

## Catalogue of American Amphibians and Reptiles.

SCOTT, NORMAN J., JR., AND ROY W. MCDIARMID. 1984. *Trimorphodon*.

*Trimorphodon* Cope  
Lyre Snakes

*Trimorphodon* Cope, 1861:297. Type species, *Lycodon lyrophanes* Cope, 1860, by original designation.

*Eteirodipsas* Jan, 1863:105. Type species, *Dipsas biscutata* Duméril, Bibron, and Duméril, 1854, by subsequent designation (Smith and Taylor, 1945; Mertens, 1952).

*Hetaerodipsas* Berg, 1901:90. Emendation of *Eteirodipsas* Jan.

• CONTENT. Two species are recognized: *T. biscutatus* and *T. tau*.

• DEFINITION AND DIAGNOSIS. A colubrid snake genus with lateral head scales fragmented, numerous, and variable in number, loreals generally 2 or 3 (2-5), preoculars generally 3 or 4 (2-5), postoculars generally 3 (2-4), temporals generally 2 or 3 (1-5) + 3 or 4 (2-5); supralabials generally 8 or 9 (7-10), infralabials generally 11 or 12 (9-14); dorsal scales smooth (or bluntly keeled in some males) with paired apical pits, generally in 21-25 rows at midbody with posterior reduction; anal plate divided or single; subcaudals paired; head distinct from body; eye moderate to large with vertically elliptical pupil; body and tail moderately slender to very slender and laterally compressed; length to over 1500 mm; color pattern composed of black or brown blotches, usually with pale centers which tend to divide the primary blotches into secondary blotches which in turn may be divided; small blotches sometimes present dorsally between large blotches or laterally in a row; head pattern usually complex with a broad pale collar (*tau*) or pale chevron or lyre (most *biscutatus*) on the nape; pale interocular bar often present; ground color brown, tan, gray, or brick red with juvenile color pattern more intense and sharply defined; venter paler than dorsum and noticeably opalescent, may be spotted or mottled.

Maxillary teeth 10-12, anterior 2 or 3 much larger than others which gradually decrease in size posteriorly to diastema which is followed by 1 or 2 enlarged teeth, deeply grooved on anterior face; anterior mandibular teeth enlarged; Duvernoy's gland well developed.

Vertebrae short, broad and flat; wider than long, neural spine low and thin; haemal spine barely indicated as a slightly raised keel. Hypapophyses blade-like, present on anterior vertebrae only.

Hemipenis 14-25 subcaudals long, single, and attenuate; sulcus single, reaching to tip; basal quarter naked, with or without tiny spinules; next distal fifth with thickened sulcal lips and covered with large spines and spinules, or naked (specimens from southern and Baja California); this part followed by two or three pockets on asulcate side with naked pouches and thick, spinulate lips; these pockets followed by a short naked neck that ends in another pocket under the distal portion of the organ, which is finger-shaped and covered with rows of spinulate papillae.

Both species are nocturnal, oviparous, and primarily feed on lizards.

In North and Central American colubrid snakes, an undivided sulcus spermaticus, elliptical pupil, generally smooth scales, and enlarged grooved posterior maxillary teeth preceded by a diastema, define three genera: *Leptodeira*, *Imantodes*, and *Trimorphodon* (Dunn, 1928). *Trimorphodon* is further distinguished by having more than one loreal, a pocketed, non-capitate hemipenis, and slightly oblique scale rows (Duellman, 1958).

• DESCRIPTIONS. Generic descriptions are found in Cope (1861, 1900), Boulenger (1896), Brown (1901), Phisalix (1922), Taylor (1939), and Duellman (1958); hemipenes are described by Klauber (1940) and Smith (1941).

• ILLUSTRATIONS. See species accounts.

• DISTRIBUTION. The genus ranges from southern California, southern Nevada, southwestern Utah, Arizona, southern New Mexico, and western Texas south through the entire peninsula of Baja California, on Cerralvo, San Marcos, and Tiburón islands of the Gulf of California, in all of the Pacific states of México plus Chihuahua, Durango, Tamaulipas, Aguascalientes, Guanajuato, Hidalgo, México, Morelos, Puebla, Queretaro, San Luis Potosí, Veracruz,

and Zacatecas; through the Pacific lowlands and some dry interior valleys of Guatemala, Honduras, El Salvador, and Nicaragua to Guanacaste and Puntarenas provinces of northwestern Costa Rica. A record for Panamá (Boulenger, 1896) is not confirmed and probably erroneous. Elevational range from sea level to 2600 m.

• FOSSIL RECORD. See species accounts.

• PERTINENT LITERATURE. McDiarmid and Scott (1970) reviewed *T. tau*, and Gehlbach (1971) revised *T. biscutatus*; see these and the species accounts for additional references.

• KEY TO SPECIES.

