	a	t	1	1
gundlachi	k	k	w	s	p	v	h	p	0	a	a	z	a	e	a	0	1
hendersoni	f	h	q	y	h	n	m	z	0	a	a	a	a	a	t	1	2
homolechis	j	r	q	n	n	t	j	h	0	a	a	z	a	z	a	0	2
humilis	c	e	t	q	p	v	u	h	0	z	a	a	z	z	t	1	1
insignis	x	i	p	n	a	o	?	p	0	a	a	a	a	a	m	0	0
insolitus	d	g	k	t	i	k	u	h	0	a	z	a	a	a	z	0	0
intermedius	f	f	n	m	n	p	p	p	0	a	a	a	a	m	t	1	2
isolepis	f	f	k	t	n	j	p	h	0	a	a	a	a	a	z	1	1
jacare	k	g	n	m	g	h	n	s	0	a	a	a	a	a	m	0	1
jubar	i	q	s	o	n	u	m	h	0	a	a	z	a	z	a	0	2
kemptoni	f	d	n	j	g	j	m	s	0	a	a	a	a	a	m	0	1
krugi	g	m	s	t	m	o	h	z	0	a	a	a	a	z	r	0	1
laeviventris	d	c	l	j	n	n	l	m	0	a	a	a	a	r	z	1	2
latifrons	u	c	v	k	f	v	r	v	0	a	a	a	a	a	z	0	1
leachii	r	u	s	t	z	n	r	s	0	a	a	a	a	a	t	1	1
lemurinus	l	f	s	k	m	s	n	p	0	z	a	a	a	z	t	1	1
limifrons	e	g	t	o	l	r	m	p	0	a	a	a	a	k	u	0	2
lineatopus	k	r	r	r	o	r	n	p	0	a	a	a	a	g	a	0	1
lineatus	k	j	s	l	i	o	o	s	0	a	a	z	a	a	a	1	1
liogaster	f	c	s	m	o	q	m	s	0	a	a	a	a	z	i	0	1
lividus	m	u	s	r	m	s	n	p	0	a	a	a	a	a	j	1	1
longiceps	m	h	n	z	i	i	m	v	0	a	a	a	a	a	z	1	1
longitibialis	k	l	x	s	q	t	o	v	0	a	a	a	a	a	g	0	2
loveridgei	s	?	u	l	l	r	m	s	0	a	a	a	a	g	a	0	?
loysianus	b	h	n	r	o	m	p	a	0	a	a	a	a	g	t	1	2
luciae	o	q	r	m	j	v	m	p	0	z	a	a	a	a	z	1	1
lucius	j	j	v	m	m	x	h	s	0	a	a	a	a	a	a	1	2
luteogularis	z	h	o	r	o	i	t	s	0	a	a	a	a	a	a	0	0
luteosignifer	g	p	r	m	m	t	j	m	0	a	a	z	a	z	a	1	2
maculiventris	d	c	s	i	k	q	j	p	0	a	a	a	a	a	t	0	2
marcanoi	h	l	v	u	t	t	m	s	0	a	a	a	a	z	g	0	2
mariarum	f	f	p	m	l	l	k	s	0	a	a	a	a	a	z	0	2
marmoratus	m	s	r	s	o	q	q	p	0	a	a	a	a	a	m	1	2
maynardi	l	u	n	y	h	k	n	p	0	a	a	a	a	g	z	1	?
megapholidotus	f	h	o	k	n	q	o	p	0	z	a	a	z	z	a	0	2
meridionalis	h	e	n	f	l	h	l	s	1	?	a	a	z	z	t	1	1
mestrei	g	k	p	p	n	t	l	h	0	a	a	z	a	m	a	0	2
micropholidotus	c	c	n	g	j	n	l	p	0	a	a	a	n	z	z	1	2
microtus	s	i	m	m	e	f	?	v	0	a	a	a	a	a	a	0	0
monticola	g	l	w	q	k	r	h	v	0	a	a	a	a	a	m	1	1
nebuloides	f	k	s	l	n	t	m	?	0	?	a	a	z	z	m	0	2
nebulosus	d	g	o	l	n	n	k	m	0	a	a	a	z	t	z	0	2
nitens	l	e	y	f	k	q	p	s	0	?	a	a	z	z	t	1	1
noblei	z	l	q	t	y	g	x	v	0	a	a	a	a	a	a	0	0
notopholis	e	d	v	l	m	u	z	s	1	z	a	a	z	z	t	0	1

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Character number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Character type	o	o	o	o	o	o	o	o	u	o	o	o	o	o	o	o	o
Parsimony transition cost	80	80	80	80	80	80	80	80	1K	40	40	40	40	40	40	1K	1K
nubilis	m	t	t	r	p	p	n	s	0	a	a	a	a	a	a	1	1
occultus	c	e	e	l	f	h	p	a	0	z	a	a	a	a	z	0	1
oculatus	o	s	s	s	o	s	m	s	0	a	a	z	a	a	a	1	1
olssoni	e	i	o	n	g	l	l	z	0	a	a	a	z	z	z	0	2
onca	o	l	q	l	k	s	u	p	2	a	a	a	a	m	z	1	1
opalinus	g	h	o	q	o	r	k	p	0	a	a	a	a	a	t	0	1
ophiolepis	b	i	k	m	k	s	m	p	1	a	a	a	z	z	g	1	1
ortoni	h	j	o	k	l	o	l	p	0	a	a	a	a	a	z	1	1
oxylophus	l	i	t	a	f	t	y	p	0	z	a	a	z	k	z	0	2
parvicirculatus	e	e	y	o	m	s	u	p	0	z	a	a	f	n	f	0	2
paternus	e	h	k	s	k	a	i	m	0	a	a	a	a	a	t	0	1
pentaprion	l	m	l	k	l	l	m	h	0	z	a	a	a	a	z	0	1
perracae	f	h	o	k	i	s	g	p	0	a	a	a	a	a	t	0	1
petersi	s	h	r	j	j	n	u	x	0	z	a	a	a	a	z	0	1
placidus	d	e	d	p	g	j	s	a	0	a	z	a	a	a	z	0	0
poecilopus	k	g	w	g	g	s	b	p	0	a	a	a	r	m	t	1	1
polylepis	g	h	t	j	i	s	i	p	0	a	a	a	a	a	a	0	1
poncensis	e	i	n	q	l	k	p	v	0	a	a	a	z	z	g	1	1
porcatus	l	l	l	y	m	m	p	s	0	a	a	a	a	a	z	1	2
proboscis	k	?	h	u	e	g	h	m	0	a	a	a	a	a	a	1	?
pulchellus	f	l	o	t	g	k	m	v	0	a	a	a	v	z	t	0	1
punctatus	n	j	o	p	e	n	n	v	0	a	a	a	a	a	z	1	1
quadriocellifer	g	p	q	l	m	u	j	m	0	a	a	z	a	z	a	0	2
reconditus	p	k	v	t	q	u	r	s	0	a	a	a	a	a	a	0	1
richardi	u	z	s	l	i	x	l	s	0	z	a	a	a	a	m	1	1
ricordi	w	g	q	r	k	s	t	p	0	a	a	z	a	a	a	0	0
roosevelti	w	i	v	u	x	w	v	s	0	a	a	z	a	a	a	0	0
roquet	n	n	p	m	k	s	k	p	0	z	a	a	a	a	z	1	1
rubribarbus	i	p	t	o	o	u	h	m	0	a	a	z	a	g	a	0	2
ruizi	g	e	l	o	j	o	?	s	0	a	a	a	a	a	z	0	1
sagrei	j	s	p	n	l	s	n	p	0	a	a	z	a	z	a	1	2
semilineatus	d	h	r	s	j	m	q	z	0	a	a	a	z	z	z	0	2
sericeus	f	h	o	j	k	j	k	v	0	z	a	a	e	z	z	1	1
sheplani	b	f	a	p	e	f	u	a	0	a	z	a	a	a	z	0	0
shrevei	h	k	t	t	t	?	v	p	0	a	a	a	a	z	p	0	2
smallwoodi	z	j	o	s	t	i	t	s	0	a	a	a	a	a	a	0	0
smaragdinus	g	q	m	t	k	h	m	s	0	a	a	a	a	a	z	1	1
sminthus	h	?	q	k	o	n	r	s	0	a	a	a	z	z	z	0	1
solitarius	f	f	l	n	h	o	x	m	0	a	a	a	a	a	z	0	1
spectrum	c	g	p	n	g	o	q	s	0	a	a	a	z	z	m	0	?
squamulatus	o	c	s	q	j	s	h	x	0	?	a	a	a	a	a	0	1
strahmi	m	l	w	p	p	u	n	s	0	a	a	a	a	a	g	0	2
stratulus	f	i	q	t	n	r	j	m	0	a	a	a	a	a	u	0	1
subocularis	i	n	t	j	m	u	n	m	0	a	a	a	u	z	z	0	2
taylori	l	l	s	k	j	p	l	p	0	a	a	a	g	a	g	0	1
tolimensis	g	g	q	k	i	k	k	p	0	a	a	a	a	a	t	0	2
townsendi	d	g	t	n	k	r	k	p	0	a	a	a	a	a	z	0	1
transversalis	l	e	p	j	d	r	i	p	0	a	a	a	a	a	z	0	1
trinitatis	k	n	o	n	j	r	h	m	0	z	a	a	a	a	z	0	1
tropidogaster	g	f	v	l	k	s	j	p	0	?	a	a	e	g	t	0	1
tropidolepis	h	f	v	l	n	u	q	p	0	z	a	a	z	t	z	1	1
tropidonotus	g	f	t	l	o	u	v	m	0	z	a	a	z	z	n	1	2
valencienni	n	i	k	t	k	j	r	h	0	a	a	a	a	a	k	0	1
vanidicus	a	g	q	u	j	r	o	p	0	a	a	a	z	z	z	1	2
ventrimaculatus	m	m	w	i	h	v	e	x	0	a	a	a	a	a	z	0	2
vermiculatus	s	g	s	s	b	w	c	m	0	a	a	a	a	a	g	2	2
vociferans	g	a	l	n	m	p	x	h	0	a	a	a	a	a	z	0	1
wattsi	h	m	p	s	n	s	l	p	0	a	a	a	a	m	a	1	2

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Character number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Character type	o	o	o	o	o	o	o	o	u	o	o	o	o	o	o	o	o
Parsimony transition cost	80	80	80	80	80	80	80	80	1K	40	40	40	40	40	40	1K	1K
whitemani	j	l	u	v	u	r	p	p	0	a	a	a	a	t	m	0	2
Anisolepis undulatus	j	a	l	a	h	u	u	v	2	z	?	a	z	a	m	2	2
Enyalius iheringi	?	?	t	e	q	z	?	?	2	z	a	a	a	a	a	2	2
Leiocephalus melanochlorus	?	?	q	a	m	z	z	?	2	?	a	a	a	z	a	2	2
Leiocephalus schreibersi	?	?	m	a	q	z	z	?	2	a	a	a	a	a	a	2	2
Polychrus acutirostris	s	a	a	b	a	v	y	z	2	z	a	a	a	a	m	1	1
Polychrus marmoratus	t	a	l	c	a	y	?	z	2	z	a	a	a	a	z	1	1
Urostrophus vautieri	m	a	i	a	k	r	v	h	2	z	?	a	a	a	m	2	2

Character number	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34
Character type	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
Parsimony transition cost	40	80	80	40	40	40	40	40	40	40	40	80	80	40	40	40	40
(*Cm.*) *chamaeleonides*	a	c	z	z	a	a	a	a	a	a	m	f	w	m	a	a	a
(*Cr.*) *barbouri*	a	c	b	a	z	a	a	a	t	a	a	d	a	a	a	a	a
(*Ph.*) *heterodermus*	a	e	m	a	a	a	a	a	a	i	a	a	g	m	a	a	a
(*Ph.*) *nicefori*	a	?	?	?	a	?	a	a	?	a	a	d	d	a	z	a	a
acutus	a	u	o	a	a	a	a	a	a	a	a	g	m	z	z	a	a
aeneus	a	t	p	a	a	a	a	a	z	a	a	h	o	z	r	a	a
aequatorialis	a	u	t	z	z	a	a	a	a	a	m	p	r	z	a	m	a
agassizi	a	s	s	m	?	a	a	a	a	a	a	f	y	z	a	a	a
ahli	a	u	o	a	a	a	a	a	z	a	a	j	d	a	a	a	a
aliniger	a	r	o	a	a	a	a	a	a	a	a	i	l	a	a	a	a
allisoni	a	n	o	a	a	a	a	a	z	a	a	e	h	a	a	a	m
allogus	a	w	p	a	a	a	a	a	f	a	a	l	e	a	a	i	a
altae	a	x	t	a	a	a	a	a	a	a	a	j	j	a	i	a	a
altavelensis	a	v	q	a	a	a	a	a	a	a	a	d	l	z	z	m	z
alutaceus	a	m	n	a	a	a	a	a	z	a	a	g	f	m	a	a	g
angusticeps	a	v	p	a	a	a	a	a	z	a	a	g	r	z	a	a	a
antonii	a	u	r	a	a	a	a	a	a	a	a	i	m	m	a	a	a
apollinaris	a	r	r	?	a	a	a	a	a	a	z	l	m	z	a	a	a
aquaticus	a	r	q	a	a	a	a	a	a	a	z	n	r	d	a	a	a
argenteolus	a	w	o	z	a	a	a	z	g	a	a	f	s	z	z	a	a
argillaceus	a	u	l	a	a	a	a	a	z	a	a	c	l	z	z	g	a
armouri	a	t	f	a	a	a	a	a	z	a	a	d	l	z	z	a	a
auratus	a	h	b	a	a	a	a	a	n	a	z	i	m	p	f	f	a
bahorucoensis	a	u	m	?	a	a	a	a	t	a	a	f	o	z	a	a	a
baleatus	a	m	t	z	a	a	a	a	a	l	z	b	m	m	a	a	a
barahonae	a	l	q	z	a	a	a	a	a	s	t	c	m	g	a	a	a
barkeri	a	t	q	a	z	a	a	a	a	a	m	i	l	a	a	a	a
bartschi	a	y	u	?	a	a	a	a	n	a	a	k	q	z	a	a	a
bimaculatus	a	p	o	a	a	a	a	a	i	a	a	e	n	z	t	a	a
biporcatus	a	s	l	a	a	a	a	a	a	a	m	k	l	a	a	a	a
bitectus	a	o	i	a	a	a	a	a	a	a	g	l	i	d	a	a	a
bonairensis	a	t	l	a	a	a	a	a	a	a	a	g	v	z	z	a	a
brevirostris	a	w	n	a	a	a	a	a	n	a	a	d	q	z	z	z	z
brunneus	a	o	q	a	a	a	a	a	z	a	a	e	f	z	m	g	g
capito	a	o	o	a	a	a	a	a	f	n	z	l	l	z	a	a	a
carolinensis	a	p	p	a	a	a	a	a	z	a	a	i	j	m	a	a	m
chloris	a	w	u	a	z	a	a	a	a	a	a	l	k	z	a	a	a
chlorocyanus	a	r	n	a	a	a	a	a	r	a	a	g	j	c	a	f	a
christophei	a	v	r	z	a	a	a	a	h	a	p	i	r	z	a	a	a
clivicola	a	q	p	a	a	a	a	a	z	a	a	i	m	z	a	a	a
cobanensis	a	r	m	a	a	a	a	a	g	a	f	j	f	i	a	a	a
coelestinus	a	s	q	a	a	a	a	a	i	a	a	l	m	d	a	a	a
compressicauda	a	c	h	a	a	z	a	a	a	a	z	g	l	m	a	a	a
conspersus	a	v	s	a	a	a	a	a	a	a	a	i	l	z	g	a	a
crassulus	a	j	d	a	a	f	a	a	z	a	a	f	d	i	a	g	a
cristatellus	a	x	q	a	a	a	a	a	a	a	i	e	r	i	t	a	a

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Character number	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34
Character type	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
Parsimony transition cost	40	80	80	40	40	40	40	40	40	40	40	80	80	40	40	40	40
cupreus	a	o	l	a	a	a	a	a	n	a	m	k	l	j	a	a	a
cuprinus	a	p	n	a	a	i	a	a	r	a	z	i	i	a	a	a	a
cuvieri	a	l	s	z	a	a	a	a	a	z	m	h	k	w	a	a	a
cyanopleurus	a	j	l	?	a	a	a	a	z	a	a	i	e	u	a	m	a
cybotes	a	w	l	a	a	a	a	a	t	a	z	h	o	z	m	f	a
darlingtoni	a	n	p	a	a	a	z	a	a	z	a	b	f	z	m	a	a
desechensis	a	u	n	a	a	a	a	a	z	a	a	e	q	u	z	f	a
distichus	a	u	n	a	a	a	a	a	a	a	a	c	t	z	z	z	z
dollfusianus	a	o	k	a	a	g	a	a	n	a	k	l	m	o	a	h	a
dunni	a	q	n	a	a	a	a	a	n	a	a	g	d	n	z	a	a
equestris	a	h	p	a	a	a	a	a	u	w	a	d	j	t	a	a	a
etheridgei	a	t	n	a	a	a	a	a	a	a	t	o	m	r	a	a	a
evermanni	a	s	s	a	a	a	a	a	a	a	a	e	r	z	t	a	a
fasciatus	a	u	t	z	z	a	a	a	a	a	a	n	r	t	g	a	a
fowleri	a	q	s	t	a	a	a	a	a	z	a	f	d	z	z	a	a
fraseri	a	t	r	z	g	a	a	a	a	a	a	i	j	j	a	a	a
frenatus	a	s	t	z	z	a	a	a	a	a	t	p	z	a	a	a	a
fuscoauratus	a	u	r	a	a	a	a	a	j	a	a	l	m	w	a	a	a
gadovii	a	t	t	a	a	m	a	a	n	a	a	k	m	z	z	a	a
garmani	a	q	t	a	a	a	a	a	a	a	a	i	h	u	a	a	a
gingivinus	a	t	l	a	a	f	a	a	z	a	a	e	o	z	z	a	a
grahami	z	v	r	a	a	a	a	a	a	a	a	k	m	z	a	a	a
granuliceps	a	v	p	a	m	a	a	a	a	a	m	x	n	g	a	a	a
griseus	a	s	o	a	a	a	a	a	a	a	a	h	s	z	a	g	a
gundlachi	a	u	q	a	a	a	a	a	a	a	a	j	s	t	a	a	a
hendersoni	a	u	n	?	a	a	a	a	z	a	a	g	o	z	a	a	a
homolechis	a	u	k	a	a	a	a	a	z	a	a	e	l	z	a	a	a
humilis	a	i	j	a	a	z	a	a	i	a	m	k	m	g	a	a	a
insignis	a	w	v	z	z	a	a	a	a	a	a	o	l	g	a	a	a
insolitus	a	u	q	n	a	a	z	a	a	a	a	c	m	z	a	a	a
intermedius	a	q	l	a	a	a	a	a	t	a	a	e	h	a	z	a	a
isolepis	a	o	o	a	?	a	a	a	z	g	a	d	h	z	a	g	a
jacare	a	t	o	a	z	a	a	a	a	a	a	g	l	m	m	a	a
jubar	a	t	j	a	a	a	a	a	z	a	a	f	m	z	m	a	a
kemptoni	a	t	q	a	a	i	a	a	a	a	a	i	l	a	i	a	a
krugi	a	u	l	a	a	a	a	a	r	a	a	f	j	t	a	a	a
laeviventris	a	q	k	a	a	a	a	a	l	a	a	g	i	m	r	a	a
latifrons	a	s	v	z	z	a	a	a	a	a	t	o	s	a	a	a	a
leachii	a	r	o	a	a	a	a	a	g	a	a	e	n	z	a	a	a
lemurinus	a	q	j	a	a	a	a	a	a	a	m	i	j	a	l	a	a
limifrons	a	u	n	a	a	a	a	a	a	a	a	o	o	a	a	a	a
lineatopus	a	t	r	a	a	a	a	a	a	a	a	i	k	z	a	a	a
lineatus	a	r	r	a	a	a	a	a	p	a	a	f	f	t	z	a	a
liogaster	a	n	h	a	a	a	a	a	z	a	a	f	d	j	z	a	a
lividus	a	s	p	a	a	a	a	a	a	a	a	e	l	z	i	a	a
longiceps	a	m	p	a	a	a	a	a	z	a	a	f	g	z	t	a	i
longitibialis	a	v	n	a	a	g	a	a	z	a	g	f	t	z	z	t	a
loveridgei	a	u	p	a	a	g	a	a	n	a	t	n	h	a	a	a	a
loysianus	a	s	p	a	a	g	a	a	z	a	a	c	h	z	z	a	a
luciae	a	v	o	a	a	a	a	a	a	a	a	h	o	z	z	a	a
lucius	a	w	p	z	a	g	a	z	a	a	a	e	s	z	z	g	a
luteogularis	a	k	q	a	a	a	a	a	z	z	a	b	j	w	a	a	a
luteosignifer	a	m	m	a	a	a	a	a	n	a	a	e	f	z	a	a	a
maculiventris	a	x	t	a	a	a	a	a	n	a	a	q	o	j	a	a	a
marcanoi	a	v	j	a	a	a	a	a	z	a	u	h	i	z	r	f	a
mariarum	a	s	n	a	a	f	a	a	n	a	a	k	o	j	a	a	a
marmoratus	a	t	r	a	a	a	a	a	a	a	a	e	m	z	r	a	a
maynardi	a	p	q	a	a	a	a	a	z	i	a	e	m	z	a	z	g

