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McCrystal, Hugh K. and Michael J. McCoid. 1986. *Crotalus mitchellii*

Crotalus mitchellii (Cope)
Speckled rattlesnake

Caudisona mitchellii Cope, 1861:293. Type-locality, "Cape St. Lucas, Lower California (=Cabo San Lucas, Baja California del Sur, México). Holotype, U.S. National Museum 5291½, presumed lost, collected by John Xantus. Date and sex are unknown.

Crotalus mitchellii: Yarrow, 1875:535.

• Content. Five subspecies are recognized: *mitchellii, angelensis, muertensis, pyrrhus* and *stephensi.*

• Definition. *Crotalus mitchellii* is a moderately sized rattlesnake [230 mm–1410 mm] in total length; adult tail length (less rattle) to total length ratio ranges from .067–.080 in males, .053–.063 in females. The head shape is subtriangular and depressed. Scutellation is as follows: 21–27 strongly keeled dorsal scale rows at midbody (occasionally the first dorsal row is not keeled); 162–187 ventrals in males, 163–190 in females; anal plate entire; 22–28 subcaudals in males, 16–23 in females, all usually entire, but last few may be divided; 12–19 supralabials; 13–19 infralabials; 2–4 internasals; nasals 2–2; 0–5 loreals; preoculars frequently split (it should be noted that the shapes, sutures, contacts and numbers of the prenasals, nasals, internasals, loreals, canthals, preoculars and postoculars are extremely variable and have, therefore, been of little taxonomic use to date); rostral usually wider than high, may be separated from prenasals by a single scale or row of small scales or not; 7–12 scales in orbital ring; 13–46 scales on crown anterior to supraocular; 1–8 scale rows between supraoculars; supraocular sutures present or not; mental usually triangular; genials usually in a single pair.

The dorsal and ventral ground color is extremely variable, and may be blue-gray, brown, buff, cream, dark gray, drab, pale gray, orange, pink, pinkish-cinnamon, red-brown, salmon, straw, tan, white or yellowish-brown. There are 23–46 body blotches, which may form rings, crossbands, hexagons or subhexagons, and which may or may not contrast with the ground color. Secondary and tertiary series of blotches are sometimes present. There are 2–9 tail rings. The head and body are usually stippled or spotted. Occasionally, there is a faint or dark postocular stripe extending posteriorly from the postoculars to the angle of the jaw.

The hemipenis is completely bifurcate with a divided sulcus. There are stiff spines on the base and the branches have reticulate fringes (Klauber, 1936a). There are 2–3 palatine teeth, 7–10 pterygoid teeth and 7–10 dentary teeth (Brattstrom, 1964).

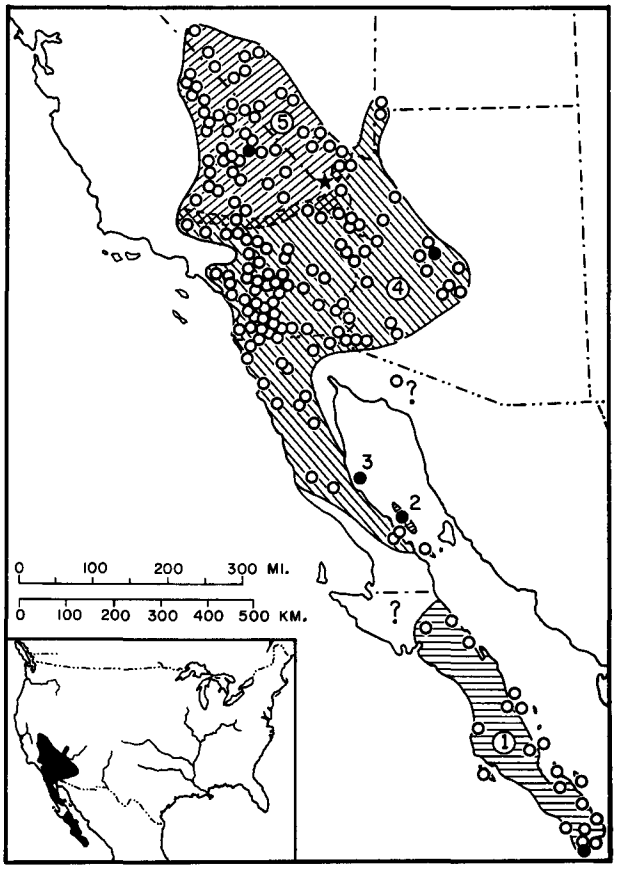
• Descriptions. The best descriptions of the subspecies of *C. mitchellii* are as follows: *C. m. mitchellii, C. m. pyrrhus* and *C. m. stephensi* (Klauber, 1936a), *C. m. muertensis* (Klauber, 1949) and *C. m. angelensis* (Klauber, 1963). Other good ones of the species, or certain subspecies, of varying detail, are found in Cope (1861, 1867, 1900), Ditmars (1907), Gloyd (1940), Klauber (1930), Schmidt (1922), Stebbins (1954), Van Denburgh (1922) and Wright and Wright (1957). Brattstrom (1964) described various osteological characters and the phylogenetic relationship of *C. mitchellii* to other pit vipers.

