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Tamias ochrogenys.  
By William L. Gannon, Richard B. Forbes, and Douglas E. Kain

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Tamias ochrogenys (Merriam, 1897)

Redwood Chipmunk

Eutamias townsendii ochrogenys Merriam, 1897:195, 206. Original

al description. Type locality “Mendocino, California.”

Tamias townsendii ochrogenys Elliot, 1901:71. First allocation of

ochrogenys to the genus Tamias.

Eutamias ochrogenys Sutton and Nadler, 1974:211. Elevation

of subspecies to species rank.

CONTEXT AND CONTENT. Order Rodentia, Suborder Sciuromorpha, Family Sciuridae, Subgenus Neotamias (Honacki et al., 1986; Wilson and Reeder, 1993). Tamias ochrogenys is monotypic

(Hall, 1981). T. ochrogenys differs significantly from other members of the townsendii species group (T. townsendii, T. senex, and T.
siskeyou) in genital bone characters and in chip vocalizations. Based

on os genitalia, Sutton and Nadler (1974) proposed elevation of T.

ochrogenys to species rank. Hall (1981), Honacki et al. (1986),

Jones et al. (1992), and Wilson and Reeder (1993) accepted this

arrangement. Others, however, argued that T. ochrogenys should be

retained as a subspecies of T. townsendii (Levenson and Hoff-

mann, 1984; Levenson et al., 1985). Disagreement also exists re-

garding the usage of Eutamias for western chipmunks and Tamias

for the eastern chipmunk (Patterson and Honeyn, 1987; Gannon

and Lawlor, 1989).

DIAGNOSIS. Compared to T. sonomae and T. merriami, which may be encountered along the southeastern or southern portions of its distribution, T. ochrogenys is larger and has a shorter tail (ca. 76% of the length of the head and body), darker and less contrasting pelage, more sharply bicolored ears (in summer pelage), greater zygomatic breadth (>21.2 mm), and a distinct post-palatal spine (Hooper, 1944).

Although this species may be difficult to distinguish from other members of the townsendii-group, T. ochrogenys differs from them in having a less bushy tail, darker dorsal coloration, a more distinctly marked dorsal stripe, greater length of head and body, and a larger adult skull that is 39–40.8 mm or more in length (Hall, 1981; Fig. 1). It also differs from other townsendii-group species in that the tips of the nasal bones are not separated by a median notch, the tip of the baculum is <50% of the length of the shaft (Kain 1985; Fig. 2), and the height of the keel of the baculum is <25% of the length of the tip (Hall, 1981; Fig. 2).

GENERAL CHARACTERS. The redwood chipmunk is dark-colored and long-tailed, with prominent alternating dark and pale longitudinal stripes on its face and dorsum. T. ochrogenys is the darkest of the townsendii-group chipmunks (Hall, 1981). Of the five dark dorsal stripes, the mid-dorsal one is the longest, widest, and most conspicuous. Of the four pale dorsal stripes, the two lateral-most are the most prominent. Of the facial stripes, the dark one through the eye and the pale ones above and below the eye are the most prominent (Fig. 1). A pale postauricular patch nearly the size of the pinna is always present (Adams, 1967). The general color of autumn pelage of adults has been described as dark tawny olive (Howell, 1929) and as ochraceous to blue-gray (Adams, 1967). Dark-gray hairs on the ventral side of the body are white-tipped. The pelage on the sides of the body blends from the color of the venters to ochraceous. The dorsoventrally flattened tail is dark rufous to bright orange ventrally; dorsally it is of the same color as the rest of the body. Most of the guard hairs on the tail are tipped with white (Adams, 1967).

There are four pairs of mammary—one pectoral, two abdominal, and one inguinal. Internal naked cheek pouches are present (Adams, 1967).

Head and body length of T. ochrogenys is the largest (ca. 159 mm) in the subgenus Neotamias (Hall, 1981). Ranges of body measurements (in mm) of adults are: total length, 233–297; length of tail, 97–130; length of hind foot, 33–42; length of ear, 20–26 (Adams, 1967). Body masses for 18 females ranged from 78.0 to 117.5 g (mean of 94.1 g). Twenty-two males ranged in mass from 60 to 116.2 g (mean, 89.3 g; Adams, 1967).

The skull of T. ochrogenys averages largest of the subgenus (Hall,

1981; Fig. 3). Greatest length of skull for adult redwood chipmunks ranges from 37.9 to 42.0 mm (Adams, 1967). Kain (1985) found no significant sexual dimorphism in external or cranial characters in this species. Johnson (1943) and Adams (1967), however, reported that females were slightly larger than males in all characters. Based on examination of 34 females and 35 males, Levenson (1990) reported that female T. ochrogenys were significantly larger than males in length of head and body and that a dimorphism ratio of 1.042 favored females.