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Character number	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34
Character type	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
Parsimony transition cost	40	80	80	40	40	40	40	40	40	40	40	80	80	40	40	40	40
megapholidotus	a	g	i	a	a	f	a	a	z	a	a	h	d	a	z	a	a
meridionalis	a	o	i	a	a	a	a	a	z	a	z	i	i	m	a	a	a
mestrei	a	v	o	a	a	g	a	a	z	a	a	f	k	z	m	a	a
micropholidotus	a	l	k	a	a	a	a	a	z	m	a	f	d	m	z	a	a
microtus	a	q	p	z	z	a	a	a	a	a	a	h	h	z	a	a	a
monticola	a	v	o	a	a	a	a	a	a	a	g	o	m	z	a	a	a
nebuloides	a	i	h	a	a	i	a	a	z	a	a	g	h	t	r	a	a
nebulosus	a	n	l	a	a	a	a	a	z	a	a	f	d	j	z	a	a
nitens	a	t	i	a	a	a	a	a	r	g	z	l	m	g	a	a	a
noblei	a	m	j	a	a	a	a	a	z	z	a	d	n	z	a	a	a
notopholis	a	f	f	a	a	z	a	a	i	a	m	g	l	a	a	a	a
nubilis	a	r	q	a	a	a	a	a	t	a	a	e	q	z	i	a	a
occultus	a	s	m	a	?	a	a	a	a	z	a	k	f	a	a	g	a
oculatus	a	u	r	a	a	a	a	a	r	a	a	f	s	z	z	a	a
olssoni	a	i	g	a	a	a	a	a	z	a	a	g	f	z	g	a	a
onca	a	p	l	a	a	a	a	a	z	a	z	l	j	e	a	a	a
opalinus	z	u	r	a	a	a	a	a	a	a	a	g	m	z	a	a	a
ophiolepis	a	a	a	a	a	a	a	a	z	a	a	e	l	z	m	a	a
ortoni	a	w	r	a	a	a	a	a	a	a	a	k	l	g	z	a	a
oxylophus	a	p	s	a	a	a	a	a	a	a	z	n	r	i	a	k	a
parvicirculatus	a	r	q	a	a	a	a	a	a	a	z	i	m	f	a	a	a
paternus	a	t	p	a	a	g	a	a	z	a	a	f	u	z	z	a	g
pentaprion	a	u	r	a	a	a	a	a	n	a	a	i	j	a	e	a	a
perracae	a	u	s	z	z	a	a	a	a	a	a	l	m	z	g	a	a
petersi	a	u	s	a	a	a	a	a	a	a	t	n	h	a	a	a	a
placidus	a	s	r	a	?	a	a	a	z	a	a	e	f	t	a	a	a
poecilopus	a	p	r	a	a	a	a	a	a	a	t	z	r	t	a	a	a
polylepis	a	w	t	f	a	a	a	a	a	a	f	l	q	m	a	a	a
poncensis	a	f	e	a	a	a	a	a	z	a	a	e	j	z	g	a	a
porcatus	a	o	o	a	a	a	a	a	z	a	a	e	m	z	m	a	g
proboscis	a	s	r	?	a	a	a	a	a	a	a	j	c	k	a	a	a
pulchellus	a	n	j	a	a	a	a	a	u	a	a	e	j	z	a	a	a
punctatus	a	w	q	a	z	a	a	a	a	a	a	l	i	t	a	a	a
quadriocellifer	a	t	m	?	a	g	a	a	r	a	a	g	l	z	a	a	a
reconditus	a	t	q	a	a	a	a	a	a	a	a	g	g	z	a	a	a
richardi	a	u	r	a	a	a	a	a	g	a	a	i	s	z	r	a	a
ricordi	a	n	s	z	a	a	a	a	a	w	m	g	o	a	a	a	a
roosevelti	a	l	o	z	a	a	a	a	z	z	m	f	w	a	a	a	a
roquet	a	s	p	a	a	a	a	a	a	a	a	g	n	z	z	a	a
rubribarbus	a	w	r	a	a	a	a	a	r	a	a	j	g	w	a	a	a
ruizi	a	v	o	a	a	a	a	a	a	a	a	g	l	w	z	a	a
sagrei	a	p	j	a	a	a	a	a	z	a	a	f	h	z	a	a	a
semilineatus	a	k	h	a	a	a	a	a	z	a	a	k	j	t	m	a	a
sericeus	a	n	f	a	a	a	a	a	z	a	a	f	f	f	k	a	a
sheplani	a	s	r	a	?	a	a	a	z	a	a	d	i	z	m	a	a
shrevei	a	q	h	a	a	f	a	a	z	a	p	i	m	u	m	a	a
smallwoodi	a	l	p	a	a	a	a	a	z	z	a	d	k	z	a	a	a
smaragdinus	a	o	o	a	a	a	a	a	z	a	a	h	j	i	g	a	a
sminthus	a	l	j	a	a	a	a	a	n	a	a	f	l	g	a	a	a
solitarius	a	t	n	a	z	a	a	a	a	n	a	g	d	a	z	a	a
spectrum	a	c	e	a	a	a	a	a	z	a	a	d	d	m	a	a	a
squamulatus	a	w	t	z	z	a	a	a	a	a	z	m	d	g	a	a	a
strahmi	a	t	q	a	a	g	a	a	z	a	z	g	t	z	z	g	a
stratulus	a	v	p	a	a	a	a	a	a	a	a	e	p	z	g	a	a
subocularis	a	l	j	a	a	g	a	a	z	a	g	h	g	j	r	a	a
taylori	a	u	s	a	a	a	a	a	n	a	a	g	d	m	z	a	a
tolimensis	a	s	q	a	a	a	a	a	z	a	a	k	k	a	a	a	a
townsendi	a	s	q	a	a	a	a	a	a	a	a	m	l	m	a	a	a

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Character number	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34
Character type	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
Parsimony transition cost	40	80	80	40	40	40	40	40	40	40	40	80	80	40	40	40	40
transversalis	a	z	t	z	z	a	a	a	a	a	a	e	n	z	z	a	a
trinitatis	a	u	s	a	a	a	a	a	a	a	a	i	m	z	z	a	a
tropidogaster	a	q	n	a	a	a	a	a	z	a	m	r	m	t	a	a	a
tropidolepis	a	s	o	a	a	a	a	a	a	a	z	q	m	a	a	a	a
tropidonotus	a	c	b	a	a	z	a	a	m	a	u	h	l	a	a	f	a
valencienni	a	p	s	a	a	a	a	a	a	a	a	b	o	a	u	p	a
vanidicus	a	f	h	a	a	a	a	a	z	a	a	e	d	z	r	a	g
ventrimaculatus	a	u	t	z	z	a	a	a	a	a	z	t	o	w	a	a	a
vermiculatus	a	w	w	?	a	a	a	a	a	a	t	l	l	z	a	a	a
vociferans	a	s	w	a	a	a	a	a	a	a	a	g	d	a	m	a	a
wattsi	a	u	m	a	a	g	a	a	z	a	a	f	r	z	z	a	a
whitemani	a	r	l	a	a	a	a	a	z	a	g	g	j	z	t	a	a
Anisolepis undulatus	a	g	g	?	?	a	a	a	?	z	z	h	a	a	a	a	a
Enyalius iheringi	a	?	?	?	?	?	a	a	a	z	z	l	a	a	a	a	a
Leiocephalus melanochlorus	a	c	e	?	a	a	a	a	a	z	a	f	a	a	z	a	a
Leiocephalus schreibersi	a	j	i	?	a	a	a	a	a	z	m	e	a	a	z	a	a
Polychrus acutirostris	a	n	n	?	z	a	a	a	a	n	a	c	a	m	a	a	a
Polychrus marmoratus	a	j	j	z	t	a	a	a	a	g	a	b	a	m	a	a	a
Urostrophus vautieri	a	m	j	?	?	a	a	a	?	z	m	d	a	a	a	a	a

Character number	35	36	37	38	39	40	41	42	43	44	45	46
Character type	o	o	u	o	n	u	e	o	o	o	o	o
Parsimony transition cost	40	40	1K	1K	1K	1K	1K	40	40	1K	40	40
(*Cm.*) *chamaeleonides*	a	a	?	0	4	8	{04}	?	a	2	?	a
(*Cr.*) *barbouri*	a	i	?	2	{24}	0	4	?	a	2	a	a
(*Ph.*) *heterodermus*	a	a	?	0	2	{e1}	3	?	a	2	?	t
(*Ph.*) *nicefori*	a	?	?	0	2	{e1}	1	?	?	2	?	z
acutus	a	a	?	1	0	0	0	?	a	2	a	m
aeneus	a	a	?	1	0	e	0	?	a	2	a	z
aequatorialis	a	a	2	1	0	2	4	?	a	2	a	a
agassizi	a	a	?	1	0	9	3	?	a	2	a	a
ahli	a	a	2	2	1	2	0	?	a	2	a	a
aliniger	a	a	?	1	0	2	0	?	a	2	z	a
allisoni	a	t	?	1	{34}	0	0	?	a	2	?	a
allogus	a	a	2	{23}	1	2	0	?	a	2	a	a
altae	a	a	?	1	0	2	1	?	a	1	a	a
altavelensis	t	a	?	1	0	1	0	?	a	2	a	g
alutaceus	a	a	2	2	0	2	1	?	a	2	a	a
angusticeps	a	g	?	{01}	3	8	2	?	a	2	?	a
antonii	a	a	?	1	0	2	1	?	a	1	a	a
apollinaris	a	?	?	1	{23}	{02}	0	?	a	0	a	a
aquaticus	a	a	2	{01}	{13}	0	0	?	a	0	a	a
argenteolus	a	g	?	1	0	1	0	?	a	2	a	a
argillaceus	a	a	?	1	2	1	2	?	a	2	?	a
armouri	a	a	?	2	0	{12}	1	?	z	2	a	a
auratus	a	i	?	2	3	0	1	?	a	0	a	a
bahorucoensis	a	p	?	1	0	2	1	?	a	2	a	a
baleatus	a	a	?	0	3	2	0	?	a	2	?	a
barahonae	a	a	?	0	2	2	0	?	a	2	?	a
barkeri	a	m	?	{01}	{34}	0	1	?	a	1	a	a
bartschi	m	a	?	1	0	1	0	?	a	2	a	a
bimaculatus	a	a	?	1	0	{e6}	0	?	a	2	a	a
biporcatus	a	i	?	1	3	0	0	?	a	0	a	a
bitectus	a	?	0	2	1	0	0	?	a	{01}	a	a
bonairensis	a	a	?	1	0	1	{01}	?	a	2	a	z
brevirostris	u	a	?	1	0	{e1}	0	?	a	2	a	p
brunneus	a	a	?	1	3	0	{01}	?	a	2	?	g
capito	a	g	?	1	3	3	{04}	?	a	0	a	a

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Character number	35	36	37	38	39	40	41	42	43	44	45	46
Character type	o	o	u	o	n	u	e	o	o	o	o	o
Parsimony transition cost	40	40	1K	1K	1K	1K	1K	40	40	1K	40	40
carolinensis	a	r	?	1	4	0	0	?	a	2	?	a
chloris	a	m	2	1	{02}	7	4	?	a	2	?	a
chlorocyanus	f	k	?	1	0	{c2}	0	?	a	{012}	z	a
christophei	a	g	2	2	0	{27}	0	?	a	2	a	a
clivicola	a	a	2	2	0	0	1	?	a	2	?	a
cobanensis	a	?	?	2	0	2	1	?	a	2	a	a
coelestinus	a	p	?	1	0	2	0	?	a	2	z	a
compressicauda	a	a	?	2	0	0	1	?	a	0	a	a
conspersus	a	a	?	1	0	2	{01}	?	a	2	z	a
crassulus	a	a	1	2	1	0	0	?	a	2	a	a
cristatellus	a	a	0	1	0	2	0	?	a	2	a	a
cupreus	a	a	?	2	1	0	{01}	?	a	1	a	a
cuprinus	a	a	0	2	{123}	0	1	?	a	{01}	a	a
cuvieri	a	a	?	0	{02}	2	{14}	?	a	2	?	a
cyanopleurus	a	m	3	1	0	0	3	?	a	{12}	a	a
cybotes	f	a	?	1	0	{c2}	0	?	a	2	a	a
darlingtoni	a	a	0	0	2	d	{13}	?	a	2	?	m
desechensis	u	a	?	1	0	2	0	?	a	2	a	a
distichus	u	a	?	1	0	1	0	?	a	2	a	p
dollfusianus	a	m	0	2	0	0	0	?	a	0	a	a
dunni	a	?	0	2	0	c	2	?	a	2	a	a
equestris	a	a	?	0	3	1	4	?	a	2	?	a
etheridgei	a	a	2	2	0	2	0	?	a	2	?	a
evermanni	z	a	2	1	0	7	0	?	a	2	a	a
fasciatus	a	g	2	1	0	{27}	{014}	?	a	2	a	a
fowleri	a	a	{23}	0	2	c	1	?	a	2	a	a
fraseri	a	a	0	0	1	c	{04}	?	a	2	?	a
frenatus	a	a	?	1	0	2	4	?	a	0	?	a
fuscoauratus	a	r	?	{12}	0	2	0	?	a	0	?	a
gadovii	a	?	0	2	0	c	{02}	?	a	2	a	a
garmani	a	a	?	1	0	2	0	a	a	2	z	a
gingivinus	a	a	?	1	0	e	0	?	a	2	a	a
grahami	a	a	?	1	0	2	0	z	a	2	z	a
granuliceps	a	g	0	1	0	0	{01}	?	a	0	a	a
griseus	a	a	?	1	0	0	0	?	a	2	?	a
gundlachi	a	m	2	1	0	0	0	?	a	2	a	a
hendersoni	a	g	?	1	0	2	0	?	a	2	?	a
homolechis	a	a	1	2	0	6	0	?	a	2	a	a
humilis	a	z	{04}	2	1	0	1	?	a	0	a	a
insignis	m	a	0	0	{13}	d	4	?	a	2	?	a
insolitus	a	g	?	0	2	1	2	?	a	2	?	a
intermedius	a	?	?	1	2	0	1	?	a	{012}	?	a
isolepis	a	a	?	0	3	0	0	?	a	2	z	a
jacare	a	a	?	1	2	{c2}	1	?	a	2	?	a
jubar	a	a	{03}	2	0	{02}	0	?	a	2	a	a
kemptoni	a	i	?	1	0	2	1	?	a	0	a	a
krugi	a	g	0	1	0	0	{01}	?	a	2	a	a
laeviventris	a	a	?	1	0	0	0	?	a	{012}	?	a
latifrons	a	a	0	0	{02}	2	4	?	a	1	?	a
leachii	a	a	?	1	0	2	0	?	a	2	?	a
lemurinus	a	a	?	2	1	0	0	?	a	1	?	a
limifrons	a	z	?	1	0	2	0	?	a	0	a	a
lineatopus	a	g	?	2	0	0	0	a	a	2	a	a
lineatus	a	a	?	2	3	0	0	?	a	2	?	a
liogaster	a	a	?	2	0	{c2}	3	?	a	2	a	a
lividus	a	m	?	1	0	c	0	?	a	2	?	a
longiceps	a	z	?	1	4	0	{01}	?	a	2	?	a
longitibialis	a	a	?	1	0	2	0	?	a	2	a	a