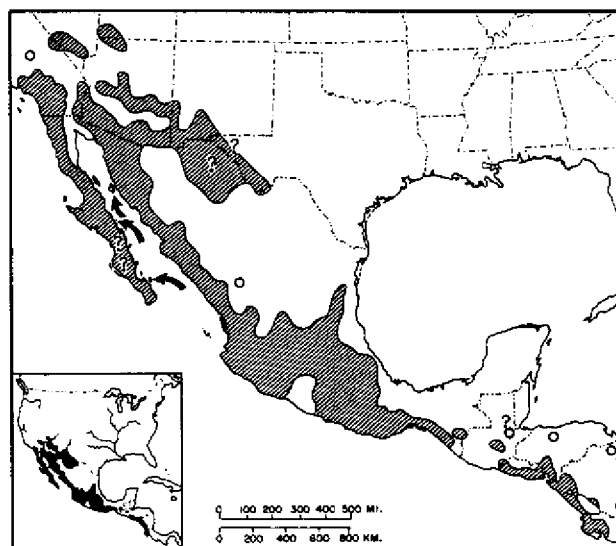
Pale band on nape broad with a straight or slightly indented posterior border; most dorsal dark saddles confluent with dark markings on ventrals \_\_\_\_\_ *T. tau*

Pale band on nape narrow and chevron or lyre shaped, posterior border  $\Lambda$  or U-shaped; most dorsal dark saddles separated from dark spots on tips of ventrals \_\_\_\_\_ *T. biscutatus*

• NOMENCLATURE HISTORY. Cope (1861) described *Trimorphodon* based on specimens of *Lycodon lyrophanes* Cope from Baja California Sur, the description of *Dipsas biscutata* Duméril, Bibron, and Duméril from México, and a specimen that Cope examined from Nicaragua. Both taxa are now included in *T. biscutatus*. In 1869, Cope described three additional forms: *T. tau*, *upsilon*, and *major*. McDiarmid and Scott (1970) showed that *Trimorphodon tau* and *upsilon* represented one species (*T. tau*); *T. major* was made a synonym of *T. biscutatus* (Cope, 1887). Subsequent work consisted of two stages, a long period during which several new forms were described, and a recent period during which all of these have been assigned to one of the two species now composing the genus (see references in Species Accounts).

*Eteirodipsas* was described by Jan (1863) to include *Dipsas biscutata*, Duméril, Bibron, and Duméril, *Dipsas colubrina* Schlegel, *Coluber annulatus* Linnaeus, and *rhomboidalis* Jan, a variety of *E. annulatus*. Jan's (1863; Jan and Sordelli, 1872) *biscutata* included both species (*biscutatus* and *tau*) currently in *Trimorphodon*. Boulenger (1896) placed *biscutatus* in *Trimorphodon* and *annulatus* in *Leptodeira* (*rhomboidalis* is a *nomen nudum*), retaining *colubrina* as the only species of *Eteirodipsas*. Smith and Taylor (1945) explicitly designated *Dipsas biscutata* as the type species of *Eteirodipsas* (Mertens, 1952).

• ETYMOLOGY. *Trimorphodon* refers to the three tooth shapes in the upper jaw: the long, recurved anterior teeth, the shorter middle teeth, and the elongate, grooved fangs at the rear. The gender is masculine.



MAP. Shading indicates estimated range of the genus *Trimorphodon*. Open circles indicate presumed isolated populations; question marks indicate areas where the genus probably occurs but no records are available and a questionable record from Guatemala.

## COMMENT

The placement of *Trimorphodon* within the family Colubridae is probably as unsettled as that of any genus. Cope (1900) placed it with a group of 13 Old and New World genera characterized by grooved fangs and a calyculate or spinose hemipenis with a single *sulcus spermaticus*. Although Cope (1900) mentioned "calyces few and irregular" on the hemipenis of *Trimorphodon*, neither Cope's drawings (Plate 28, Figure 7) nor our observations indicate calyces. Dunn (1928) rejected the emphasis that Cope placed on grooved fangs and included *Trimorphodon* with *Hypsiglena* and *Leptodeira* in a colubrine group having enlarged rear teeth either grooved or not and a capitate hemipenis with a simple sulcus. We do not know how Dunn defined a capitate hemipenis, but we do not consider that of *Trimorphodon* to be capitate because the capitulum does not have a free overhanging edge on the sulcate side. Dunn (1928) may have been repeating Cope's observations that the head is very distinct. Duellman (1958), using Dunn's arrangement, compared the same three genera and concluded that *Trimorphodon* was distantly related to the other two. Underwood (1967), using hemipenial and retinal characters, tentatively placed *Trimorphodon* and *Hypsiglena* in one heterogeneous family (Natricidae) and *Leptodeira* in another (Homalopsidae). Dowling (1975) doubtfully placed *Trimorphodon* in a small tribe with *Phyllorhynchus* and the oriental *Oligodon* because it did not fit well elsewhere. However Dowling and Duellman (1978) returned to the classification of Cope (1893, et seq.), and included the genus in a heterogeneous array of neotropical forms. This placement conflicts with the biochemical data which agree in allying *Trimorphodon* with a group of mostly North American genera, including *Elaphe*, *Pituophis*, and *Lampropeltis* (George and Dessauer, 1970; Minton and Salanito, 1972; Schwaner and Dessauer, 1982; Cadle, in press). These studies also coincide in placing the relationships of *Trimorphodon* far from the North American *Nerodia-Thamnophis* series (George and Dessauer, 1970; Minton and Salanito, 1972), from *Leptodeira* and other neotropical xenodontines (Minton and Salanito, 1972; Cadle and Sarich, 1981; Cadle, in press), and from various elapids and *Crotalus* (Cadle and Sarich, 1981; Cadle and Gorman, 1981). On the other hand, Bury et al. (1970) showed that the karyotype of *Trimorphodon* is distinct from a variety of genera from western North America, including *Lampropeltis* and *Pituophis*. Most early attempts to clarify the relationships of *Trimorphodon* have been misled by an inadequate description of the hemipenis and by the unusual combination of characters (e.g., vertical pupil; enlarged, grooved posterior maxillary teeth; noncalyculate hemipenis with large pockets), and even now no close relatives of *Trimorphodon* have been identified.

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