• Illustrations. Behler and King (1979), Shaw and Campbell (1974) and Stebbins (1966) illustrated the species in color. Black and white photographs appeared in Fowlie (1965), Glenn and Straight (1982), Gloyd (1940), Klauber (1930, 1936a, 1936b, 1949, 1963, 1972), Pope (1944), Russell (1980), Tu (1982), Van Denburgh (1922) and Wright and Wright (1957). Klauber (1972) illustrated both aspects of the hemipenis and a dorsal view of the head of *C. m. stephensi,* a frontal view of the head of *C. m. pyrrhus,* and a lateral view of the head of *C. m. mitchellii.* Cope (1900) illustrated the vent, and dorsal, frontal and lateral views of the head of one of the paratypes of *C. m. angelensis* and the vent, and dorsal, frontal, lateral and ventral views of the head of *C. m. mitchellii.* Glenn and Straight (1982) illustrated a dorsal view of the head of *C. m. pyrrhus.* Brattstrom (1964) illustrated with line drawings many of the skeletal characters.

• Distribution. *Crotalus mitchellii* ranges from east-central California, southwestern Nevada, and extreme southwestern Utah, south through southern California and western Arizona, to the southern tip of Baja California, México. Populations are known from the Gulf Islands of Angel de la Guarda, Carmen, Cerralvo, El Muerto, Espíritu Santo, Monserrate, Piojo, Salispuedes, San José and Smith (Murphy, 1983). *Crotalus mitchellii* is also known from the Pacific coast island of Santa Margarita (Klauber, 1972). Santa Cruz Island should not be listed as a part of the range (Soulé and Sloan, 1966). A specimen from Pinacate Lava, 36.3 miles west of Sonoyta, Sonora, México (see map), shows affinities with *C. m. muertensis* and *C. m. pyrrhus.* It is the only known specimen from the area and its relation to the subspecies of *C. mitchellii* is discussed by Smith and Hensley (1958).

• Fossil Record. Brattstrom (1954) recorded a *C. mitchellii* from the late Pleistocene (8–10,000 years old) at Gypsum Cave, Clark County, Nevada.

• Pertinent Literature. Klauber (1972) reported on numerous aspects of the biology and ecology of *C. mitchellii* and listed numerous references. Other comprehensive works listing many references are those of Gloyd (1940), Klauber (1936a, 1936b, 1949), and Wright and Wright (1957). Data on brood size were reported by Miller and Stebbins (1964), Stebbins (1954) and Wright and Wright (1957), who also provided size measurements of neonates and reproductively active adults. Armstrong and Murphy (1979) reported on reproduction in captivity and provided additional measurements for neonates. Cliff (1954) also listed some size measurements for *C. mitchellii.* Prey items of *C. mitchellii* were reported by Fowlie (1965), Gates (1957), Klauber (1936a, 1949), Miller and Stebbins (1964) and Stebbins (1954). Case (1983) discussed the possibility that *C. m. angelensis* attains the large length that it does in response to its large prey (*Sauromalus hispidus*). Detailed works on various aspects of the morphology of *C. mitchellii* are provided by Klauber (1937, 1938, 1939, 1940, 1972). Brattstrom



Map. Solid circles show type-localities; hollow circles indicate other known localities. Star marks Pleistocene fossil record. Question marks indicate a record of uncertain subspecies assignment in Sojnora and uncertain distribution in Baja California. Overlapping shading pattern represents area of intergradation.