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Character number	35	36	37	38	39	40	41	42	43	44	45	46
Character type	o	o	u	o	n	u	e	o	o	o	o	o
Parsimony transition cost	40	40	1K	1K	1K	1K	1K	40	40	1K	40	40
loveridgei	a	a	?	{012}	3	2	4	?	a	0	a	a
loysianus	a	a	?	1	2	1	2	?	a	2	a	g
luciae	a	z	{02}	1	0	{c2}	0	?	a	2	a	z
lucius	a	i	0	1	0	1	0	?	a	2	a	a
luteogularis	a	a	?	0	{23}	1	4	?	a	2	?	a
luteosignifer	a	a	?	2	0	4	0	?	a	2	?	a
maculiventris	a	t	1	1	0	{27}	0	?	a	0	a	a
marcanoi	a	a	?	1	0	2	0	?	a	2	a	a
mariarum	a	a	?	1	0	0	1	?	a	{01}	a	a
marmoratus	a	h	?	1	0	2	0	?	a	2	a	a
maynardi	g	m	?	1	4	0	1	?	a	2	?	a
megapholidotus	a	a	0	3	0	0	{23}	?	a	1	a	a
meridionalis	a	?	?	2	1	0	1	?	a	0	?	a
mestrei	a	a	1	2	0	6	0	?	a	2	?	a
micropholidotus	a	?	0	{12}	0	0	3	?	a	{012}	?	a
microtus	a	a	?	0	2	c	4	?	a	2	?	?
monticola	a	a	?	1	0	0	0	?	a	2	a	a
nebuloides	a	a	0	2	0	0	2	?	a	2	a	a
nebulosus	a	z	?	2	0	0	{23}	?	a	2	a	a
nitens	a	i	3	{12}	3	0	0	?	a	0	a	a
noblei	a	a	?	1	4	1	4	?	a	2	?	a
notopholis	a	a	?	2	{12}	0	1	?	a	0	a	a
nubilis	a	a	?	1	0	{ce}	0	?	a	2	?	a
occultus	a	a	?	0	{13}	1	4	?	a	0	?	a
oculatus	a	a	?	1	{12}	2	{01}	?	a	2	a	a
olssoni	a	f	?	1	0	0	0	?	a	2	?	a
onca	a	a	?	1	3	0	0	?	a	2	a	a
opalinus	a	g	?	1	0	7	0	z	a	2	z	a
ophiolepis	a	g	?	2	0	0	1	?	a	{12}	?	a
ortoni	a	a	?	1	0	d	0	?	a	{012}	?	a
oxylophus	a	z	4	1	1	3	1	?	a	0	a	a
parvicirculatus	a	?	0	{12}	1	2	0	?	a	1	a	a
paternus	a	m	?	1	3	{b0}	{02}	?	a	2	?	m
pentaprion	a	a	?	0	3	1	0	?	a	2	?	a
perracae	a	a	{02}	1	0	2	0	?	a	2	a	a
petersi	a	a	?	0	3	0	4	?	a	2	a	a
placidus	a	a	?	0	4	1	2	?	a	2	?	a
poecilopus	a	a	{01}	1	{23}	0	0	?	a	{01}	a	a
polylepis	a	z	?	2	1	2	{01}	?	a	1	a	a
poncensis	a	?	2	1	0	0	{01}	?	a	2	?	a
porcatus	g	t	?	1	4	0	0	?	a	2	?	a
proboscis	a	z	?	0	2	{d1}	4	?	a	2	?	a
pulchellus	a	a	0	1	0	0	0	?	a	2	?	a
punctatus	g	z	{04}	1	0	2	0	?	a	2	a	a
quadriocellifer	a	a	?	2	0	{026}	0	?	a	2	a	a
reconditus	a	g	?	2	0	{02}	0	a	a	2	a	a
richardi	a	a	?	1	0	0	0	?	a	2	a	a
ricordi	a	a	?	0	{02}	2	0	?	a	2	?	a
roosevelti	a	a	?	2	{12}	2	{14}	?	a	2	?	a
roquet	a	a	?	1	0	c	0	?	a	2	a	z
rubribarbus	a	a	2	3	{01}	2	0	?	a	2	a	a
ruizi	a	a	?	1	{02}	c	{01}	?	a	2	?	z
sagrei	a	f	?	2	0	0	0	a	a	2	?	a
semilineatus	a	z	2	1	0	0	0	?	a	2	?	a
sericeus	a	a	?	1	0	0	0	?	a	2	a	a
sheplani	a	g	?	0	4	1	2	?	a	2	?	a
shrevei	a	a	?	2	0	0	1	?	z	2	?	a
smallwoodi	a	a	?	0	3	1	4	?	a	2	?	a

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Character number	35	36	37	38	39	40	41	42	43	44	45	46
Character type	o	o	u	o	n	u	e	o	o	o	o	o
Parsimony transition cost	40	40	1K	1K	1K	1K	1K	40	40	1K	40	40
smaragdinus	a	a	?	1	{34}	{09}	0	?	a	2	?	a
sminthus	a	a	?	{123}	{02}	{09}	1	?	a	1	a	a
solitarius	a	a	?	{01}	0	c	1	?	a	2	a	z
spectrum	a	a	1	1	0	0	3	?	a	2	a	a
squamulatus	a	z	?	{01}	2	2	4	?	a	{012}	a	a
strahmi	a	a	?	1	0	d	0	?	a	2	a	a
stratulus	a	a	0	1	0	{d17}	0	?	a	2	?	a
subocularis	a	a	1	2	0	{09}	2	?	a	1	a	a
taylori	a	z	0	{12}	0	c	2	?	a	2	a	a
tolimensis	a	z	?	1	0	2	3	?	a	1	a	a
townsendi	a	a	?	{12}	0	{02}	0	?	a	0	a	a
transversalis	a	g	?	0	0	1	1	?	a	2	?	a
trinitatis	a	a	?	1	0	2	0	?	a	2	a	t
tropidogaster	a	t	?	1	0	0	{01}	?	a	0	a	a
tropidolepis	a	?	{14}	2	3	0	0	?	a	1	a	a
tropidonotus	a	i	?	2	1	0	1	?	a	1	a	a
valencienni	a	a	?	0	0	1	1	a	a	2	z	m
vanidicus	a	g	3	2	0	0	1	?	a	2	a	a
ventrimaculatus	a	a	?	1	{01}	2	4	?	a	0	a	a
vermiculatus	a	z	2	1	0	0	0	?	a	2	?	a
vociferans	a	?	?	{12}	{23}	0	{01}	z	a	{12}	?	a
wattsi	a	k	?	2	0	0	0	?	a	2	a	a
whitemani	a	a	?	1	0	0	0	?	a	2	a	a
Anisolepis undulatus	a	a	?	{01}	6	9	1	?	a	{12}	z	a
Enyalius iheringi	a	a	?	0	3	0	0	?	?	?	?	?
Leiocephalus melanochlorus	m	a	?	3	5	6	0	?	a	2	z	a
Leiocephalus schreibersi	a	a	?	2	5	6	0	?	a	2	z	a
Polychrus acutirostris	z	a	?	0	7	?	?	?	a	1	z	a
Polychrus marmoratus	m	a	?	0	7	9	{14}	?	a	{01}	z	?
Urostrophus vautieri	a	a	?	0	2	1	1	?	a	2	z	a

Character number	47	48	49	50	51	52	53	54	55	56	57	58	59
Character type	r	o	u	o	o	o	o	o	u	o	o	o	o
Parsimony transition cost	1K	1K	1K	40	1K	1K	1K	40	1K	40	1K	40	40
(*Cm.*) *chamaeleonides*	2	1	0	a	0	0	?	z	2	n	2	a	z
(*Cr.*) *barbouri*	4	1	2	z	0	2	?	z	1	a	0	a	a
(*Ph.*) *heterodermus*	1	0	0	?	2	0	?	z	2	g	0	a	a
(*Ph.*) *nicefori*	{01}	0	0	a	1	0	?	z	?	?	0	?	?
acutus	7	1	0	a	0	1	5	a	0	a	2	a	a
aeneus	6	1	0	a	0	1	3	a	0	a	0	a	a
aequatorialis	6	?	0	z	?	?	?	?	0	a	1	a	a
agassizi	6	1	0	a	0	1	3	a	0	a	1	a	a
ahli	8	1	1	z	0	{01}	{56}	a	0	a	2	a	a
aliniger	7	1	0	z	0	1	4	a	0	g	0	a	a
allisoni	7	1	0	z	0	1	{45}	a	0	g	2	z	a
allogus	8	1	1	z	0	0	6	a	0	a	2	a	a
altae	7	1	1	z	1	0	4	a	1	a	0	a	a
altavelensis	7	1	0	a	0	1	{45}	a	0	a	2	a	a
alutaceus	7	1	0	z	0	{23}	4	a	1	a	2	a	a
angusticeps	8	1	0	z	0	{12}	4	a	1	a	{12}	a	a
antonii	7	1	1	z	0	0	3	a	1	a	0	a	a
apollinaris	?	?	0	?	?	?	?	?	0	a	0	a	a
aquaticus	8	1	1	z	0	0	5	a	?	a	2	a	a
argenteolus	7	1	0	z	0	1	5	a	1	a	2	a	a
argillaceus	8	1	0	z	0	2	5	a	1	a	0	r	a
armouri	8	1	0	a	0	0	4	a	0	a	2	n	a
auratus	8	1	1	z	0	1	4	a	{01}	a	{12}	a	a
bahorucoensis	7	1	0	z	0	1	4	a	0	a	2	a	a

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Character number	47	48	49	50	51	52	53	54	55	56	57	58	59
Character type	r	o	u	o	o	o	o	o	u	o	o	o	o
Parsimony transition cost	1K	1K	1K	40	1K	1K	1K	40	1K	40	1K	40	40
baleatus	?	?	?	?	?	?	?	?	0	z	2	a	a
barahonae	7	1	0	a	0	0	3	a	0	z	2	a	a
barkeri	5	1	1	z	0	0	4	a	1	a	2	a	a
bartschi	7	1	0	z	0	1	5	a	0	a	{12}	a	a
bimaculatus	7	1	0	a	0	1	5	a	0	a	2	z	a
biporcatus	5	1	1	z	0	0	3	a	1	a	1	a	a
bitectus	7	1	1	z	0	0	{56}	a	1	a	{12}	a	a
bonairensis	6	1	0	a	0	1	4	a	0	a	0	a	a
brevirostris	7	1	0	a	0	1	5	a	0	a	1	a	a
brunneus	7	1	0	z	0	1	4	a	0	a	2	n	a
capito	{35}	1	1	z	0	0	2	a	1	a	2	a	a
carolinensis	7	1	0	z	0	1	4	a	0	d	2	z	a
chloris	6	1	0	a	0	1	4	z	1	a	1	a	a
chlorocyanus	7	1	0	z	0	1	4	a	0	d	0	a	a
christophei	7	1	0	z	0	1	5	a	1	a	{12}	a	a
clivicola	7	1	0	z	0	{23}	4	a	1	a	1	a	a
cobanensis	8	1	1	z	1	0	4	a	1	a	1	a	a
coelestinus	6	1	0	z	0	1	4	a	0	a	1	a	a
compressicauda	8	1	1	z	0	0	{45}	a	1	n	2	a	a
conspersus	7	1	1	z	0	0	4	a	0	a	2	a	a
crassulus	8	1	1	z	2	0	5	a	1	n	0	a	a
cristatellus	8	1	0	a	1	1	5	a	0	a	2	a	a
cupreus	8	1	1	z	0	1	4	a	1	a	{12}	a	a
cuprinus	a	1	1	z	2	0	2	a	1	a	2	a	a
cuvieri	7	1	0	a	0	0	3	a	0	n	2	a	a
cyanopleurus	7	1	0	z	0	2	{2345}	a	1	a	1	a	a
cybotes	8	1	0	a	0	1	5	a	0	a	2	n	a
darlingtoni	6	1	0	z	0	0	?	z	1	n	2	a	a
desechensis	?	?	?	?	?	?	?	?	0	a	2	a	a
distichus	7	1	0	a	0	0	5	a	0	a	2	a	a
dollfusianus	8	1	1	z	0	{01}	5	a	1	a	{12}	a	a
dunni	8	1	1	z	1	0	4	a	1	a	2	a	a
equestris	7	1	0	z	0	0	{12}	a	0	z	2	a	z
etheridgei	7	1	0	z	0	3	{34}	a	1	a	2	a	a
evermanni	7	1	0	a	0	1	5	a	0	a	2	a	a
fasciatus	6	1	0	a	0	1	2	z	1	a	1	a	a
fowleri	7	1	0	z	?	?	?	a	1	a	1	a	a
fraseri	6	1	0	?	0	0	{234}	z	0	n	1	a	a
frenatus	6	1	0	?	0	{01}	1	z	0	a	0	a	a
fuscoauratus	7	1	1	z	0	0	3	a	1	a	{12}	a	a
gadovii	8	1	1	z	1	0	5	a	0	a	2	a	a
garmani	7	1	1	z	0	0	4	a	0	a	2	a	a
gingivinus	7	1	0	a	0	1	5	a	{01}	a	2	a	a
grahami	7	1	1	z	0	0	5	a	0	a	2	a	a
granuliceps	7	1	1	z	0	1	4	a	1	a	2	a	a
griseus	6	1	0	a	0	1	3	a	0	a	0	a	a
gundlachi	8	1	0	a	1	1	5	a	0	a	2	a	a
hendersoni	7	1	0	z	0	1	4	a	0	a	{12}	a	a
homolechis	8	1	1	z	0	1	5	a	0	a	2	a	a
humilis	8	1	1	z	1	{01}	5	a	1	a	2	a	a
insignis	3	1	0	?	0	1	1	z	0	a	2	a	a
insolitus	7	1	0	z	0	{12}	?	z	1	a	3	a	a
intermedius	8	1	1	z	1	0	3	a	{01}	a	1	a	a
isolepis	7	1	0	z	0	1	4	a	?	a	0	a	a
jacare	6	1	0	a	1	0	1	z	{01}	a	3	a	a
jubar	?	1	?	?	?	?	?	?	0	a	2	a	a
kemptoni	7	1	1	z	0	1	4	a	1	a	1	a	a
krugi	8	1	0	a	1	{01}	5	a	0	a	2	a	a

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Character number	47	48	49	50	51	52	53	54	55	56	57	58	59
Character type	r	o	u	o	o	o	o	o	u	o	o	o	o
Parsimony transition cost	1K	1K	1K	40	1K	1K	1K	40	1K	40	1K	40	40
laeviventris	8	1	1	z	1	0	5	a	?	?	?	?	?
latifrons	6	1	0	?	0	0	2	z	0	g	{01}	a	a
leachii	7	1	0	a	0	1	5	a	0	a	2	a	a
lemurinus	8	1	1	z	0	0	4	a	{01}	a	{12}	a	a
limifrons	7	1	1	z	0	1	4	a	1	a	1	a	a
lineatopus	7	1	1	z	0	0	4	a	1	a	1	a	a
lineatus	8	1	1	z	0	0	4	a	0	a	2	a	a
liogaster	8	1	1	z	1	0	4	a	?	?	?	?	?
lividus	7	1	0	a	0	1	{56}	a	0	a	2	a	a
longiceps	7	1	0	z	0	1	4	a	0	a	2	n	a
longitibialis	8	1	0	a	0	1	4	a	0	a	2	a	a
loveridgei	5	1	1	z	0	0	4	a	0	a	2	a	a
loysianus	8	1	0	z	0	{12}	4	a	1	a	1	a	a
luciae	6	1	0	a	0	1	3	a	0	a	0	a	a
lucius	7	1	0	z	0	1	5	a	0	a	2	a	a
luteogularis	7	1	0	z	0	0	{12}	a	0	z	2	a	z
luteosignifer	8	1	1	z	0	1	5	a	?	?	?	?	?
maculiventris	7	1	1	z	0	1	4	a	1	a	2	a	a
marcanoi	8	1	0	a	0	{01}	5	a	0	a	2	z	a
mariarum	7	1	1	z	0	0	4	a	1	a	0	a	a
marmoratus	7	1	0	a	0	1	5	a	0	a	2	a	a
maynardi	7	1	0	z	0	1	4	a	0	a	2	z	a
megapholidotus	8	1	1	z	1	1	5	a	?	?	?	?	?
meridionalis	5	1	1	z	0	1	{0123}	z	{01}	a	0	a	a
mestrei	8	1	1	z	0	1	5	a	0	a	2	a	a
micropholidotus	?	?	?	?	?	?	?	?	?	?	?	?	?
microtus	3	1	0	?	0	0	{0123}	z	?	a	1	a	a
monticola	7	1	0	z	0	1	5	a	1	a	1	a	a
nebuloides	8	1	1	z	{01}	0	5	a	1	a	{01}	a	a
nebulosus	9	1	1	z	{12}	0	{45}	a	1	a	{01}	a	a
nitens	8	1	1	z	0	0	4	a	1	a	2	a	a
noblei	?	?	?	?	?	?	?	?	0	z	2	a	z
notopholis	7	1	1	z	0	0	4	a	1	a	1	a	a
nubilis	7	1	0	a	0	1	5	a	0	a	2	a	a
occultus	3	0	0	z	1	{01}	2	a	1	a	0	a	a
oculatus	7	1	0	a	0	0	4	a	0	a	2	a	a
olssoni	7	1	0	z	0	2	4	a	1	a	{12}	a	a
onca	8	1	1	z	0	0	3	a	{01}	a	2	a	a
opalinus	7	1	1	z	0	0	5	a	0	a	2	a	a
ophiolepis	8	1	1	z	0	{01}	5	a	1	a	2	a	a
ortoni	8	1	1	z	0	1	5	a	1	a	{01}	a	a
oxylophus	?	?	?	?	?	?	?	?	1	a	{12}	a	a
parvicirculatus	8	1	1	z	1	0	4	a	1	a	2	a	a
paternus	8	1	0	z	0	2	4	a	?	a	2	a	a
pentaprion	5	1	1	z	0	0	3	a	1	n	1	a	a
perracae	6	1	0	a	0	1	4	z	1	a	0	a	a
petersi	5	1	1	z	0	0	0	a	1	a	2	a	a
placidus	?	?	?	?	?	?	?	?	1	a	3	a	a
poecilopus	8	1	1	z	0	0	4	a	{01}	a	2	a	a
polylepis	7	1	1	z	0	{12}	4	a	1	a	{12}	a	a
poncensis	8	1	0	a	1	0	5	a	0	a	2	a	a
porcatus	7	1	0	z	0	1	5	a	0	a	2	z	a
proboscis	6	1	0	a	0	0	3	z	2	a	2	a	a
pulchellus	8	1	0	a	1	1	5	a	0	a	2	a	a
punctatus	6	1	0	a	1	0	2	z	0	a	{12}	a	a
quadriocellifer	8	1	1	z	0	1	5	a	0	a	2	a	a
reconditus	7	1	1	z	0	0	4	a	{01}	a	2	a	a
richardi	6	1	0	a	0	{12}	3	a	0	a	0	a	a