Ossa genitalia of chipmunks, including those in the townsendii-

group, are distinctive and therefore useful taxonomically (Sutton,

1982; Fig. 2). The baculum of T. ochrogenys most closely resembles that of T. townsendii, but it differs in that the tip is longer than that of T. townsendii, the tip and shaft are thicker, the base is wider, the keel is higher, the angle of the tip and shaft averages 22° less, a prominent keel is present on the shaft, and there is no lateral shelf on the tip (Sutton and Nadler, 1974). Measurements of 83 bacula from adults (ranges in mm, means in parentheses) are: length of shaft, 2.0–2.7 (2.5); width of shaft, 0.16–0.27 (0.23); width of base, 0.82–1.07 (0.94); height of keel, 0.2–0.4 (0.3); length of tip, 1.03–1.23 (1.14); angle formed by the tip and the shaft, 95–123° (108°; Adams and Sutton, 1968; Kain, 1965; Sutton, 1987; Sutton and Nadler, 1974; Williams, 1980).

As in all members of subgenus Eutamias and Neotamias, the baubulum of T. ochrogenys is generally U-shaped. The base is parallel to the body and supports two blunt projections that point caudally. In T. ochrogenys, the base is 44% of the length of the shaft, the shaft is vertical, there is a slight groove on the right lateral surface of the shaft, a dorsal tubercle divides the baubulum into distal and proximal portions, and the tip is broader than deep and gradually narrows to a blunt end (Adams and Sutton, 1968; Sutton, 1982). Like the baubulum, the baubulum of T. ochrogenys most closely resembles that of T. townsendii, but it differs in that the base–shaft angle is more acute than that of T. townsendii, the shaft is thicker, the tip is larger and thicker, and the keel is small.

Fig. 1. An adult redwood chipmunk (Tamias ochrogenys) from near Ferndale, Humboldt County, California. Photo by Susan Smith.
but prominent (Sutton and Nadler, 1974). Measurements of 32 baculums (ranges in mm, means in parentheses) are: length of base, 0.46–0.91 (0.69); length of shaft, 0.65–1.20 (0.99); depth of shaft, 0.36–0.46 (0.41); tip length, 0.39–0.91 (0.72); keel height, 0.20–0.33 (0.24); angle of tip to shaft, 107–137° (127°; Adams and Sutton, 1968; Kain, 1985; Sutton, 1987).

**DISTRIBUTION.** *T. ochrogenys* occurs along the Pacific coast of northern California in a narrow belt from the south side of the Eel River, Humboldt Co. (Gannon and Lawlor, 1989; Kain, 1985), eastward no more than 40 km from the seacoast, and southward to ca. 5 km north of Bodega and Freestone, Sonoma Co. (Fig. 4; Adams, 1967; Hooper, 1944). Alitudinal range extends from sea level to 1,280 m (Adams, 1967).

Distribution of the redwood chipmunk is correlated with the humid coastal forest of northern California. Where this forest becomes patchy, distribution of the redwood chipmunk also becomes discontinuous. Presence of vegetation such as coniferous woods with a brushy understory, rather than physical factors, may limit the distribution of *T. ochrogenys* (Adams, 1967; Hooper, 1944; Sutton, 1987). *T. ochrogenys* has not been found as a fossil.

**FORM AND FUNCTION.** In autumn, the redwood chipmunk begins to acquire its winter pelage which is long, silky, dense, and dull-colored. The autumn molt begins at the rump and moves anteriorly. The spring molt starts at the anterior end and moves caudally (Howell, 1929).
The dental formula is i 1/1, c 0/0, p 2/1, m 3/3, total = 22. In T. ochrognrys, the basihyal and thyrohyal were found to be fused into a horseshoe-shaped structure with the sides pointing caudally. There are two linear ceratohyal-epiphyal elements and two long curving stylohyals. A ligament on either side connects the tip of the stylohyoid to its place of attachment posterior to the tympanic bulla. The lengthily double that of the epiphyseal-ceratohyal element. A small chondrohyal bone often is near or fused to the posterior tips of the thyrohyals (Adams, 1967).

There is no significant individual variation or variation associated with age in the bauplana of T. ochrognrys (Adams and Sutton, 1968; Kain, 1985). The thyrohyal tip and distal end of the shaft of the cartilage protude from the body of the penis (Kain, 1985). The urethra passes along the ventral surface of the bacular shaft. The urethral opening is located at the right posterior edge of the angle between the shaft and tip (Adams, 1967).

There is no significant individual variation or variation associated with age in the bauplana of T. ochrognrys (Adams, 1967; Kain, 1985; Sutton, 1987). The bauplana lies anteroventrally to the vaginal opening with its tip protruding from the clitoral tissue, an orientation similar to that of the bauplana within the penis (Kain, 1985).

**ONTGENY AND REPRODUCTION.** In male T. ochrognrys, testes attain their largest size in late March and remain large through June. The testicular size decreases through autumn. On 18 March, one female had four fetuses that were 43 mm in length (Adams, 1967). Larger size in female T. ochrognrys may increase the probability of surviving hibernation and producing a litter in the spring (Levensohn, 1990).