(1964) discussed in detail aspects of the osteology of *C. mitchellii*. The venom of *C. mitchellii* was reported on by Glenn and Straight (1982), Klauber (1936a), Russell et al. (1960), Russell (1980) and Tu (1982). Githens and Wolff (1939a) investigated antivenins for *C. m. mitchellii*, *C. m. pyrrhus* and *C. m. stephensi*. They also (1939b) compared antivenins for the above subspecies with those for *C. d. durissus* and established minimum lethal doses for *C. m. mitchellii* and *C. m. pyrrhus* (1939c). Glenn and Straight (1982) listed venom yields for all five subspecies and lethal toxicity data for *C. m. mitchellii*, *C. m. pyrrhus* and *C. m. stephensi*. They, along with Russell et al. (1960) and Tu (1982), showed the venom of *C. m. mitchellii* to be not only more lethal than that of its conspecifics, but one of the most lethal among all rattlesnakes. Russell (1980) discussed and recommended the best antivenins available for *C. mitchellii* bites. Damman (1961) discussed locomotion, coloration, factors affecting sympatry with other crotalids, metabolic rates in relation to body temperature and the role of body temperature in relation to the ecology of *C. mitchellii*. Brattstrom (1965) reported on the body temperature of copulating *C. mitchellii* and on their critical minimum temperature. Klauber (1949), Miller and Stebbins (1964) and Moore (1978) also discussed body temperature. Reports on daily and annual activity periods were found in Armstrong and Murphy (1979), Gates (1957), Klauber (1949), Miller and Stebbins (1964), Moore (1978) and Stebbins (1954). The habitat of *C. mitchellii* was discussed in varying detail by Armstrong and Murphy (1979), Fowlie (1965), Gates (1957), Klauber (1949), Miller and Stebbins (1964) and Stebbins (1954). Paleobiogeographic data were presented by Murphy (1983). Bullock and Cowles (1952) reported on the physiology of the heat pit. Murphy and Armstrong (1978) reported their observations involving the husbandry of *C. mitchellii*. Bowler (1977) gave a longevity record for a specimen still alive in captivity at the time of 15 years, 6 months.

• ETYMOLOGY. The name *mitchellii* is a patronym and refers to Dr. S. Weir Mitchell, who researched rattlesnake venom in the 1860's. The name *angelensis* refers to Angel de la Guarda Island, Gulf of California, México. The name *muertensis* refers to El Muerto Island, Gulf of California, México. The name *pyrrhus* (Latin) means "reddish, orange, or flame colored." The name *stephensi* is a patronym and refers to Frank Stephens, who was a member of the collecting team that brought in the first specimen of *C. m. stephensi*.

1. *Crotalus mitchellii mitchellii* (Cope) San Lucan Speckled Rattlesnake

Caudisona mitchellii Cope, 1861:293. See species synonymy.
Crotalus mitchellii: Cope *in* Yarrow, 1875:535.
Crotalus oreganus var. *mitchellii:* Garman, 1884:173.
Crotalus mitchellii mitchellii: Stejneger, 1895:454 (part).
Crotalus tigris mitchellii: Amaral, 1929:82 (part).
Crotalus confluentus mitchellii: Klauber, 1930:108 (part).

• DEFINITION. A subspecies with 23–27 (usually 25) scale rows at midbody; 164–186 ($\bar{x}$ = 176.3) ventrals in males, 164–186 ($\bar{x}$ = 178.9) in females; 22–28 ($\bar{x}$ = 25.1) subcaudals in males, 16–24 ($\bar{x}$ = 20.7) in females; 13–19 ($\bar{x}$ = 16.0) supralabials; 13–17 ($\bar{x}$ = 15.5) infralabials; prenasals usually separated from the rostral by row of small scales; dorsal ground color pale gray or tan; ventral ground color buff with dark spots; 26–41 ($\bar{x}$ = 32.3) body blotches highly variable in shape and usually paler in the center than at their border; 3–5 tail rings; length up to 939 mm.