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Character number	47	48	49	50	51	52	53	54	55	56	57	58	59
Character type	r	o	u	o	o	o	o	o	u	o	o	o	o
Parsimony transition cost	1K	1K	1K	40	1K	1K	1K	40	1K	40	1K	40	40
ricordi	5	1	0	a	0	0	3	a	0	z	2	a	a
roosevelti	5	1	0	a	0	0	4	a	?	n	?	?	?
roquet	6	1	0	a	0	1	4	a	0	a	0	a	a
rubribarbus	8	1	1	z	0	1	5	a	0	a	2	a	a
ruizi	?	?	?	?	?	?	?	?	1	a	2	a	a
sagrei	8	1	1	z	0	1	6	a	0	a	2	i	a
semilineatus	7	1	0	z	0	3	4	a	1	a	1	a	a
sericeus	8	1	1	z	0	1	4	a	1	a	0	a	a
sheplani	1	1	0	z	0	1	?	z	1	a	3	a	a
shrevei	8	1	0	a	0	0	5	a	0	a	2	n	a
smallwoodi	?	1	?	?	?	?	?	?	0	z	2	a	z
smaragdinus	7	1	0	z	0	1	4	a	{01}	a	2	z	a
sminthus	7	1	1	z	1	0	4	a	1	n	0	a	a
solitarius	6	1	0	a	1	0	3	z	1	a	3	a	a
spectrum	7	1	0	z	0	{23}	{34}	a	?	?	?	?	?
squamulatus	6	1	0	?	1	0	0	z	0	a	2	a	a
strahmi	8	1	0	a	0	0	5	a	0	a	2	n	a
stratulus	7	1	0	a	0	1	5	a	0	a	0	a	a
subocularis	8	1	1	z	1	1	5	a	0	a	{01}	a	a
taylori	8	1	1	z	1	1	4	a	0	a	2	?	a
tolimensis	7	1	1	z	0	0	3	a	?	?	?	?	?
townsendi	8	1	1	z	0	1	4	a	1	a	0	a	a
transversalis	6	1	0	a	1	0	{123}	z	1	a	2	a	a
trinitatis	6	1	0	a	0	1	3	a	0	a	0	a	a
tropidogaster	{78}	1	1	z	0	0	4	a	1	a	{12}	a	a
tropidolepis	8	1	1	z	1	0	4	a	1	a	1	a	a
tropidonotus	8	1	1	z	0	0	4	a	1	a	{12}	a	a
valencienni	8	1	1	z	0	0	4	a	0	a	2	a	a
vanidicus	7	1	0	z	0	2	4	?	1	a	0	a	a
ventrimaculatus	6	1	0	a	0	0	3	z	0	a	2	a	a
vermiculatus	7	1	0	z	0	0	{45}	a	0	e	2	a	a
vociferans	?	?	1	?	?	?	4	a	1	a	1	a	a
wattsi	7	1	0	z	0	1	5	a	0	a	2	a	a
whitemani	?	?	?	?	?	?	?	?	0	a	2	z	a
Anisolepis undulatus	0	1	?	?	{01}	0	4	z	{012}	?	0	?	a
Enyalius iheringi	?	2	3	?	0	0	?	?	{012}	?	0	?	a
Leiocephalus melanochlorus	?	?	4	?	0	0	?	a	0	?	0	?	a
Leiocephalus schreibersi	?	?	4	?	0	0	?	a	0	a	0	a	a
Polychrus acutirostris	?	0	3	a	0	0	?	z	?	?	0	?	?
Polychrus marmoratus	?	0	3	?	?	0	?	z	{012}	n	0	a	a
Urostrophus vautieri	b	1	4	?	0	0	?	z	{012}	?	0	?	a

Character number	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75
Character type	o	o	o	o	u	o	o	o	o	o	o	o	o	o	o	o
Parsimony transition cost	40	40	40	40	1K	40	40	40	40	40	40	40	40	40	40	40
(*Cm.*) *chamaeleonides*	a	z	a	g	0	a	z	z	z	a	z	a	z	z	a	a
(*Cr.*) *barbouri*	a	z	n	z	0	a	a	a	z	z	a	z	a	z	a	a
(*Ph.*) *heterodermus*	a	z	a	i	0	a	?	v	s	z	z	z	a	a	a	a
(*Ph.*) *nicefori*	a	?	a	?	?	?	?	?	?	?	?	?	?	?	?	?
acutus	a	z	a	z	0	a	a	a	a	a	a	a	a	a	a	a
aeneus	a	a	a	z	0	a	a	a	a	a	a	z	a	a	a	a
aequatorialis	g	z	a	g	0	a	a	a	z	a	a	z	a	q	a	r
agassizi	a	a	a	a	0	a	a	a	a	n	a	z	a	g	a	g
ahli	n	z	a	n	{02}	a	a	a	z	a	a	z	a	z	z	n
aliniger	a	a	a	z	0	a	a	a	a	a	a	n	a	a	a	z
allisoni	a	z	a	z	0	z	a	a	z	n	a	n	n	a	a	n
allogus	z	z	a	z	0	a	a	a	n	a	a	n	?	z	z	a
altae	a	a	a	m	0	a	a	z	a	a	a	z	a	z	a	a

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Character number	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75
Character type	o	o	o	o	u	o	o	o	o	o	o	o	o	o	o	o
Parsimony transition cost	40	40	40	40	1K	40	40	40	40	40	40	40	40	40	40	40
altavelensis	a	z	a	a	0	a	a	a	?	a	a	z	a	z	a	z
alutaceus	z	a	a	z	0	a	a	a	?	a	a	z	a	a	a	a
angusticeps	f	p	a	u	0	a	a	d	j	a	a	z	a	a	a	k
antonii	z	a	a	a	0	a	a	a	a	a	?	z	a	z	a	a
apollinaris	a	a	a	a	0	a	a	a	z	a	a	z	a	z	a	a
aquaticus	a	z	a	z	0	a	a	a	?	a	?	z	a	z	a	a
argenteolus	z	n	a	a	0	a	?	a	g	a	a	z	n	a	a	g
argillaceus	z	a	a	z	0	a	a	a	a	a	a	z	a	z	a	n
armouri	a	z	a	z	0	a	a	a	a	z	a	a	a	z	a	z
auratus	a	a	z	t	0	a	a	a	a	a	a	z	a	r	a	a
bahorucoensis	n	n	a	a	0	a	a	a	a	a	n	a	a	g	a	a
baleatus	a	z	a	a	0	a	n	n	r	a	a	a	a	z	a	n
barahonae	a	z	a	a	0	a	n	a	i	a	a	a	a	z	a	e
barkeri	a	z	z	z	0	a	a	a	z	a	a	z	?	z	a	a
bartschi	z	z	a	a	0	a	a	a	z	a	a	n	a	n	a	a
bimaculatus	n	z	a	z	0	a	a	a	a	a	a	a	a	a	a	x
biporcatus	a	n	a	z	0	a	a	a	n	a	a	z	a	z	a	a
bitectus	a	n	n	a	0	a	a	a	a	a	a	z	a	z	a	a
bonairensis	a	a	a	a	0	a	a	a	a	a	a	z	a	a	a	a
brevirostris	a	z	a	n	0	a	a	a	a	a	a	z	a	z	a	z
brunneus	a	a	a	n	0	z	a	a	?	a	?	z	a	a	a	a
capito	a	z	a	z	1	a	a	n	r	a	a	z	a	z	a	a
carolinensis	a	g	a	w	0	z	a	a	z	n	a	g	a	z	a	a
chloris	z	a	a	a	0	a	a	a	a	a	a	z	a	z	a	a
chlorocyanus	a	a	a	g	{02}	a	a	a	h	a	a	a	a	a	a	a
christophei	z	z	a	z	0	a	a	a	z	?	a	z	a	z	a	a
clivicola	z	z	a	z	0	a	a	a	z	a	a	z	a	z	a	a
cobanensis	n	a	a	a	0	a	a	a	g	a	a	z	a	z	a	a
coelestinus	a	a	a	v	0	a	a	e	a	a	a	a	a	a	a	s
compressicauda	a	a	a	n	0	a	a	a	n	a	a	z	a	t	a	a
conspersus	z	z	a	z	0	a	?	a	z	z	a	z	a	g	a	n
crassulus	a	a	a	z	0	a	a	a	z	a	a	z	a	z	a	a
cristatellus	w	z	h	z	0	a	a	a	e	a	a	d	a	z	z	z
cupreus	z	a	a	z	0	a	a	a	z	a	?	z	a	z	a	a
cuprinus	z	z	a	z	0	a	a	a	z	m	a	z	a	z	a	a
cuvieri	a	z	a	g	0	a	n	a	n	a	a	a	a	y	a	b
cyanopleurus	z	i	a	a	0	a	a	a	a	a	a	z	a	i	a	a
cybotes	a	z	n	x	0	a	a	a	l	z	a	f	a	z	a	z
darlingtoni	a	z	a	a	0	a	n	z	a	a	z	z	a	z	a	a
desechensis	z	z	a	g	0	a	a	a	a	a	a	n	a	z	z	a
distichus	a	t	a	l	0	a	?	a	i	a	a	z	a	z	a	q
dollfusianus	a	a	a	z	0	a	a	a	g	a	a	z	a	z	a	a
dunni	a	a	n	z	0	a	a	a	z	a	a	z	a	z	a	a
equestris	a	z	a	i	0	a	z	a	n	a	i	a	z	u	a	i
etheridgei	z	t	a	t	0	a	a	a	n	a	a	z	a	z	a	g
evermanni	z	z	a	a	0	a	a	a	a	n	a	a	a	n	a	a
fasciatus	a	a	a	z	0	a	a	a	n	a	a	z	a	n	a	a
fowleri	z	z	a	a	0	a	a	a	z	a	a	z	a	n	a	n
fraseri	a	a	a	a	0	a	g	a	z	a	a	z	a	z	a	a
frenatus	a	a	a	n	{02}	a	a	a	z	a	a	z	a	z	a	a
fuscoauratus	a	a	a	t	0	a	a	a	a	a	a	z	a	z	a	?
gadovii	a	a	z	z	0	a	a	a	a	a	z	z	a	z	a	z
garmani	z	z	a	n	0	a	a	a	n	a	a	n	a	n	a	n
gingivinus	z	a	a	z	0	a	?	a	a	a	a	a	?	a	a	z
grahami	z	y	a	s	0	a	?	a	n	?	a	e	a	a	a	u
granuliceps	a	z	a	i	0	a	a	a	n	a	?	z	a	z	a	a
griseus	a	a	a	a	0	a	a	a	a	a	a	z	a	a	a	z
gundlachi	z	z	a	n	0	a	a	a	t	g	a	a	a	z	z	n

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Continued.

Character number	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75
Character type	o	o	o	o	u	o	o	o	o	o	o	o	o	o	o	o
Parsimony transition cost	40	40	40	40	1K	40	40	40	40	40	40	40	40	40	40	40
hendersoni	z	c	a	n	0	a	?	a	a	a	a	a	a	a	a	a
homolechis	n	z	n	z	0	a	?	a	z	a	a	z	a	z	z	n
humilis	n	a	n	z	0	a	a	a	z	a	a	z	a	z	a	a
insignis	a	z	a	a	0	a	a	a	n	a	a	z	a	?	a	a
insolitus	z	z	z	z	0	a	a	n	a	a	z	z	?	a	a	a
intermedius	a	a	a	a	2	a	a	a	a	a	a	a	a	z	a	a
isolepis	a	a	?	z	0	a	?	a	a	a	a	z	?	?	a	a
jacare	a	z	a	z	1	a	g	a	a	a	n	z	a	z	a	a
jubar	z	n	z	z	0	a	a	a	n	a	a	z	a	z	z	n
kemptoni	a	?	a	z	0	a	a	a	a	a	a	z	?	n	a	a
krugi	z	z	a	a	0	a	a	a	a	a	a	f	a	z	z	a
laeviventris	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?
latifrons	a	n	a	a	0	a	a	a	z	a	a	z	a	z	a	a
leachii	a	z	a	n	0	a	a	a	a	n	a	n	a	a	a	a
lemurinus	a	a	a	z	0	a	a	a	z	a	a	z	a	z	a	a
limifrons	a	a	a	g	0	a	?	a	a	a	a	z	a	z	a	a
lineatopus	z	a	a	z	0	a	?	a	t	a	a	z	a	p	a	a
lineatus	a	z	a	n	0	a	a	a	a	n	a	z	a	n	a	z
liogaster	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?
lividus	a	z	a	z	0	a	a	a	a	a	a	z	a	a	a	a
longiceps	a	z	a	a	0	z	a	a	a	g	a	a	a	a	a	a
longitibialis	a	z	z	z	0	a	a	a	a	z	a	a	a	z	a	z
loveridgei	a	z	a	n	0	a	a	a	n	?	a	?	a	z	a	a
loysianus	a	n	a	z	{02}	a	a	a	t	a	a	n	a	z	a	a
luciae	a	a	a	z	1	a	a	a	z	a	n	z	a	a	a	a
lucius	o	z	k	e	0	a	?	a	o	a	a	a	a	z	a	g
luteogularis	a	z	a	a	0	a	z	a	z	a	n	a	z	z	a	n
luteosignifer	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?
maculiventris	a	a	a	a	0	a	a	a	z	?	a	z	a	z	a	a
marcanoi	a	z	z	z	0	a	?	a	n	z	a	a	a	z	a	z
mariarum	a	a	a	z	2	a	a	a	?	a	a	z	a	z	a	a
marmoratus	a	z	a	z	{01}	a	a	a	a	a	a	n	a	a	a	z
maynardi	a	a	a	z	0	a	a	z	a	a	?	z	a	a	a	a
megapholidotus	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?
meridionalis	a	a	a	z	0	a	a	a	z	a	a	a	a	z	a	a
mestrei	z	z	a	z	0	a	a	a	z	?	a	z	a	z	z	z
micropholidotus	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?
microtus	?	z	a	z	0	a	a	a	a	z	?	z	a	z	a	a
monticola	d	r	a	n	0	a	?	a	e	a	a	z	a	q	a	a
nebuloides	a	a	z	z	0	a	a	a	n	a	a	z	a	z	a	a
nebulosus	a	a	a	z	0	a	a	a	n	a	a	z	a	z	a	a
nitens	a	z	z	z	0	a	a	a	a	a	a	a	a	z	a	a
noblei	a	z	a	?	0	a	z	a	n	a	a	a	z	z	a	g
notopholis	a	i	z	z	0	a	a	a	i	a	a	z	a	z	a	a
nubilis	z	z	a	z	0	a	a	a	?	a	a	a	a	a	a	a
occultus	a	a	g	z	1	a	a	z	a	a	w	z	a	a	a	a
oculatus	a	z	a	z	0	a	?	a	a	a	a	z	?	n	a	z
olssoni	a	n	a	n	0	a	a	a	a	a	a	z	a	a	a	a
onca	a	z	z	x	0	a	?	a	s	n	f	v	a	z	a	j
opalinus	r	i	a	n	0	a	a	a	e	a	a	r	a	a	a	r
ophiolepis	a	z	z	a	0	a	a	a	a	a	?	?	?	?	a	a
ortoni	a	a	a	t	0	a	a	a	?	a	a	z	a	z	a	a
oxylophus	a	a	a	z	0	a	a	a	z	a	a	z	a	z	a	a
parvicirculatus	n	a	a	a	0	a	a	a	z	a	a	z	a	t	a	a
paternus	a	n	a	z	0	a	a	a	a	a	a	z	a	a	a	a
pentaprion	a	z	a	a	0	a	a	a	z	a	?	z	a	z	a	a
perracae	a	a	a	n	0	a	a	a	t	a	a	z	a	r	a	a
petersi	a	a	a	z	2	a	a	a	z	a	a	z	a	z	a	a

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Continued.

Character number	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75
Character type	o	o	o	o	u	o	o	o	o	o	o	o	o	o	o	o
Parsimony transition cost	40	40	40	40	1K	40	40	40	40	40	40	40	40	40	40	40
placidus	a	z	a	z	0	a	a	z	a	a	z	z	?	a	a	a
poecilopus	a	z	a	a	0	a	a	a	n	?	a	z	a	z	a	a
polylepis	q	d	a	o	0	a	?	a	r	a	a	z	a	y	a	a
poncensis	z	z	a	t	0	a	a	a	a	a	a	z	a	z	a	z
porcatus	a	r	a	i	0	z	a	a	a	a	a	r	a	a	a	i
proboscis	a	z	a	a	0	a	?	a	z	n	z	z	a	z	a	a
pulchellus	a	z	a	n	0	a	a	a	?	a	a	z	a	a	a	a
punctatus	a	f	a	i	1	a	?	a	i	a	a	z	a	z	a	a
quadriocellifer	z	z	z	z	0	a	a	a	a	a	a	z	a	z	z	a
reconditus	z	z	a	z	0	a	a	a	t	z	a	n	a	z	a	a
richardi	a	a	a	n	0	a	a	a	a	a	a	z	a	z	a	n
ricordi	a	z	a	a	0	a	n	a	z	a	a	a	a	z	a	n
roosevelti	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?
roquet	a	a	a	n	0	a	a	a	n	a	a	z	a	a	a	a
rubribarbus	z	a	a	z	0	a	a	a	z	z	a	z	a	z	z	t
ruizi	a	a	a	n	1	a	a	z	a	?	a	z	a	z	a	a
sagrei	z	w	t	t	0	a	?	a	q	a	a	z	a	w	z	w
semilineatus	l	f	f	b	0	a	a	a	h	a	a	z	a	l	a	d
sericeus	a	a	n	t	0	a	a	a	a	a	a	z	a	n	a	a
sheplani	z	z	z	z	0	a	a	z	a	a	z	z	?	a	a	a
shrevei	a	z	z	i	0	a	a	a	g	z	a	z	a	z	a	z
smallwoodi	a	z	a	?	0	a	?	a	z	?	a	a	z	z	a	a
smaragdinus	n	n	a	z	0	n	a	a	a	a	a	z	a	a	a	a
sminthus	a	a	a	z	0	a	a	a	z	?	a	?	a	z	a	a
solitarius	a	z	a	r	1	a	a	?	e	a	z	z	a	e	a	a
spectrum	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?
squamulatus	a	z	a	a	0	a	a	a	z	a	a	z	a	z	a	a
strahmi	a	z	a	g	0	a	a	a	z	n	a	z	a	z	a	z
stratulus	a	a	i	z	0	a	a	a	i	i	a	a	a	a	a	a
subocularis	a	a	z	n	0	a	a	a	n	a	a	z	a	z	a	a
taylori	a	a	n	z	0	a	a	a	z	a	a	z	z	z	a	a
tolimensis	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?
townsendi	a	a	a	n	0	a	a	a	g	a	a	z	a	z	a	a
transversalis	a	z	a	z	0	a	a	a	z	a	a	z	a	z	a	a
trinitatis	a	a	a	z	0	a	?	a	a	a	a	z	a	a	a	a
tropidogaster	a	r	z	z	0	a	a	a	a	a	a	z	a	z	a	a
tropidolepis	a	a	a	z	0	a	a	a	a	z	a	z	?	z	a	a
tropidonotus	a	a	a	z	1	a	a	a	z	a	a	z	a	z	a	a
valencienni	d	z	a	w	0	a	?	a	f	a	a	d	a	i	a	z
vanidicus	z	i	a	z	0	a	a	a	n	a	a	z	a	v	a	a
ventrimaculatus	?	n	a	n	0	a	a	a	z	a	a	z	a	z	a	a
vermiculatus	z	z	a	a	0	r	?	a	z	a	a	a	a	z	a	i
vociferans	a	z	z	z	0	a	a	a	a	a	a	z	a	z	a	a
wattsi	a	z	a	z	0	a	?	a	a	n	a	z	a	z	a	a
whitemani	a	z	z	z	0	a	a	a	g	z	a	a	a	z	a	z
Anisolepis undulatus	a	a	a	a	0	?	?	z	a	?	?	a	?	a	?	a
Enyalius iheringi	a	a	a	a	0	?	?	z	a	?	?	a	?	a	?	a
Leiocephalus melanochlorus	a	a	a	a	0	?	?	a	a	?	a	z	?	a	a	a
Leiocephalus schreibersi	a	a	a	a	0	a	a	a	n	a	a	z	?	a	a	a
Polychrus acutirostris	?	a	z	?	?	?	?	?	?	?	?	?	?	?	?	?
Polychrus marmoratus	?	a	z	a	0	a	a	z	a	a	t	v	?	a	?	a
Urostrophus vautieri	a	a	a	a	0	?	?	z	a	?	z	a	?	a	?	a

Character number	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91
Character type	o	o	o	o	o	o	o	o	o	u	o	o	o	o	u	o
Parsimony transition cost	40	40	40	40	40	40	40	40	40	1K	40	40	40	40	1K	40
(*Cm.*) *chamaeleonides*	a	a	a	a	a	n	a	a	z	0	a	a	z	z	1	a
(*Cr.*) *barbouri*	a	a	a	a	a	a	a	a	z	1	n	n	z	a	0	z

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Appendix 2

Continued.