**ECOLOGY.** Redwood chipmunks are commonly associated with the humid coastal redwood forest (Stephens, 1906). As do other chipmunks, T. ochrognrys takes a wide variety of foods. Analysis of cheek pouch contents revealed that fungi are eaten in late winter and early spring. Observations in June and July show that these chipmunks may gather grass seeds. Other food items and their season or month in which they were taken were: western raspberry (Rubus leucoderms) in autumn; buckthorn and blue-blossom (Ceanothus) in September, October, January, and March; wax myrtle (Myrica californica) in September; California huckleberry ( Vaccinium ovatum) in September; poison oak (Rhus diversifolia) in September; bull thistle (Cirsium) in September; Scotch broom (Cytisus scoparius) in November; and acorns ( Lithospermum or Quercus) in September, January, March, and April. Adams (1967) reported unidentified insect wing fragments in stomach contents.

No information is available on predators of T. ochrognrys. Incidence of parasitism in T. ochrognrys appears to be low, but stomach nematodes ( Spirotris) and a boffy larva (Caterbebra, found in the left inguinal area) have been reported (Adams, 1967). Kim et al. (1985) reported Hoplopleura arboricola, from T. ochrognrys. Hubbard (1947) reported the flea, Monoscyllus eumolpi cyrturus, to be present on chipmunks of the Cascade Mountains of coastal California, but he did not specifically mention fleas from T. ochrognrys in that area. Hubbard (1947) reported Monoscyllus ciliatus pronus from "Eutamias townsendii ochrognrys" from Port Orford and Chetco River, Oregon, but in that area the hosts for these fleas were probably T. townsendii townsendii.

**BEHAVIOR.** T. ochrognrys is difficult to observe (Gannon and Lawlor, 1989; Kain, 1985) and "would be lost in the forest" but for their shrill, whistling chitter, or chuck-chuck chuck (call)" (Bailey, 1936:130). The redwood chipmunk is distinguished from T. senex and T. siskiyou by a two-syllable "chip" call of low frequency relative to the other species (Fig. 3). Calls of T. ochrognrys typically are paired, regular in delivery, and have a unique rhythm. The chip call of T. ochrognrys most resembles that of T. townsendii, a pattern like that reported for the ossa genitalia of these two allopatric species (Gannon and Lawlor, 1989; Patterson and Thaler, 1982). Chip vocalizations of chipmunks from Rio Dell, south of the Eel River, Humboldt Co., California, appear to be intermediate between T. senex and T. ochrognrys. This population may include hybrid individuals (Gannon and Lawlor, 1989).

**GENETICS.** Although at least nine chromosomal rearrangements separate all Neotamias karyotypes from that of Tamias (sensu stricto; Nadler et al., 1977), T. ochrognrys, like all members of the genus, has a model diploid number of 38 chromosomes. The autosomal karyotype is known as Type B and contains four pair of large metacentric, six pair of large submetacentric, one pair of small metacentric, and three pair of small acrocentric or subterminal chromosomes. The X chromosome is a large submetacentric and the Y chromosome is a minute acrocentric (Nadler, 1964; Sutton and Nadler, 1969).

**REMARKS.** Disagreement exists over the assignment of generic names for chipmunks of western and eastern North America. Jones et al. (1992) preferred Tamias over Eutamias for the generic description because no one has published convincing data to show that the usage of Tamias is incorrect for all western chipmunks. Other recent authors have continued to use Eutamias for the genus of western chipmunks (Gannon and Lawlor, 1989; Patterson and Heaney, 1987; Sutton, 1987). The entire assemblage is in need of revision (Patterson and Heaney, 1987).

The northern boundary of this species was revised recently. Sutton and Nadler (1974) and Williams (1980) placed the northern boundary of the species at the Van Duzen River, Humboldt County, California. Subsequently, the northern limit was placed at the Eel River (Gannon and Lawlor, 1989; Kain, 1985; Sutton, 1987). The Tertiary fossil record for chipmunks in North America is at best incomplete; however, fragmentary material belonging to the subgenus Neotamias is known from the early Miocene (Black, 1972). North America is hypothesized to be the center of origin for chipmunks; the subgenus Eutamias does not appear until late Pliocene in Eurasia (Black, 1972).

Tamias in Latin means storer or distributor; ochrognrys refers to ochre or pale yellow (Greek) and genys to the cheek or side of the head (Greek; Jaeger, 1955). Another vernacular name for this species is yellow-cheeked chipmunk (Adams, 1967). The type specimen was collected on 17 July 1894 at Mendocino, California, by J. E. McLean (collector number 1015) and is housed at the U. S. National Museum (catalog number 67182; Howell, 1929).

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LITERATURE CITED


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W. L. Gannon, Museum of Southwestern Biology, Department of Biology, The University of New Mexico, Albuquerque, 87131; R. B. Forbes, Department of Biology, Portland State University, Portland, Oregon 97207; D. E. Kain, Department of Entomology and the Museum of Vertebrate Zoology, University of California, Berkeley 94720.