2. *Crotalus mitchellii angelensis* Klauber Angel de la Guarda Island Speckled Rattlesnake

Crotalus pyrrhus: Streets, 1877:39.
Crotalus confluentus mitchellii: Garman, 1884:173 (part).
Crotalus mitcheli: Belding, 1887:98 (part).
Crotalus tigris mitchellii: Amaral, 1929:82 (part).
Crotalus mitchellii pyrrhus: Klauber, 1936a:157 (part).
Crotalus mitchellii angelensis Klauber, 1963:73. Type-locality, "about 4 miles southeast of Refugio Bay, at 1500 feet elevation, Isla Angel de la Guarda, Gulf of California, México (near 29°29½'N, 113°33'W)." Holotype SDSNH 51994, adult male, collected by Dr. Reid Moran, 22 March 1963 (examined by authors).
Crotalus mitchellii angelicus: Hoge, 1966:152 (emendation; see COMMENT).

• DEFINITION. A subspecies with 25–27 (usually 27) scale rows at midbody; 180–187 ($\bar{x}$ = 184.8) ventrals in males, 186–190 ($\bar{x}$ = 188.2) in females; 23–28 ($\bar{x}$ = 25.4) subcaudals in males, 19–21 ($\bar{x}$ = 20.1) in females; 12–15 ($\bar{x}$ = 13.8) supralabials; 13–17 ($\bar{x}$ = 14.9) infralabials; prenasals usually separated from rostral by a single scale; juvenile dorsal ground color pinkish-cinnamon with brown blotching on outer edge of ventrals; 36–46 ($\bar{x}$ = 41.0) body blotches (actually areas of darker ground color with more spots), secondary lateral blotches present, posteriorly forming crossbars; 4–8 tail rings, posterior 2 or 3 black; length up to 1410 mm (not 1410 cm as reported by Case, 1983).

3. *Crotalus mitchellii muertensis* Klauber El Muerto Island Speckled Rattlesnake

Crotalus mitchellii muertensis Klauber, 1949:97. Type-locality, "El Muerto Island, Gulf of California, México." Holotype, SDSNH 37447, adult male, collected by Charles H. Lowe, Jr., 6 or 7 June 1946 (examined by authors).
Crotalus mitchelli muertensis: Klauber, 1952:123.

• DEFINITION. A subspecies with 23–25 (usually 23) scale rows at midbody; 175–184 ($\bar{x}$ = 179.4) ventrals in males, 174–181 ($\bar{x}$ = 178.3) in females; 21–24 ($\bar{x}$ = 22.9) subcaudals in males, 16–18 ($\bar{x}$ = 17.4) in females; 14–18 ($\bar{x}$ = 15.9) supralabials; 14–19 ($\bar{x}$ = 16.5) infralabials; prenasals usually separated from rostral by row of small scales; dorsal ground color grayish; ventral ground color cream to buff; 32–39 ($\bar{x}$ = 35.7) indefinitely outlined brown body blotches, hexagonal anteriorly, crossbands posteriorly; 2–6 tail rings; length up to 637 mm.

4. *Crotalus mitchellii pyrrhus* (Cope) Southwestern Speckled Rattlesnake

Caudisona pyrrha Cope, 1867:308. Type-locality not mentioned in text (=Canyon Prieto, Yavapai County, Arizona). Holotype, U.S. National Museum 6606, male, collected by Dr. E. Coues; see COMMENT for date of collection (not seen by authors).
Crotalus pyrrhus: Cope *in* Yarrow, 1875:535.
Crotalus confluentus var. *pyrrhus:* Garman, 1883:173.
Crotalus mitchellii: Van Denburgh, 1894:450 (part).
Crotalus Mitchellii pyrrhus: Stejneger, 1895:456 (part).
Crotalus goldmani Schmidt, 1922:701. Type-locality, "El Piñon, Lower California, 5300 feet." Holotype, U.S. National Museum 37573, male, collected by E. W. Nelson and A. E. Goldman, 9 July 1905 (not seen by authors).
Crotalus tigris mitchellii: Amaral, 1929:82 (part).
Crotalus confluentus mitchellii: Klauber, 1930:108 (part).
Crotalus mitchellii pyrrhus: Klauber, 1936a:157.
Crotalus mitchelli pyrrhus: Klauber, 1952:117.