Character number	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91
Character type	o	o	o	o	o	o	o	o	o	u	o	o	o	o	u	o
Parsimony transition cost	40	40	40	40	40	40	40	40	40	1K	40	40	40	40	1K	40
(*Ph.*) *heterodermus*	n	a	a	z	a	c	z	a	h	0	v	c	z	a	0	z
(*Ph.*) *nicefori*	?	?	?	?	?	?	?	?	?	0	?	?	?	?	?	z
acutus	a	a	a	a	a	a	a	a	z	0	z	a	z	a	5	z
aeneus	a	a	a	a	a	n	a	a	z	0	z	a	z	a	0	z
aequatorialis	a	a	a	a	a	a	a	a	a	0	w	a	z	a	0	z
agassizi	a	a	a	a	a	a	a	a	z	0	z	a	z	a	0	z
ahli	a	z	a	a	a	g	a	n	z	1	z	a	z	a	?	z
aliniger	z	a	a	a	a	g	a	a	z	1	a	a	z	a	5	z
allisoni	a	a	a	a	a	z	a	z	z	1	a	a	z	a	0	z
allogus	a	z	a	a	a	a	a	n	z	?	z	a	z	a	0	z
altae	z	a	a	a	a	a	a	z	z	1	z	z	a	a	0	z
altavelensis	a	n	n	a	a	t	n	a	z	0	z	a	z	a	?	z
alutaceus	a	z	a	a	a	a	?	a	z	1	z	z	z	a	0	z
angusticeps	a	a	a	a	a	p	g	u	z	1	f	j	z	a	0	z
antonii	a	z	a	a	a	a	a	n	z	1	n	a	z	a	0	z
apollinaris	a	z	a	a	a	a	a	a	n	0	z	a	z	?	?	z
aquaticus	a	a	z	a	a	a	a	a	z	1	z	?	z	a	?	z
argenteolus	a	?	a	a	a	a	a	z	z	1	z	a	z	a	0	z
argillaceus	z	a	a	a	a	n	a	r	z	1	n	a	z	a	?	z
armouri	a	z	a	a	a	a	a	a	z	1	z	a	z	a	?	z
auratus	a	r	a	a	a	c	a	r	z	1	h	r	z	a	0	z
bahorucoensis	a	a	a	a	a	a	a	a	z	0	z	a	z	a	0	z
baleatus	a	?	a	a	a	a	a	a	z	3	i	a	z	z	0	z
barahonae	a	?	a	a	a	a	a	a	z	3	i	a	z	r	0	z
barkeri	a	z	a	a	a	a	a	a	z	1	n	z	z	a	?	z
bartschi	a	a	a	a	a	g	a	a	z	1	z	n	z	a	0	z
bimaculatus	a	a	a	a	a	a	a	z	z	1	o	l	z	a	5	z
biporcatus	a	a	a	a	a	a	a	n	z	0	z	a	z	a	0	z
bitectus	a	n	z	a	a	a	a	n	z	1	n	n	z	a	?	z
bonairensis	a	a	a	a	a	n	a	a	n	0	z	a	z	a	0	z
brevirostris	a	a	a	a	a	a	a	a	z	0	z	?	z	a	0	z
brunneus	a	n	a	a	a	n	a	z	z	1	a	a	z	a	0	z
capito	a	r	a	a	a	a	a	r	z	1	z	e	z	a	0	z
carolinensis	a	a	a	a	a	z	a	n	z	1	q	a	z	a	0	z
chloris	a	a	n	a	a	c	a	a	r	{01}	n	a	z	a	0	z
chlorocyanus	z	a	a	a	a	a	a	a	z	1	a	a	z	a	5	z
christophei	a	a	a	a	a	a	a	z	z	1	t	a	z	a	0	z
clivicola	?	n	a	n	a	a	a	a	z	1	n	a	z	a	0	z
cobanensis	a	n	a	a	a	a	a	a	z	1	z	a	z	a	0	z
coelestinus	n	a	a	a	a	a	a	a	z	1	a	d	z	a	5	z
compressicauda	a	z	a	a	a	a	a	t	z	1	n	n	z	a	0	z
conspersus	a	z	a	a	a	a	a	w	z	1	z	n	z	a	5	z
crassulus	a	z	a	a	a	a	a	a	z	0	a	a	z	a	0	z
cristatellus	a	z	a	a	a	a	a	r	z	0	z	g	z	a	{23}	z
cupreus	a	n	n	a	a	a	a	t	z	1	z	n	z	a	0	z
cuprinus	a	z	n	a	a	a	a	a	z	1	z	a	z	a	0	z
cuvieri	a	a	a	a	a	a	a	a	z	3	z	a	z	a	1	z
cyanopleurus	a	a	a	a	a	e	a	i	z	1	z	a	z	a	0	z
cybotes	a	i	a	a	a	a	a	r	z	1	z	e	z	a	{45}	z
darlingtoni	a	?	a	a	a	a	a	a	n	0	a	a	z	a	0	z
desechensis	a	z	a	a	a	a	a	t	z	0	z	n	z	a	?	z
distichus	a	a	n	a	a	o	a	l	z	0	z	s	z	a	0	z
dollfusianus	a	n	a	a	a	d	a	n	z	1	z	g	z	a	0	z
dunni	a	z	n	a	a	g	a	z	z	1	z	z	z	a	0	z
equestris	a	?	a	n	a	a	a	a	a	0	d	a	z	a	1	z
etheridgei	a	a	a	a	a	a	a	a	z	1	z	a	z	a	0	z
evermanni	a	z	a	a	a	a	a	n	z	{01}	z	a	z	a	0	z
fasciata	a	n	a	a	a	a	z	a	z	0	n	a	z	a	0	z

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Appendix 2

Continued.

Character number	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91
Character type	o	o	o	o	o	o	o	o	o	u	o	o	o	o	u	o
Parsimony transition cost	40	40	40	40	40	40	40	40	40	1K	40	40	40	40	1K	40
fowleri	a	a	a	a	a	a	a	a	z	1	n	a	z	a	0	z
fraseri	a	?	a	a	a	a	a	a	a	0	a	a	z	a	0	z
frenatus	a	n	a	a	a	a	a	a	a	0	z	a	z	a	0	z
fuscoauratus	a	n	n	a	a	d	a	z	z	1	z	n	z	a	0	z
gadovii	a	z	z	a	a	a	a	z	z	1	n	z	z	?	0	z
garmani	a	n	a	a	a	g	a	n	z	1	z	a	z	a	5	z
gingivinus	a	z	a	a	a	a	a	?	z	1	z	?	z	a	5	z
grahami	a	a	a	a	a	d	a	v	z	1	z	d	z	a	5	z
granuliceps	a	i	r	a	a	a	a	n	z	1	r	r	z	a	0	z
griseus	a	n	a	a	a	a	a	a	e	0	z	f	z	a	0	z
gundlachi	a	n	a	a	g	a	a	z	z	{03}	z	n	z	a	{23}	z
hendersoni	a	a	a	a	a	c	a	a	z	0	q	i	z	a	0	z
homolechis	a	n	?	a	a	a	a	t	z	1	z	a	z	a	0	z
humilis	a	r	z	a	a	a	a	n	z	1	n	z	z	a	0	z
insignis	a	?	a	a	a	a	a	a	a	0	n	a	z	a	?	z
insolitus	a	a	a	z	z	r	z	a	z	1	i	a	z	a	0	z
intermedius	a	a	z	a	a	a	a	z	z	1	z	a	z	a	0	z
isolepis	z	?	a	a	a	z	a	?	?	?	a	?	?	?	0	z
jacare	n	n	a	a	a	a	z	a	a	0	n	a	z	a	0	z
jubar	a	n	a	a	a	a	a	z	z	1	z	a	z	a	0	z
kemptoni	z	a	a	a	a	a	a	n	z	1	n	?	z	a	?	z
krugi	a	z	a	a	a	a	a	a	z	0	z	a	z	a	3	z
laeviventris	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	z
latifrons	a	n	a	n	a	a	a	a	a	0	z	a	z	a	0	z
leachii	a	a	a	a	a	a	a	t	z	1	g	a	z	a	5	z
lemurinus	a	i	i	a	a	a	a	g	z	1	z	a	z	a	0	z
limifrons	a	a	a	a	a	a	a	z	z	1	z	z	z	a	0	z
lineatopus	a	a	a	a	a	n	a	n	z	1	z	n	z	a	5	z
lineatus	a	z	a	a	a	a	a	n	z	1	r	a	z	a	0	z
liogaster	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	z
lividus	a	a	a	a	a	n	a	z	z	1	z	t	z	a	0	z
longiceps	a	a	a	a	a	n	a	a	z	1	a	a	z	a	0	z
longitibialis	a	a	a	a	a	a	a	a	z	1	z	a	z	a	4	z
loveridgei	a	a	a	a	a	a	a	z	z	0	z	a	z	a	0	z
loysianus	z	a	a	a	a	n	a	t	z	1	t	a	z	a	0	z
luciae	a	a	a	a	a	a	a	a	z	0	g	a	z	a	0	z
lucius	a	i	a	a	a	a	a	n	z	1	s	a	z	a	0	z
luteogularis	a	?	a	n	a	a	a	a	a	{01}	a	a	z	a	?	z
luteosignifer	?	?	?	?	?	?	?	?	?	?	?	?	?	?	0	z
maculiventris	a	a	z	a	a	a	a	?	z	1	z	n	z	a	?	z
marcanoi	a	a	a	a	a	a	a	a	z	1	z	a	z	a	4	z
mariarum	n	a	a	a	a	a	a	i	z	1	t	a	z	a	0	z
marmoratus	a	a	a	a	a	g	a	z	z	1	z	a	z	a	5	z
maynardi	a	a	a	a	a	n	a	n	z	1	a	a	z	a	?	z
megapholidotus	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	z
meridionalis	a	a	a	a	a	a	a	g	z	1	t	n	z	a	0	z
mestrei	a	z	a	a	a	a	a	z	z	1	z	n	z	n	0	z
micropholidotus	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	z
microtus	a	z	a	a	a	a	a	a	a	0	a	a	z	a	?	z
monticola	a	a	a	a	a	a	a	c	z	1	c	n	z	a	0	z
nebuloides	a	z	a	a	a	a	a	a	z	1	z	z	z	a	0	z
nebulosus	a	i	a	a	a	a	a	t	z	1	z	z	z	a	0	z
nitens	a	z	z	a	a	a	a	n	z	1	z	a	z	a	0	z
noblei	a	a	a	a	a	a	a	a	n	0	a	a	z	a	1	z
notopholis	a	z	z	a	a	a	a	r	z	1	n	n	z	a	0	z
nubilis	a	a	a	a	a	g	a	z	z	1	z	z	z	a	0	z
occultus	?	a	a	a	a	x	z	a	z	1	a	a	a	a	0	z
oculatus	a	n	a	a	a	n	a	z	z	1	z	a	z	a	5	z

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APPENDIX 2

Continued.

Character number	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91
Character type	o	o	o	o	o	o	o	o	o	u	o	o	o	o	u	o
Parsimony transition cost	40	40	40	40	40	40	40	40	40	1K	40	40	40	40	1K	40
olssoni	a	a	a	a	a	a	a	a	z	1	z	a	z	a	0	z
onca	a	r	n	a	a	a	a	h	z	1	q	e	z	n	0	z
opalinus	a	n	a	a	a	n	a	n	z	1	z	a	z	a	5	z
ophiolepis	a	z	a	a	a	a	a	n	z	1	z	a	z	a	0	z
ortoni	z	n	a	a	a	g	a	a	z	0	z	n	z	a	0	z
oxylophus	a	n	z	a	a	a	a	g	z	1	z	n	z	a	?	z
parvicirculatus	a	z	a	a	a	a	a	a	z	1	z	t	z	a	0	z
paternus	a	a	a	a	a	z	a	n	z	1	a	a	z	a	?	z
pentaprion	z	z	a	a	a	a	a	m	z	1	z	a	z	a	0	z
perracae	a	a	a	a	a	i	a	a	z	0	z	r	z	a	0	z
petersi	a	a	a	a	a	a	a	z	z	1	n	a	z	a	?	z
placidus	a	a	a	z	z	t	z	a	?	1	a	a	z	a	0	z
poecilopus	a	a	z	a	a	a	a	z	z	1	z	a	z	a	?	z
polylepis	a	z	a	a	a	a	a	z	z	1	w	z	z	a	0	z
poncensis	a	n	a	a	a	a	a	g	z	1	z	a	z	a	5	z
porcatus	a	a	a	a	a	z	a	z	z	1	a	a	z	a	0	z
proboscis	z	?	a	a	a	a	z	a	a	0	?	a	z	a	?	z
pulchellus	a	a	a	a	a	t	a	z	z	{01}	z	a	z	a	{23}	z
punctatus	a	a	a	a	a	a	a	a	z	0	p	a	z	a	0	z
quadriocellifer	a	z	a	a	a	a	a	z	z	1	z	a	z	a	?	z
reconditus	a	z	a	a	a	a	a	a	z	1	z	a	z	a	5	z
richardi	a	n	a	a	a	g	a	a	a	0	n	a	z	a	0	z
ricordi	a	?	a	a	a	a	a	a	z	3	r	a	z	z	0	z
roosevelti	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	z
roquet	a	a	a	a	a	g	a	a	z	0	z	a	z	a	0	z
rubribarbus	a	z	a	a	a	a	a	g	z	1	z	a	z	a	0	z
ruizi	a	a	a	a	a	a	z	a	a	0	n	a	z	a	?	z
sagrei	a	n	n	a	a	a	a	n	z	1	t	d	z	a	5	z
semilineatus	a	a	a	a	a	b	a	l	z	1	y	a	z	a	0	z
sericeus	a	a	z	a	a	a	a	n	z	1	z	g	z	a	?	z
sheplani	a	?	a	z	z	j	z	a	z	1	a	a	z	a	0	z
shrevei	a	a	a	a	a	a	a	e	z	1	z	a	z	a	4	z
smallwoodi	a	?	a	a	a	a	a	a	a	0	a	a	z	?	?	z
smaragdinus	a	n	a	a	a	w	a	z	z	1	a	a	z	a	0	z
sminthus	a	z	a	a	a	a	a	z	z	0	z	a	z	a	?	z
solitarius	r	a	a	a	a	i	z	a	a	0	i	a	z	i	?	z
spectrum	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	z
squamulatus	a	n	a	a	a	a	a	a	a	0	t	a	z	a	0	z
strahmi	a	n	a	a	a	a	a	a	z	1	z	a	z	a	4	z
stratulus	a	a	a	a	a	a	a	r	z	1	z	a	z	a	3	z
subocularis	a	z	a	a	a	a	a	z	z	1	n	t	z	a	?	z
taylori	a	z	n	a	a	a	a	z	z	1	z	a	z	a	0	z
tolimensis	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	z
townsendi	a	z	a	a	a	a	a	z	z	1	z	z	z	a	?	z
transversalis	a	i	a	a	a	a	z	a	a	0	n	a	z	a	?	z
trinitatis	a	a	a	a	a	n	a	a	z	?	z	?	z	a	0	z
tropidogaster	a	a	i	a	a	a	a	n	z	1	z	z	z	a	0	z
tropidolepis	a	z	z	a	a	a	a	a	z	1	z	a	z	a	0	z
tropidonotus	a	u	n	a	a	a	a	e	z	1	v	i	z	a	0	z
valencienni	r	i	a	a	a	a	a	e	z	1	w	a	z	a	5	z
vanidicus	a	a	a	a	a	e	i	a	z	1	r	i	z	a	0	z
ventrimaculatus	?	a	a	a	a	a	a	a	t	0	g	a	z	a	0	z
vermiculatus	a	a	a	a	a	a	a	a	a	1	i	a	z	i	0	z
vociferans	z	z	a	a	a	a	a	z	z	1	a	a	z	a	0	z
wattsi	a	a	a	a	a	n	a	z	z	1	z	z	z	a	0	z
whitemani	a	a	a	a	a	a	a	a	z	1	z	a	z	a	?	z
Anisolepis undulatus	?	?	?	a	a	a	a	?	?	0	?	a	a	?	?	a
Enyalius iheringi	?	?	?	a	a	a	a	z	?	0	a	a	a	?	?	a

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Appendix 2

Continued.

Character number	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91
Character type	o	o	o	o	o	o	o	o	o	u	o	o	o	o	u	o
Parsimony transition cost	40	40	40	40	40	40	40	40	40	1K	40	40	40	40	1K	40
Leiocephalus melanochlorus	?	?	?	a	a	?	a	a	a	0	a	n	z	?	0	a
Leiocephalus schreibersi	a	?	z	a	a	a	z	a	a	0	a	z	z	?	?	a
Polychrus acutirostris	?	?	?	?	?	?	?	?	?	0	?	?	?	?	0	a
Polychrus marmoratus	a	?	a	a	a	a	a	a	f	0	s	a	k	a	0	a
Urostrophus vautieri	?	?	?	a	a	a	a	?	?	0	a	a	a	?	?	a

Appendix 3

Morphological apomorphy list. Changes under ACCTRAN optimization are shown with arrows (→). Changes that occur under both ACCTRAN and DELTRAN optimization are shown with double arrows (⇒). Apomorphy descriptions are ordered as follows: **branch** (in bold), character number(s) and transformation(s) that occur on that branch. **361 → 359** 10 a → z 15 a → m 19 j → m 20 i → j 29 f → h 54 a → z 67 a → z 70 a → t 84 a → f **359 → 357** 4 a ⇒ e 19 m → n 20 j → m 39 2 ⇒ 3 44 2 → 1 47 b → 3 49 4 ⇒ 3 **357 → 356** 5 k ⇒ f 15 m → z 16 2 ⇒ 1 17 2 ⇒ 1 27 z → n 28 m ⇒ a 31 a → m 41 0 → 4 48 1 → 0 62 a → g 71 a → v 86 a → s 88 a → k **356 → 354** 2 a ⇒ e 4 e ⇒ l 6 v ⇒ r 7 v ⇒ p 9 2 ⇒ 0 19 n ⇒ s 30 a ⇒ f 45 z → a 49 3 ⇒ 0 50 a → z 52 0 → 1 54 z → a 63 a ⇒ i 71 v → z 84 f ⇒ z 85 0 → 1 91 a ⇒ z **354 → 353** 2 e ⇒ j 3 l ⇒ r 4 l ⇒ o 5 f → j 7 p → n 10 z → a 19 s ⇒ t 20 m ⇒ p 27 n ⇒ a 30 f ⇒ m 31 m ⇒ w 38 0 ⇒ 1 39 3 ⇒ 0 41 4 → 0 44 1 → 2 47 3 ⇒ 6 48 0 → 1 57 0 → 1 61 a → f 62 g → a 67 z ⇒ a 68 a → i 70 t ⇒ a 73 a → q 86 s → t 88 k ⇒ z **353 → 325** 3 r → s 4 o ⇒ r 5 j ⇒ l 8 p → s 15 z → m 17 1 → 2 26 a → i 47 6 ⇒ 7 53 3 → 4 57 1 ⇒ 2 61 f ⇒ z 68 i → n 71 z → a 75 a → b **325 → 313** 1 k → j 5 l ⇒ m 6 r → s 15 m → i 16 1 ⇒ 0 29 h → f 73 q ⇒ z **313 → 190** 3 s → t 15 i → a 21 a ⇒ z 26 i → a 37 2 → 0 63 i ⇒ g 66 a → n **190 → 188** 1 j → u 2 j → h 4 r → u 7 n → r 8 s → p 17 2 ⇒ 0 19 t ⇒ m 20 p → s 27 a → s 28 a → m 38 1 ⇒ 0 39 0 ⇒ 2 40 1 → d 50 z → a 52 1 ⇒ 0 53 4 → 3 56 a ⇒ n 85 1 → 0 **188 → 182** 2 h → f 3 t ⇒ k 6 s ⇒ o 8 p ⇒ h 47 7 → 4 54 a ⇒ z 55 0 → 1 67 a ⇒ z 70 a ⇒ z 75 b → a 86 t ⇒ a **182 → chamaeleonides** 1 u ⇒ y 3 k ⇒ j 5 m ⇒ n 19 m ⇒ c 20 s ⇒ z 27 s → a 30 m ⇒ w 31 w ⇒ m 39 2 ⇒ 4 40 d → 8 47 4 ⇒ 2 55 1 → 2 59 a ⇒ z 66 n ⇒ z 68 n ⇒ z 72 a ⇒ z 81 a ⇒ n 89 a ⇒ z 90 0 ⇒ 1 91 z ⇒ a **182 → darlingtoni** 1 u → l 4 u ⇒ y 5 m ⇒ j 6 o ⇒ f 19 m → n 20 s → p 21 z ⇒ a 24 a ⇒ z 27 s ⇒ z 28 m → a 29 f ⇒ b 30 m ⇒ f 31 w ⇒ z 32 a ⇒ m 41 0 ⇒ {13} 46 a ⇒ m 47 4 → 6 50 a → z 63 g ⇒ a 68 n ⇒ a 71 a → z 84 z ⇒ n **188 → 187** 12 a ⇒ z 37 0 → 2 40 d → 2 85 0 → 3 **187 → 186** 1 u → w 2 h → i 4 u → q 7 r → s 28 m → p 31 w → m 68 n ⇒ r **186 → 184** 3 t ⇒ q 5 m ⇒ j 6 s → r 28 p → t 29 f → c 56 n ⇒ z 63 g ⇒ a 75 b ⇒ n 86 t ⇒ i 89 a ⇒ z **184 → baleatus** 1 w ⇒ y 2 i ⇒ k 20 s ⇒ t 27 s → l 28 t ⇒ z 29 c ⇒ b 39 2 ⇒ 3 67 a ⇒ n **184 → 183** 2 i → h 31 m ⇒ g **183 → barahonae** 3 q ⇒ p 5 j ⇒ i 6 r ⇒ q 7 s → r 8 p → s 19 m ⇒ l 20 s ⇒ q 68 r ⇒ i 75 n → e 89 z → r **183 → ricordi** 2 h ⇒ g 4 q → r 5 j → k 6 r → s 7 s ⇒ t 19 m ⇒ n 27 s ⇒ w 28 t → m 29 c ⇒ g 30 m ⇒ o 31 g ⇒ a 47 7 ⇒ 5 68 r ⇒ z 86 i → r **186 → 185** 6 s ⇒ t 20 s → r 26 a ⇒ h 30 m ⇒ r 38 0 ⇒ 2 53 3 → 4 55 0 → 1 60 a → z 63 g → z 66 n → a 68 r → z 71 a → z 75 b → a 83 a → z 85 3 → 1 **185 → christophei** 1 w ⇒ e 4 q ⇒ p 7 s → o 8 p ⇒ m 12 z ⇒ a 15 a ⇒ g 17 0 ⇒ 1 19 m ⇒ v 27 s ⇒ a 29 f ⇒ i 31 m ⇒ z 36 a ⇒ g 39 2 ⇒ 0 50 a ⇒ z 52 0 ⇒ 1 53 4 ⇒ 5 56 n ⇒ a **185 → roosevelti** 3 t ⇒ v 4 q → u 5 m ⇒ x 6 t ⇒ w 7 s ⇒ v 8 p → s 19 m ⇒ l 20 r ⇒ o 26 h ⇒ z 27 s ⇒ z 28 p → m 30 r ⇒ w 31 m ⇒ a 41 0 ⇒ {14} 47 7 ⇒ 5 **187 → cuvieri** 3 t ⇒ u 5 m ⇒ p 7 r → n 8 p → s 19 m ⇒ l 27 s ⇒ z 29 f ⇒ h 30 m ⇒ k 41 0 ⇒ {14} 73 z ⇒ y 86 t ⇒ z 90 0 ⇒ 1 **190 → 189** 4 r → q 6 s ⇒ w 7 n ⇒ h 19 t ⇒ w 25 a ⇒ z 30 m ⇒ s 31 w ⇒ z 32 a ⇒ z 36 a ⇒ g 53 4 ⇒ 5 60 a ⇒ o 63 g ⇒ e 75 b ⇒ g 77 a → i 83 a ⇒ n **189 → argenteolus** 1 j ⇒ g 5 m ⇒ k 15 a → m 20 p → o 26 a → g 55 0 ⇒ 1 60 o ⇒ z 61 z ⇒ n 63 e ⇒ a 68 n → g 71 a → z 72 a ⇒ n 73 z ⇒ a 83 n ⇒ z 86 t ⇒ z **189 → lucius** 3 t ⇒ v 4 q ⇒ m 6 w ⇒ x 16 0 ⇒ 1 23 a ⇒ g 29 f ⇒ e 33 a ⇒ g 36 g ⇒ i 62 a ⇒ k 68 n ⇒ o 86 t → s **313 → 312** 1 j ⇒ g 5 m ⇒ o 20 p → n 40 1 → 0 63 i ⇒ t 71 a → z 86 t → z **312 → 197** 1 g ⇒ d 2 j → i 4 r → q 6 s → n 7 n → q 8 s ⇒ x 15 i → z 31 w → t 52 1 ⇒ 2 55 0 ⇒ 1 **197 → 194** 14 a ⇒ z 19 t ⇒ i 20 n ⇒ g 26 i ⇒ t 30 m ⇒ f 36 a ⇒ i 57 2 ⇒ 1 75 b → a **194 → barbouri** 2 i ⇒ k 3 s ⇒ t 4 q → r 7 q ⇒ u 9 0 ⇒ 1 16 0 ⇒ 1 17 2 → 1 19 i ⇒ c 20 g ⇒ b 22 a ⇒ z 29 f ⇒ d 30 f ⇒ a 31 t ⇒ a 38 1 ⇒ 2 39 0 ⇒ {24} 41 0 ⇒ 4 47 7 ⇒ 4 49 0 ⇒ 2 54 a ⇒ z 57 1 ⇒ 0 62 a ⇒ n 63 t ⇒ z 68 n ⇒ z 69 a ⇒ z 86 z ⇒ n 87 a ⇒ n **194 → 193** 3 s ⇒ r 5 o ⇒ i 6 n → m 8 x → z 13 a ⇒ z 26 t ⇒ z 29 f → g 32 a → g 61 z ⇒ n 63 t ⇒ n 68 n → a 73 z ⇒ i **193 → 192** 2 i → h 19 i → j 20 g → h 29 g → i 36 i → m 60 a ⇒ l 61 n ⇒ i 63 n ⇒ b 81 a ⇒ b 83 a ⇒ i **192 → 191** 1 d ⇒ c 6 m ⇒ o 8 z → x 15 z ⇒ m 30 f ⇒ e 32 g → a 37 2 → 1 41 0 ⇒ 3 60 l → z 63 b → a 81 b → e **191 → cyanopleurus** 2 h → i 6 o ⇒ q 7 q → p 15 m ⇒ k 20 h ⇒ l 31 t → u 33 a ⇒ m 37 1 → 3 **191 → spectrum** 2 h ⇒ g 3 r ⇒ p 4 q ⇒ n 5 i ⇒ g 8 x ⇒ s 19 j ⇒ c 20 h ⇒ e 29 i ⇒ d 30 e ⇒ d 31 t ⇒ m 36 m ⇒ a **192 → semilineatus** 4 q ⇒ s 5 i → j 19 j ⇒ k 29 i ⇒ k 30 f ⇒ j 32 g ⇒ m 36 m ⇒ z 52 2 ⇒ 3 61 i ⇒ f 62 a ⇒ f 68 a → h 73 i → l 75 a ⇒ d 83 i ⇒ l 86 z → y **193 → olssoni** 1 d ⇒ e 3 r ⇒ o 4 q ⇒ n 5 i ⇒ g 6 m ⇒ l 7 q ⇒ l 31 t ⇒ z 36 i → f 73 i ⇒ a **197 → 196** 2 i ⇒ f 26 i → a 40 0 → c 60 a ⇒ z 75 b → g **196 → etheridgei** 1 d ⇒ c 3 s ⇒ z 6 n ⇒ v 7 q ⇒ h 15 z → m 16 0 ⇒ 1 28 a ⇒ t 29 f ⇒ o 31 t ⇒ r 38 1 ⇒ 2 40 c → 2 52 2 ⇒ 3 61 z ⇒ t **196 → 195** 6 n ⇒ m 7 q ⇒ u 17 2 → 1 20 n ⇒ q 21 a ⇒ n 31 t ⇒ z 38 1 ⇒ 0 39 0 ⇒ 2 73 z ⇒ n 86 z ⇒ n **195 → fowleri** 1 d ⇒ l 4 q ⇒ p 5 o ⇒ p 7 u ⇒ w 19 t ⇒ q 20 q ⇒ s 21 n ⇒ t 27 a ⇒ z 30 m ⇒ d 32 a ⇒ z 41 0 ⇒ 1 57 2 ⇒ 1 63 t ⇒ a 68 n ⇒ z 75 g ⇒ n **195 → insolitus** 2 f → g 3 s ⇒ k 4 q ⇒ t 5 o ⇒ i 6 m ⇒ k 8 x ⇒ h 11 a ⇒ z 17 1 ⇒ 0 19 t ⇒ u 24 a ⇒ z 29 f ⇒ c 36 a ⇒ g 40 c → 1 41 0 ⇒ 2 54 a ⇒ z 57 2 ⇒ 3 62 a ⇒ z 63 t ⇒ z 67 a ⇒ n 68 n ⇒ a 70 a ⇒ z 73 n ⇒ a 75 g → a 79 a ⇒ z 80 a ⇒ z 81 a ⇒ r 82 a ⇒ z 86 n ⇒ i **312 → 311** 2 j → l 4 r ⇒ s 8 s → p 31 w ⇒ z 53 4 → 5 63 t → z 68 n → g 83 a → n **311 → 216** 7 n → m 19 t ⇒ u 29 f ⇒ e 30 m → n 32 a ⇒ t 37 2 → 0 50 z ⇒ a 68 g ⇒ a 85 1 → 0 **216 → 205** 17 2 → 1 71 z ⇒ f 75 b → a 90 0 → 3 **205**