• DEFINITION. A subspecies with 21–27 (usually 25) scale rows at midbody; 168–185 ($\bar{x}$ = 178.0) ventrals in males, 163–187 ($\bar{x}$ = 178.7) in females; 20–28 ($\bar{x}$ = 23.7) subcaudals in males, 16–23 ($\bar{x}$ = 19.3) in females; 13–19 ($\bar{x}$ = 16.1) supralabials; 13–19 ($\bar{x}$ = 16.1) infralabials; prenasals usually not in contact with rostral, but may be on one or both sides; dorsal ground color pink, white, tan, cream, buff, drab, gray, brown, orange or salmon; ventral ground color cream, buff or pink, usually blotched or spotted; 23–42 ($\bar{x}$ = 33.3) body blotches (very variable in shape); secondary lateral blotches present; tertiary blotches sometimes present; 4–9 tail rings that usually contrast the ground color, terminal ring usually black; length up to 1114 mm.

5. *Crotalus mitchellii stephensi* Klauber Panamint Rattlesnake

Crotalus tigris: Stejneger, 1893:214.
Crotalus tigris tigris: Amaral, 1929:82 (part).
Crotalus confluentus stephensi Klauber, 1930:108. Type-locality, "two miles west of Jackass Springs, Panamint Mountains, altitude 6200 ft., Inyo County, California." Holotype, Museum of Vertebrate Zoology 6699, male, collected by Dr. Joseph Grinnell, 8 October 1917 (not seen by authors).
Crotalus mitchellii: Stejneger and Barbour, 1933:136 (part).
Crotalus mitchellii stephensi: Klauber, 1936a:162.

• DEFINITION. A subspecies with 21–25 (usually 23) scale rows at midbody; 162–181 ($\bar{x}$ = 174.3) ventrals in males, 173–185 ($\bar{x}$ = 179.0) in females; 21–28 ($\bar{x}$ = 25.1) subcaudals in males, 17–24 ($\bar{x}$ = 20.0) in females; 12–17 ($\bar{x}$ = 14.0) supralabials; 12–18 ($\bar{x}$ = 14.6) infralabials; prenasals not separated from rostral, usually contacting supralabials; supraocular sutures present; dorsal ground color straw, tan, buff, yellowish-brown, red-brown, gray or blue-gray; ventral ground color buff or tan, punctuated with spots; 27–43 ($\bar{x}$ = 36.8), usually subhexagonal, buff gray, brown or red-brown body blotches, which may or may not contrast with the ground color; secondary lateral blotches present, which may form rings; 6–9 tail rings in males, 2–3 in females, posterior 2 or 3 usually black and may merge together; length up to 943 mm.

COMMENT

The collecting date for the holotype of *Caudisona pyrrha* Cope is listed in the U.S. National Museum as 1870 and is so stated in several papers (e.g. Cochran, 1961). This is obviously an error as Cope could hardly have described a specimen in 1866 that was not collected until 1870.

The name *Crotalus m. angelicus* is a "lapsus calami" first used by Hoge (1966), and later by Hoge and Romano (1971) and Brown (1973). It was intended as a use for *C. m. angelensis*.

The combination *C. m.* var. *aureus* (Kallert, 1927) probably refers to *C. m. pyrrhus*, because *aureus* means golden and *pyrrhus* means reddish or flame colored, and other species mentioned in Kallert's paper are also from California. However, because there is no specimen or description associated with this name, we can only infer to which subspecies it applies and it remains a "nomen nudum" which should not be included in the synonymy of *C. mitchellii*.

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