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→ **199** 1 g → j 2 l → o 3 s ⇒ r 4 s → t 7 m → n 15 i → g 20 n → o 26 i → a 71 f ⇒ a 73 z ⇒ a **199** → **acutus** 4 t ⇒ u 16 0 ⇒ 1 29 e ⇒ g 30 n → m 32 t ⇒ z 46 a ⇒ m 83 n → a 90 3 ⇒ 5 **199** → **198** 5 o ⇒ n 8 p ⇒ m 20 o ⇒ p 30 n ⇒ p 40 0 ⇒ 7 69 a ⇒ i 85 0 → 1 **198** → **evermanni** 1 j ⇒ l 4 t ⇒ q 5 n ⇒ m 7 n ⇒ o 19 u ⇒ s 20 p ⇒ s 30 p ⇒ r 35 a ⇒ z 37 0 → 2 60 a ⇒ z 63 z ⇒ a 69 i ⇒ n 73 a → n 77 a ⇒ z 90 3 → 0 **198** → **stratulus** 1 j ⇒ f 2 o ⇒ i 3 r ⇒ q 6 s → r 7 n ⇒ j 15 g ⇒ u 19 u ⇒ v 32 t ⇒ g 57 2 ⇒ 0 61 z ⇒ a 62 a ⇒ i 68 a ⇒ i 83 n ⇒ r **205** → **204** 6 s → r 7 m → k 8 p → s 14 a → e 26 i → r 31 z → u 47 7 ⇒ 8 51 0 ⇒ 1 60 a ⇒ z 63 z → n 74 a → z 77 a ⇒ n 83 n → r **204** → **200** 3 s ⇒ t 4 s ⇒ r 12 a ⇒ z 30 n ⇒ q 40 0 ⇒ 2 77 n ⇒ z 87 a ⇒ g **200** → **cristatellus** 1 g ⇒ m 2 l ⇒ h 4 r ⇒ q 5 o ⇒ r 6 r → s 19 u ⇒ x 20 n ⇒ q 26 r → a 28 a ⇒ i 30 q ⇒ r 31 u ⇒ i 60 z → w 62 a ⇒ h 63 n → z 68 a ⇒ e 71 f ⇒ d 75 a ⇒ z **200** → **desechensis** 2 l ⇒ m 7 k ⇒ i 8 s → p 14 e → a 15 i ⇒ k 26 r ⇒ z 32 t ⇒ z 33 a ⇒ f 35 a ⇒ u 63 n ⇒ g 71 f → n 83 r ⇒ t 87 g ⇒ n **204** → **203** 5 o → m 6 r → o 8 s → v 14 e → z 20 n → l 30 n → j 32 t ⇒ a 36 a → g **203** → **201** 2 l → k 15 i ⇒ g 36 g → m 37 0 → 2 75 a ⇒ n **201** → **gundlachi** 1 g ⇒ k 3 s ⇒ w 5 m ⇒ p 6 o ⇒ v 7 k ⇒ h 8 v → p 12 a ⇒ z 14 z → e 15 g ⇒ a 20 l ⇒ q 26 r → a 29 e ⇒ j 30 j ⇒ s 31 u ⇒ t 68 a ⇒ t 69 a ⇒ g 71 f ⇒ a 80 a ⇒ g 83 r ⇒ z 87 a ⇒ n **201** → **poncensis** 1 g ⇒ e 2 k ⇒ i 3 s ⇒ n 4 s ⇒ q 5 m ⇒ l 6 o ⇒ k 7 k ⇒ p 13 a ⇒ z 16 0 ⇒ 1 19 u ⇒ f 20 l ⇒ e 26 r ⇒ z 31 u → z 32 a → g 52 1 ⇒ 0 63 n → t 71 f ⇒ z 74 z → a 75 n ⇒ z 83 r → g 85 0 ⇒ 1 90 3 ⇒ 5 **203** → **202** 4 s ⇒ t 15 i ⇒ r **202** → **krugi** 2 l ⇒ m 7 k ⇒ h 8 v ⇒ z 29 e ⇒ f 31 u ⇒ t 63 n ⇒ a 77 n ⇒ z 83 r ⇒ a **202** → **pulchellus** 1 g ⇒ f 3 s ⇒ o 5 m ⇒ g 6 o ⇒ k 7 k → m 13 a ⇒ v 15 r ⇒ t 19 u ⇒ n 20 l ⇒ j 26 r ⇒ u 31 u → z 36 g → a 60 z ⇒ a 71 f ⇒ z 73 z ⇒ a 74 z → a 77 n ⇒ a 81 a ⇒ t 83 r ⇒ z **216** → **215** 16 0 ⇒ 1 32 t → z 75 b → x 81 a ⇒ n **215** → **207** 1 g → f 2 l → j 4 s ⇒ m 5 o ⇒ p 8 p ⇒ m 19 u → v 26 i → a 29 e ⇒ d 33 a ⇒ m 34 a ⇒ z 35 a ⇒ t 40 0 ⇒ 1 46 a ⇒ g 63 z ⇒ l 75 x → z 78 a → n 81 n → o 83 n → a **207** → **altavelensis** 6 s → r 15 i ⇒ a 20 n ⇒ q 30 n ⇒ l 63 l ⇒ a 77 a ⇒ n 81 o ⇒ t 82 a ⇒ n **207** → **206** 3 s ⇒ t 6 s ⇒ t 7 m ⇒ g 8 m ⇒ h 30 n ⇒ q 33 m ⇒ z 35 t ⇒ u 46 g ⇒ p 87 a → s **206** → **brevirostris** 2 j ⇒ e 4 m → o 5 p ⇒ q 15 i ⇒ k 19 v ⇒ w 26 a ⇒ n 57 2 ⇒ 1 63 l → n 78 n → a 81 o ⇒ a **206** → **distichus** 1 f → h 3 t ⇒ u 6 t ⇒ v 19 v → u 29 d ⇒ c 30 q ⇒ t 52 1 ⇒ 0 61 z ⇒ t 68 a ⇒ i 75 z → q 83 a → l **215** → **214** 1 g → h 2 l ⇒ m 83 n ⇒ z 85 0 → 1 **214** → **213** 1 h ⇒ o 2 m ⇒ s 7 m → n 15 i → j 17 2 → 1 19 u → t 20 n → o 32 z → t 40 0 ⇒ 2 73 z ⇒ a 90 0 ⇒ 5 **213** → **210** 1 o → r 2 s ⇒ u 5 o ⇒ r 6 s ⇒ p 7 n ⇒ o 15 j ⇒ k 19 t ⇒ r 71 z ⇒ n 81 n ⇒ a 86 z → o **210** → **209** 4 s → r 40 2 ⇒ e 60 a ⇒ n 71 n ⇒ a 87 a ⇒ l **209** → **bimaculatus** 1 r ⇒ s 2 u ⇒ y 4 r ⇒ q 6 p → q 17 1 ⇒ 2 19 r ⇒ p 58 a ⇒ z **209** → **208** 1 r → m 2 u → t 26 i ⇒ t 30 n ⇒ o 60 n ⇒ z 86 o → z 87 l → z **208** → **gingivinus** 1 m ⇒ k 2 t ⇒ o 4 r ⇒ v 7 o ⇒ p 14 a ⇒ q 15 k ⇒ m 19 r ⇒ t 20 o ⇒ l 23 a ⇒ f 26 t ⇒ z 32 t ⇒ z 61 z ⇒ a 75 x ⇒ z 77 a ⇒ z **208** → **nubilis** 3 s ⇒ t 5 r ⇒ p 7 o ⇒ n 8 p ⇒ s 15 k ⇒ a 20 o ⇒ q 30 o ⇒ q 32 t ⇒ i 75 x → a 81 a ⇒ g 90 5 ⇒ 0 **210** → **leachii** 4 s ⇒ t 5 r ⇒ z 6 p ⇒ n 7 o ⇒ r 8 p ⇒ s 15 k ⇒ t 26 i → g 32 t ⇒ a 63 z ⇒ n 69 a ⇒ n 75 x → a 83 z ⇒ t 86 o ⇒ g **213** → **212** 20 o ⇒ r 75 x → z **212** → **211** 1 o → m 26 i ⇒ a 30 n ⇒ m 32 t ⇒ r 36 a ⇒ h **211** → **lividus** 2 s ⇒ u 4 s ⇒ r 5 o ⇒ m 19 t ⇒ s 20 r → p 30 m ⇒ l 32 r ⇒ i 36 h ⇒ m 40 2 ⇒ c 75 z → a 87 a ⇒ t 90 5 ⇒ 0 **211** → **marmoratus** 3 s ⇒ r 6 s ⇒ q 7 n ⇒ q 15 j ⇒ m 17 l ⇒ 2 71 z ⇒ n 81 n ⇒ g **212** → **oculatus** 7 n → m 8 p ⇒ s 12 a ⇒ z 15 j ⇒ a 19 t → u 26 i ⇒ r 29 e ⇒ f 30 n ⇒ s 32 t → z 39 0 ⇒ {12} 52 1 ⇒ 0 53 5 ⇒ 4 73 a → n 77 a ⇒ n **214** → **wattsi** 3 s ⇒ p 5 o ⇒ n 7 m ⇒ l 14 a ⇒ m 15 i ⇒ a 20 n ⇒ m 23 a ⇒ g 26 i ⇒ z 29 e ⇒ f 30 n ⇒ r 36 a ⇒ k 38 1 ⇒ 2 50 a ⇒ z 69 a ⇒ n 75 x → a 87 a ⇒ z **311** → **310** 4 s → t 26 i ⇒ z 29 f → g 30 m → k 47 7 → 8 **310** → **293** 1 g → i 6 s → t 14 a ⇒ n 15 i → g 20 n → m 37 2 → 1 40 0 → 2 75 b → n **293** → **286** 4 t ⇒ o 26 z → r 38 1 ⇒ 2 49 0 ⇒ 1 60 a ⇒ r 77 a ⇒ n **286** → **225** 2 l ⇒ p 7 n ⇒ j 8 p ⇒ m 12 a ⇒ z 15 g ⇒ a 19 t → u 60 r ⇒ z 68 g → z 74 a ⇒ z 77 n → z **225** → **218** 3 s ⇒ t 6 t ⇒ u 7 j ⇒ h 14 n → m 19 u → w 20 m → p 29 g ⇒ j 30 k ⇒ g 31 z ⇒ w 37 1 → 2 39 0 → 1 **218** → **217** 2 p → m 6 u ⇒ x 17 2 ⇒ 1 30 g ⇒ e 31 w ⇒ a 52 1 → 0 53 5 → 6 **217** → **ahli** 1 i → h 2 m ⇒ l 6 x ⇒ y 7 h ⇒ f 12 z ⇒ a 19 w → u 20 p → o 26 r → z 30 e ⇒ d 60 z ⇒ n 63 z ⇒ n 81 a ⇒ g **217** → **allogus** 3 t ⇒ v 5 o ⇒ n 7 h → i 8 m ⇒ p 26 r ⇒ f 29 j ⇒ l 33 a ⇒ i 68 z → n 71 z ⇒ n 75 n ⇒ a **218** → **rubribarbus** 14 m ⇒ g 20 p ⇒ r 38 2 ⇒ 3 61 z ⇒ a 69 a ⇒ z 75 n ⇒ t 83 n → g **225** → **224** 3 s → q 5 o ⇒ n 8 m → h 14 n → z 26 r → z 29 g ⇒ f 40 2 → 0 62 a → n 83 n ⇒ z **224** → **219** 2 p ⇒ q 20 m ⇒ k 30 k ⇒ l 77 z → n **219** → **homolechis** 1 i ⇒ j 2 q ⇒ r 4 o ⇒ n 29 f ⇒ e 40 0 → 6 60 z ⇒ n 83 z → t **219** → **jubar** 3 q → s 6 t ⇒ u 7 j ⇒ m 19 u → t 20 k ⇒ j 30 l ⇒ m 32 a ⇒ m 37 1 ⇒ {03} 61 z ⇒ n 62 n ⇒ z 68 z → n **224** → **223** 1 i ⇒ g 23 a → g **223** → **222** 4 o ⇒ m 5 n ⇒ m 8 h → m 19 u → t 26 z → r 62 n ⇒ z 68 z → a 75 n → a **222** → **221** 16 0 ⇒ 1 19 t ⇒ m 23 g → a 29 f → e 30 k → h 63 z → t 73 z → w 83 z → n **221** → **luteosignifer** 3 q ⇒ r 26 r ⇒ n 30 h ⇒ f 40 0 → 4 **221** → **220** 3 q ⇒ p 5 m ⇒ l 6 t ⇒ s 7 j ⇒ m 8 m ⇒ p 20 m ⇒ j 26 r → z 36 a ⇒ f **220** → **ophiolepis** 1 g ⇒ b 2 p ⇒ i 3 p ⇒ k 5 l ⇒ k 9 0 ⇒ 1 12 z ⇒ a 13 a ⇒ z 15 a ⇒ g 17 2 ⇒ 1 19 m ⇒ a 20 j ⇒ a 30 h ⇒ l 32 a ⇒ m 36 f ⇒ g 41 0 ⇒ 1 55 0 ⇒ 1 60 z ⇒ a 63 t ⇒ a 74 z ⇒ a **220** → **sagrei** 1 g ⇒ j 2 p ⇒ s 4 m ⇒ n 7 m ⇒ n 19 m → p 29 e → f 53 5 ⇒ 6 58 a ⇒ i 61 z ⇒ w 62 z → t 68 a → q 75 a ⇒ w 77 z ⇒ n 78 a ⇒ n 86 z ⇒ t 87 a ⇒ d 90 0 ⇒ 5 **222** → **quadriocellifer** 4 m ⇒ l 6 t ⇒ u 29 f ⇒ g 30 k ⇒ l **223** → **mestrei** 2 p ⇒ k 3 q ⇒ p 4 o ⇒ p 7 j → l 14 z → m 19 u ⇒ v 20 m → o 32 a ⇒ m 40 0 → 6 62 n → a 75 n ⇒ z 87 a ⇒ n 89 a ⇒ n **286** → **285** 2 l → k 6 t → r 15 g → k 26 r ⇒ g 52 1 ⇒ 0 53 5 → 4 55 0 → 1 75 n → a **285** → **278** 1 i → h 4 o ⇒ n 5 o ⇒ n 19 t ⇒ r 28 a → f 29 g → j 30 k → g 31 z ⇒ i 42 a → z 51 0 ⇒ 1 57 2 ⇒ 1 60 r → n 61 z ⇒ a **278** → **277** 1 h → g 2 k → g 4 n ⇒ k 6 r → q 13 a ⇒ z 14 n ⇒ z 15 k ⇒ m 19 r → o 20 m ⇒ j 26 g → n 40 2 → 0 60 n ⇒ a 77 n ⇒ z **277** → **268** 2 g ⇒ f 7 n → p 15 m → t 16 0 ⇒ 1 17 2 ⇒ 1 29 j → l 30 g → l 31 i ⇒ g 44 2 ⇒ 1 68 g → a 78 a → n **268** → **262** 2 f → e **262** → **260** 3 s → t 5 n ⇒ l 7 p ⇒ k 26 n → f 37 1 → 0 51 1 ⇒ 0 63 z ⇒ t 77 z ⇒ n 87 a ⇒ n **260** → **259** 2 e → f 13 z ⇒ a 14 z ⇒ g 19 o → q 20 j → p 38 2 ⇒ 1 **259** → **255** 6 q → s 7 k → j 30 l ⇒ m 31 g → m 36 a → g 44 1 ⇒ 0 **252** → **230** 3 t ⇒ r 6 s → q 14 g ⇒ a 15 t ⇒ z 17 1 ⇒ 2 19 q ⇒ u 20 p ⇒ r 26 f → j 28 f → a 40 0 ⇒ 2 47 8 ⇒ 7 53 4 ⇒ 3 **230** → **229** 6 q ⇒ o 7 j → k 8 p → s 29 l ⇒ k 36 g → a 41 0 ⇒ 1 44 0 ⇒ 1 57 1 ⇒ 0 78 n ⇒ a 86 z ⇒ t 87 n → a **229** → **228** 3 r ⇒ q 6 o ⇒ l 16 1 ⇒ 0 19 u → s 20 r → q 26 j → n 30 m → l 31 m → a 63 t → z 76 a → n 77 n → a **228** → **227** 1 g ⇒ f 3 q ⇒ p 4 k → l 23 a → f 53 3 ⇒ 4 **227** → **226** 2 f ⇒ d 3 p ⇒ o 7 k ⇒ m 17 2 ⇒ 1 19 s → t 26 n ⇒ a 29 k ⇒ j 32 a ⇒ i 76 n ⇒ z 87 a → z **226** → **altae** 1 f ⇒ c 2 d ⇒ a 5 l ⇒ m 6 l ⇒ p 7 m ⇒ n 16 0 ⇒ 1 19 t ⇒ x 20 q ⇒ t 23 f → a 30 l ⇒ j 51 0 ⇒ 1 63 z ⇒ m 67 a ⇒ z 83 n ⇒ z 86 t ⇒ z 88 z ⇒ a **226** → **kemptoni** 3 o ⇒ n 4 l ⇒ j 5 l ⇒ g 6 l ⇒ j 15 z ⇒ m 23 f ⇒ i 29 j ⇒ i 36 a ⇒ i 44 1 ⇒ 0 52 0 ⇒ 1 57 0 ⇒ 1 73 z ⇒ n 86 t ⇒ n **227** → **mariarum** 4 l ⇒

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g → h 31 j ⇒ t 83 t ⇒ a **278** → **cobanensis** 2 k ⇒ n 3 s ⇒ v 5 n ⇒ m 6 r → t 8 p ⇒ s 10 a ⇒ z 30 g ⇒ f 41 0 ⇒ l 63 z ⇒ a 83 n ⇒ a **285** → **284** 1 i ⇒ l 3 s → r 4 o → r 14 n ⇒ a 17 2 ⇒ l 20 m ⇒ r 26 g ⇒ a 47 8 → 7 71 z → n 73 z → p 90 0 ⇒ 5 **284** → **282** 2 k → i 3 r ⇒ o 6 r → q 20 r → s 30 k ⇒ m 38 2 ⇒ l 45 a ⇒ z 55 l → 0 63 z ⇒ w 68 g → f 73 p ⇒ i 75 a → r **282** → **281** 4 r → q 7 n → m 19 t → u 42 a → z 63 w ⇒ n 73 i → g 81 a ⇒ g **281** → **280** 2 i → p 3 o → q 15 k → a 17 l → 2 29 g ⇒ i 30 m → l 60 r ⇒ z 68 f → n 75 r → n **280** → **279** 16 0 ⇒ l 19 u ⇒ v 63 n → s 69 a → z 81 g → d 83 n ⇒ v 87 a ⇒ d **279** → **conspersus** 1 l ⇒ j 5 o ⇒ m 15 a ⇒ m 17 2 → l 32 a ⇒ g 63 s ⇒ z 68 n ⇒ z 71 n ⇒ z 77 n ⇒ z 81 d ⇒ a 83 v ⇒ w 87 d ⇒ n **279** → **grahami** 2 p → j 3 q → p 4 q ⇒ s 5 o ⇒ p 6 q ⇒ n 7 m ⇒ f 14 a ⇒ m 18 a ⇒ z 20 s → r 29 i ⇒ k 30 l → m 53 4 ⇒ 5 61 z ⇒ y 71 n ⇒ e 73 g ⇒ a 75 n ⇒ u 77 n ⇒ a **280** → **garmani** 1 l ⇒ t 2 p ⇒ r 7 m ⇒ t 8 p ⇒ v 12 a ⇒ z 19 u ⇒ q 20 s ⇒ t 30 l ⇒ h 31 z ⇒ u 42 z → a 73 g ⇒ n **281** → **opalinus** 1 l ⇒ g 2 i ⇒ h 6 q → r 7 m ⇒ k 15 k ⇒ t 18 a ⇒ z 20 s → r 36 a ⇒ g 40 2 → 7 53 4 ⇒ 5 61 z ⇒ i 68 f ⇒ e 71 n → r 73 g ⇒ a 81 g ⇒ n **282** → **valencienni** 1 l ⇒ n 3 o ⇒ k 4 r ⇒ t 5 o ⇒ k 6 q ⇒ j 7 n ⇒ r 8 p ⇒ h 19 t ⇒ p 29 g ⇒ b 30 m ⇒ o 31 z ⇒ a 32 a ⇒ u 33 a ⇒ p 38 l ⇒ 0 40 2 → l 41 0 ⇒ l 46 a ⇒ m 47 7 → 8 60 r ⇒ d 71 n ⇒ d 75 r ⇒ z 76 a ⇒ r 77 n ⇒ i 83 n → e 86 z ⇒ w **284** → **283** 15 k ⇒ a 36 a ⇒ g 40 2 → 0 60 r ⇒ z 68 g ⇒ t **283** → **lineatopus** 1 l → k 2 k ⇒ r 14 a → g 29 g ⇒ i 57 2 ⇒ l 61 z ⇒ a 71 n → z 77 n ⇒ a 81 a ⇒ n 87 a ⇒ n **283** → **reconditus** 1 l ⇒ p 3 r ⇒ v 4 r ⇒ t 5 o ⇒ q 6 r ⇒ u 7 n ⇒ r 8 p ⇒ s 20 r → q 30 k ⇒ g 69 a ⇒ z 73 p → z 77 n ⇒ z 83 n ⇒ a **293** → **292** 3 s ⇒ v 4 t → u 5 o ⇒ t 8 p → s 14 n → t 20 m → l 28 a ⇒ p 32 a ⇒ r 33 a → f 50 z ⇒ a 58 a ⇒ n 62 a ⇒ z 69 a ⇒ z 71 z ⇒ a 75 n ⇒ z 83 n → a 90 0 ⇒ 4 **292** → **291** 1 i ⇒ j 7 n → o 30 k → m 32 r → t **291** → **289** 3 v → u 7 o ⇒ p 8 s → p 15 g → m 33 f → a **289** → **288** 6 t → v 7 p → q 14 t ⇒ z 29 g → h 32 t → m 62 z → n 63 z → x 71 a → f 77 a → i 83 a → e **288** → **287** 2 l ⇒ k 3 u ⇒ t 20 l ⇒ h 38 l ⇒ 2 41 0 ⇒ l 43 a ⇒ z 52 l ⇒ 0 **287** → **armouri** 3 t ⇒ s 4 u ⇒ v 5 t ⇒ x 7 q ⇒ n 8 p ⇒ m 20 h ⇒ f 28 p ⇒ a 29 h ⇒ d 30 m → l 32 m ⇒ z 53 5 ⇒ 4 62 n ⇒ a 63 x → z 68 g ⇒ a 71 f → a 77 i ⇒ z 83 e → a **287** → **shrevei** 1 j ⇒ h 4 u ⇒ t 7 q ⇒ v 15 m ⇒ p 19 t ⇒ q 23 a ⇒ f 29 h ⇒ i 31 z ⇒ u 40 2 ⇒ 0 62 n → z 63 x ⇒ i 71 f ⇒ z 77 i → a **288** → **cybotes** 1 j ⇒ m 15 m ⇒ f 19 t ⇒ w 26 z ⇒ t 28 p ⇒ z 30 m ⇒ o 33 a → f 35 a ⇒ f 68 g → l 83 e ⇒ r 87 a ⇒ e **289** → **whitemani** 4 u ⇒ v 5 t ⇒ u 6 t ⇒ r 19 t ⇒ r 28 p → g 30 m ⇒ j 40 2 ⇒ 0 58 n ⇒ z **291** → **290** 1 j ⇒ k 3 v ⇒ w 4 u → s 5 t → q 14 t ⇒ a 20 l → n 23 a ⇒ g 30 m ⇒ t 32 t ⇒ z 33 f ⇒ g **290** → **longitibialis** 3 w ⇒ x 8 s ⇒ v 19 t ⇒ v 28 p → g 29 g ⇒ f 33 g ⇒ t 53 5 ⇒ 4 58 n ⇒ a 68 g ⇒ a **290** → **strahmi** 1 k ⇒ m 4 s ⇒ p 5 q ⇒ p 6 t ⇒ u 7 o → n 20 n ⇒ q 28 p ⇒ z 40 2 ⇒ d 52 l ⇒ 0 62 z ⇒ a 63 z ⇒ g 68 g ⇒ z 69 z ⇒ n 71 a ⇒ z 77 a ⇒ n **292** → **marcanoi** 1 i → h 7 n ⇒ m 14 t ⇒ z 19 t ⇒ v 20 l ⇒ j 28 p ⇒ u 29 g ⇒ h 30 k ⇒ i 58 n ⇒ z 68 g → n **310** → **309** 1 g ⇒ e 2 l ⇒ h 3 s → r 5 o → m 6 s ⇒ p 7 n → o 15 i ⇒ t 19 t → s 20 n → p 52 l ⇒ 2 53 5 → 4 55 0 ⇒ l 61 z → n 73 z → v 75 b → a 86 z ⇒ n **309** → **306** 3 r ⇒ k 6 p ⇒ j 8 p ⇒ m 29 g → f 39 0 ⇒ 3 41 0 ⇒ 2 68 g → a 73 v → a 81 a ⇒ p 86 n → f **306** → **304** 7 o → p 8 m → h 16 0 → l 29 f ⇒ d 30 k → i 40 0 → l **304** → **302** 2 h → f 15 t ⇒ z 17 2 ⇒ l 38 l → 0 39 3 → 4 45 a → z 47 8 → 7 52 2 ⇒ l 81 p → t 86 f ⇒ a **302** → **300** 1 e ⇒ f 19 s ⇒ o 20 p → o 40 1 → 0 41 2 ⇒ 0 55 1 → 0 61 n → g 81 t ⇒ z **300** → **299** 1 f ⇒ l 2 f ⇒ n 3 k → m 4 t ⇒ y 7 p → n 8 h ⇒ s 29 d → e 30 i → j 34 a ⇒ g 36 a ⇒ m 38 0 → l 58 a ⇒ z 65 a ⇒ z **299** → **297** 2 n → p 3 m → n 5 m → k 81 z → w **297** → **294** 31 z ⇒ i 61 g → n 83 n ⇒ z **294** → **allisoni** 1 l ⇒ o 5 k → m 6 j ⇒ o 17 l ⇒ 2 19 o ⇒ n 30 j ⇒ h 31 i ⇒ a 34 g ⇒ m 36 m ⇒ t 56 a ⇒ g 61 n ⇒ z 68 a ⇒ z 69 a ⇒ n 71 z ⇒ n 72 a ⇒ n 75 a ⇒ n 81 w → z **294** → **smaragdinus** 1 l ⇒ g 2 p ⇒ q 3 n → m 4 y ⇒ t 6 j ⇒ h 7 n ⇒ m 29 e ⇒ h 32 a ⇒ g 34 g ⇒ a 36 m ⇒ a 60 a ⇒ n 65 z → n 77 a ⇒ n **297** → **296** 5 k → i 20 o → q 33 a → g 41 0 → l 61 g → a 81 w ⇒ n **296** → **295** 2 p ⇒ h 6 j ⇒ i 7 n ⇒ m 30 j ⇒ g 32 a ⇒ m 58 z ⇒ n 63 z ⇒ n **295** → **brunneus** 5 i → k 6 i ⇒ e 30 g ⇒ f 36 m ⇒ a 39 4 ⇒ 3 46 a ⇒ g 77 a ⇒ n 83 n ⇒ z **295** → **longiceps** 1 l ⇒ m 4 y ⇒ z 8 s ⇒ v 19 o ⇒ m 20 q → p 29 e ⇒ f 32 m ⇒ t 33 g → a 34 g ⇒ i 36 m ⇒ z 61 a ⇒ z 63 n ⇒ a 69 a ⇒ g 71 z ⇒ a 83 n ⇒ a **296** → **maynardi** 2 p ⇒ u 5 i ⇒ h 6 j ⇒ k 8 s → p 14 a ⇒ g 19 o ⇒ p 27 a ⇒ i 30 j ⇒ m

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33 g ⇒ z 35 a ⇒ g 65 z ⇒ a 67 a ⇒ z **299** → **298** 36 m ⇒ r 63 z ⇒ w 71 z ⇒ r **298** → **carolinensis** 1 l → k 4 y → w 5 m ⇒ p 6 j ⇒ i 8 s → p 14 a ⇒ g 19 o ⇒ p 20 o → p 29 e ⇒ i 31 z ⇒ m 34 g ⇒ m 56 a ⇒ d 68 a ⇒ z 69 a ⇒ n 71 r ⇒ g 73 a ⇒ z 86 a ⇒ q **298** → **porcatus** 2 n → l 3 m → l 6 j ⇒ m 7 n → p 17 l ⇒ 2 30 j ⇒ m 32 a ⇒ m 35 a ⇒ g 36 r ⇒ t 53 4 ⇒ 5 61 g ⇒ r 63 w ⇒ i 75 a ⇒ i 83 n ⇒ z **300** → **isolepis** 5 m → n 27 a ⇒ g 30 i ⇒ h 33 a ⇒ g 39 4 → 3 57 2 ⇒ 0 61 g ⇒ a 76 a ⇒ z **302** → **301** 1 e ⇒ d 3 k ⇒ d 4 t ⇒ p 5 m ⇒ g 7 p ⇒ s 8 h ⇒ a 11 a ⇒ z 16 1 → 0 17 1 ⇒ 0 20 p ⇒ r 47 7 → 1 54 a → z 57 2 ⇒ 3 61 n ⇒ z 67 a ⇒ z 70 a ⇒ z 79 a ⇒ z 80 a ⇒ z 82 a ⇒ z 83 n ⇒ a **301** → **placidus** 2 f ⇒ e 29 d → e 30 i ⇒ f 31 z ⇒ t **301** → **sheplani** 1 d ⇒ b 3 d ⇒ a 5 g ⇒ e 6 j ⇒ f 7 s ⇒ u 32 a ⇒ m 36 a ⇒ g 60 a ⇒ z 62 a ⇒ z 81 t ⇒ j **304** → **303** 3 k → m 5 m → o 6 j → l 14 a ⇒ g 29 d ⇒ c 32 a ⇒ z 39 3 ⇒ 2 57 2 ⇒ 1 73 a → z 76 a ⇒ z 81 p → n 83 n ⇒ r 86 f → n **303** → **argillaceus** 2 h ⇒ m 5 o ⇒ p 7 p ⇒ l 8 h ⇒ p 14 g ⇒ m 15 t ⇒ a 19 s ⇒ u 20 p ⇒ l 30 i → l 33 a ⇒ g 53 4 ⇒ 5 57 1 ⇒ 0 58 a ⇒ r 60 a ⇒ z 61 n ⇒ a 75 a ⇒ n **303** → **loysianus** 1 e ⇒ b 3 m ⇒ n 4 t ⇒ r 6 l ⇒ m 8 h ⇒ a 23 a ⇒ g 30 i ⇒ h 46 a ⇒ g 68 a ⇒ t 71 z ⇒ n 83 r ⇒ t 86 n ⇒ t **306** → **305** 5 m ⇒ l 6 j ⇒ f 7 o ⇒ j 19 s → t 30 k ⇒ r 36 a ⇒ g **305** → **angusticeps** 1 e ⇒ f 2 h ⇒ k 3 k ⇒ h 4 t ⇒ w 15 t ⇒ z 19 t ⇒ v 29 f → g 40 0 ⇒ 8 60 a ⇒ f 61 n → p 63 z ⇒ u 67 a ⇒ d 68 a → j 75 a ⇒ k 82 a ⇒ g 83 n ⇒ u 87 a ⇒ j **305** → **paternus** 4 t → s 5 l ⇒ k 6 f ⇒ a 7 j ⇒ i 17 2 ⇒ 1 23 a ⇒ g 30 r ⇒ u 32 a ⇒ z 34 a ⇒ g 36 g ⇒ m 46 a ⇒ m 81 p ⇒ z 86 f ⇒ a **309** → **308** 8 p → v 13 a ⇒ z 19 s ⇒ q 38 l ⇒ 2 41 0 ⇒ 1 47 8 → 7 57 2 → 1 60 a ⇒ z 68 g → n 77 a → n 83 n → a **308** → **307** 1 e ⇒ a 2 h ⇒ g 5 m ⇒ k 6 p → q 15 t ⇒ z 19 q ⇒ m 20 p → n 30 k ⇒ f 34 a ⇒ g 61 n ⇒ i 82 a → i 86 n → r 87 a ⇒ i **307** → **alutaceus** 2 g ⇒ f 4 t → s 7 o ⇒ m 31 z ⇒ m 40 0 ⇒ 2 57 1 → 2 61 i ⇒ a 73 v ⇒ a 77 n ⇒ z 86 r ⇒ z 87 i ⇒ z **307** → **vanidicus** 3 r ⇒ q 4 t ⇒ u 5 k ⇒ j 6 q ⇒ r 8 v → p 14 a ⇒ z 16 0 ⇒ 1 19 m ⇒ f 20 n ⇒ h 29 g ⇒ e 30 f ⇒ d 32 a ⇒ r 36 a ⇒ g 37 2 ⇒ 3 57 1 ⇒ 0 77 n → a 81 a ⇒ e **308** → **clivicola** 3 r ⇒ t 5 m ⇒ p 7 o ⇒ r 29 g ⇒ i 30 k → m 61 n → z 68 n ⇒ z 73 v → z 79 a ⇒ n **325** → **324** 1 k → l 29 h → i 86 t → i **324** → **319** 1 l ⇒ m 3 s → o 6 r ⇒ l 7 n → s 17 2 → 1 19 t ⇒ r 30 m → l 31 w → t 45 a → z 56 a → d 75 b ⇒ i 86 i ⇒ a 90 0 → 1 **319** → **315** 2 j → n 3 o ⇒ n 15 m ⇒ z 31 t ⇒ d 36 a → k 40 1 ⇒ 2 57 2 ⇒ 1 61 z ⇒ a 63 i → v 68 n → a 73 q ⇒ a 75 i → s 76 a ⇒ n 90 1 → 5 **315** → **314** 20 p → o 31 d ⇒ c 57 1 ⇒ 0 76 n ⇒ z **314** → **aliniger** 1 m ⇒ h 2 n ⇒ g 4 r ⇒ s 5 l ⇒ p 6 l ⇒ k 7 s ⇒ v 8 s ⇒ p 17 1 ⇒ 2 26 i ⇒ a 31 c ⇒ a 36 k → a 56 d ⇒ g 63 v ⇒ z 71 a ⇒ n 75 s ⇒ z 81 a ⇒ g **314** → **chlorocyanus** 3 n ⇒ m 4 r ⇒ q 5 l ⇒ k 20 o ⇒ n 26 i ⇒ r 29 i → g 30 l ⇒ j 33 a ⇒ f 35 a ⇒ f 63 v ⇒ g 68 a → h 75 s ⇒ a **315** → **coelestinus** 2 n ⇒ o 6 l → o 7 s ⇒ m 19 r → s 20 p ⇒ q 29 i ⇒ l 30 l → m 36 k ⇒ p 47 7 ⇒ 6 56 d → a 67 a ⇒ e 87 a ⇒ d **319** → **318** 1 m ⇒ z 2 j → h 4 r → s 5 l ⇒ q 6 l ⇒ i 7 s ⇒ t 15 m ⇒ a 16 l ⇒ 0 17 l ⇒ 0 19 r ⇒ k 26 i ⇒ u 27 a ⇒ w 29 i ⇒ d 30 l ⇒ j 38 1 ⇒ 0 39 0 ⇒ 3 41 0 ⇒ 4 52 1 ⇒ 0 53 4 ⇒ 2 56 d ⇒ z 59 a ⇒ z 66 a ⇒ z 70 a → i 72 a ⇒ z 73 q ⇒ u 79 a → n 84 z ⇒ a 85 1 ⇒ 0 **318** → **equestris** 6 i ⇒ h 19 k ⇒ h 86 a → d **318** → **317** 26 u ⇒ z 27 w ⇒ z 31 t → w 63 i → a 68 n → z 73 u ⇒ z **317** → **luteogularis** 4 s → r 5 q → o 20 p ⇒ q 29 d ⇒ b 70 i ⇒ n 75 i ⇒ n **317** → **316** 2 h → j 5 q ⇒ t 19 k → l 30 j → k 31 w ⇒ z 70 i → a 75 i ⇒ g 79 n → a **316** → **noblei** 2 j ⇒ l 3 o ⇒ q 4 s ⇒ t 5 t ⇒ y 6 i ⇒ g 7 t ⇒ x 8 s ⇒ v 19 l ⇒ m 20 p ⇒ j 30 k ⇒ n 38 0 ⇒ 1 39 3 ⇒ 4 68 z → n 84 a ⇒ n **316** → **smallwoodi** 75 g ⇒ a **324** → **323** 5 l → k 7 n ⇒ h 8 s → v 19 t ⇒ v 29 i → k 31 w ⇒ z 40 1 → 0 53 4 → 5 60 a ⇒ n 75 b → a 87 a → i **323** → **321** 1 l ⇒ g 20 p → o 61 z → r 63 i → n 68 n → e **321** → **320** 1 g ⇒ f 4 r ⇒ y 6 r ⇒ q 7 h → l 15 m → p 19 v → u 20 o ⇒ n 26 i ⇒ t 29 k → g 30 m ⇒ o 36 a ⇒ g 40 0 → 2 53 5 → 4 61 r ⇒ n 68 e ⇒ a 73 q ⇒ g 85 1 ⇒ 0 86 i → q **320** → **bahorucoensis** 5 k ⇒ l 13 a ⇒ f 20 n ⇒ m 29 g ⇒ f 36 g ⇒ p 41 0 ⇒ 1 63 n ⇒ a 70 a ⇒ n 86 q ⇒ z 87 i → a **320** → **hendersoni** 2 j ⇒ h 3 s ⇒ q 5 k ⇒ h 6 q ⇒ n 7 l ⇒ m 8 v ⇒ z 15 p ⇒ t 26 t ⇒ z 60 n ⇒ z 61 n ⇒ c 73 g ⇒ a 81 a ⇒ c **321** → **monticola** 2 j ⇒ l 3 s ⇒ w 4 r → q 17 2 → 1 26 i → a 28 a ⇒ g 29 k ⇒ o 55 0 ⇒ 1 57 2 ⇒ 1 60 n → d 71 a ⇒ z 83 a ⇒ c 86 i ⇒ c 87 i ⇒ n **323** → **322** 6 r ⇒ w 7 h ⇒ g 16 1 ⇒ 2 19 v ⇒ w 20 p ⇒ u 60 n ⇒ z 63 i ⇒ a 68 n ⇒ z **322** → **bartschi** 3 s ⇒ w 4 r ⇒ o 6 w ⇒ z 15 m ⇒ z 19 w ⇒ y 26 i ⇒ n 30 m ⇒ q 35 a ⇒ m 40 0 → 1 71 a → n 73 q → n 81 a ⇒ g 86 i ⇒ z 87 i ⇒ n **322** → **vermiculatus** 1 l ⇒ s 2 j ⇒ g 4 r ⇒ s 5 k ⇒ b 7 g ⇒ c 8 v ⇒ m 15 m ⇒ g 20 u ⇒ w 26 i → a 28 a ⇒ t 29 k ⇒ l 30 m → l 36 a ⇒ z 52 1 ⇒ 0 56 a ⇒ e 65 a ⇒ r 73 q ⇒ z 75 a ⇒ i 84 z ⇒ a 87 i → a 89 a ⇒ i **353** → **352** 50 z → a 85 1 → 0 86 t ⇒ v **352** → **345** 2 j → h 3 r → o 5 j → f 6 r → o 20 p → q 30 m → l 41 0 ⇒ 1 52 1 → 0 54 a ⇒ z **345** → **327** 2 h → g 3 o ⇒ h 6 o ⇒ g 8 p ⇒ m 15 z ⇒ a 19 t ⇒ s 30 l ⇒ d 31 w ⇒ k 38 1 ⇒ 0 39 0 ⇒ 2 55 0 ⇒ 2 61 f ⇒ z 68 i ⇒ s 69 a ⇒ n 70 a ⇒ z 76 a ⇒ n 82 a ⇒ z 84 z ⇒ h **327** → **326** 3 h → f 5 f → g 7 n ⇒ y 19 s → e 20 q → m 29 h ⇒ d 46 a ⇒ t 47 6 ⇒ 1 48 1 ⇒ 0 51 0 ⇒ 1 56 a → g 57 1 → 0 67 a → v 69 n → z 73 q → a 79 a → z 81 a → c 87 a → c **326** → **heterodermus** 1 k → l 8 m ⇒ h 27 a ⇒ i 29 d ⇒ a 30 d → g 31 k → m 41 1 ⇒ 3 51 1 ⇒ 2 **326** → **nicefori** 1 k ⇒ i 7 y ⇒ z 31 k ⇒ a 32 a ⇒ z 46 t ⇒ z **327** → **proboscis** 4 o ⇒ u 5 f ⇒ e 7 n ⇒ h 20 q ⇒ r 29 h ⇒ j 30 d ⇒ c 36 a ⇒ z 41 1 ⇒ 4 57 1 ⇒ 2 63 i ⇒ a 68 s ⇒ z 73 q ⇒ z 76 n ⇒ z 84 h ⇒ a **345** → **344** 1 k → n 8 p → s 19 t → u 22 a ⇒ z 40 1 ⇒ 2 **344** → **339** 1 n → o 3 o ⇒ t 4 o ⇒ i 6 o → t 7 n → p 20 q ⇒ s 21 a ⇒ m 30 l ⇒ r 31 w → z 52 0 → 1 61 f → a 63 i → g 86 v → w **339** → **338** 16 1 ⇒ 0 20 s ⇒ t 21 m ⇒ z 29 h ⇒ n 41 1 ⇒ 4 68 i ⇒ n **338** → **335** 7 p → r 8 s ⇒ x 28 a ⇒ m 29 n ⇒ p 52 1 → 0 61 a → n 68 n ⇒ z 84 z ⇒ a **335** → **aequatorialis** 3 t ⇒ w 7 r ⇒ u 8 x ⇒ z 9 0 ⇒ 1 33 a ⇒ m 50 a ⇒ z 60 a ⇒ g 61 n ⇒ z 75 a ⇒ r **335** → **334** 1 o → q 2 h → i 6 t → u 19 u → s 28 m ⇒ t 31 z → w 37 2 → 0 44 2 ⇒ 0 73 q ⇒ z 77 a → n 86 w → z **334** → **328** 5 f ⇒ g 17 1 ⇒ 2 28 t ⇒ z 30 r ⇒ o 84 a → n **328** → **apollinaris** 4 i ⇒ j 6 u ⇒ j 7 r ⇒ u 8 x ⇒ z 19 s ⇒ r 20 t ⇒ r 22 z ⇒ a 29 p ⇒ l 30 o ⇒ m 31 w → z 39 0 ⇒ {23} 41 4 ⇒ 0 57 1 ⇒ 0 61 n → a 63 g ⇒ a 77 n ⇒ z **328** → **ventrimaculatus** 1 q ⇒ m 2 i ⇒ m 3 t ⇒ w 5 g ⇒ h 6 u ⇒ v 7 r ⇒ e 19 s → u 29 p ⇒ t 57 1 ⇒ 2 63 g ⇒ n 77 n → a 84 n ⇒ t 86 z ⇒ g **334** → **333** 1 q → u 8 x → v 15 z → m 30 r → s 31 w ⇒ a 53 3 ⇒ 1 **333** → **332** 2 i ⇒ c 4 i ⇒ k 29 p → o 38 1 ⇒ 0 39 0 → 2 44 0 → 1 63 g ⇒ a **332** → **331** 1 u → q 3 t ⇒ s 4 k ⇒ m 6 u ⇒ s 15 m ⇒ i 19 s → t 29 o ⇒ m 30 s ⇒ j 31 a → g 44 1 → 2 61 n → z 86 z ⇒ t **331** → **330** 3 s ⇒ n 6 s ⇒ r 8 v → s 17 1 ⇒ 0 20 t → r 28 t ⇒ a 29 m → i 31 g → j 39 2 → 1 40 2 ⇒ c 77 n → z 86 t ⇒ a **330** → **fraseri** 4 m → l 22 z ⇒ g 53 1 → {234} 56 a ⇒ n 61 z ⇒ a 66 a ⇒ g **330** → **329** 1 q → s 2 c ⇒ i 5 f ⇒ e 6 r ⇒ o 47 6 ⇒ 3 68 z ⇒ n **329** → **insignis** 1 s ⇒ x 3 n → p 4 m ⇒ n 5 e ⇒ a 8 s ⇒ p 15 i ⇒ m 19 t ⇒ w 20 r ⇒ v 29 i ⇒ o 30 j ⇒ l 31 j → g 35 a ⇒ m 40 c ⇒ d 52 0 ⇒ 1 57 1 ⇒ 2 86 a → n **329** → **microtus** 3 n ⇒ m 6 o ⇒ f 8 s → v 15 i ⇒ a 19 t ⇒ q 20 r ⇒ p 29 i ⇒ h 30 j ⇒ h 31 j ⇒ z 39 1 → 2 63 a ⇒ z 68 n ⇒ a 69 a ⇒ z **331** → **squamulatus** 1 q ⇒ o 4 m ⇒ q 5 f ⇒ j 7 r ⇒ h 8 v ⇒ x 15 i ⇒ a 19 t ⇒ w 28 t ⇒ z 30 j ⇒ d 36 a ⇒ z 51 0 ⇒ 1 53 1 ⇒ 0 57 1 ⇒ 2 **332** → **latifrons** 3 t ⇒ v 6 u ⇒ v 15 m → z 20 t

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