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Onychomys torridus. By Richard McCarty

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Onychomys Baird, 1858

Onychomys Baird, 1858:480. Type species *Hypudaeus leucogaster* Wied.

CONTEXT AND CONTENT. Order Rodentia, Suborder Myomorpha, Superfamily Muroidea, Family Muridae, Subfamily Cricetinae, Tribe Hesperomyini. The genus *Onychomys* includes two species, *O. leucogaster*, and *O. torridus*.

1. Total length 130 to 190 mm; tail usually less than half of body length (31 to 57%); maxillary toothrow long (3.8 to 4.8 mm); length of mandible usually more than 14 mm .... *O. leucogaster.*
2. Total length 120 to 163 mm; tail usually more than half of body length (48 to 56%); maxillary toothrow short (3.3 to 4.0 mm); length of mandible usually less than 14 mm .... *O. torridus.*

Onychomys torridus Coues, 1874

Southern Grasshopper Mouse, Scorpion Mouse

Hesperomys (*Onychomys*) *torridus* Coues, 1874:183. Type locality Camp Grant, Graham Co., Arizona.

CONTEXT AND CONTENT. Context noted above in generic summary. Taxonomic accounts have been prepared by Hollister (1914), with a revision for Arizona by Van Cura and Hoffmeister (1966). The 10 currently recognized subspecies are:

O. t. longicaudus Merriam, 1889:2. Type locality St. George, Washington Co., Utah.

O. t. clarus Hollister, 1913:215. Type locality Keeler, east shore of Owens Lake, Inyo Co., California.

O. t. tularensis Merriam, 1904:123. Type locality Bakersfield, Kern Co., California.

O. t. ramona Rhoades, 1893:833. Type locality San Bernardino, California.

O. t. pulcher Elliott, 1903:243. Type locality Morongo Pass, San Bernardino Mountains, California.

O. t. torridus Coues, 1874:183. See above (*perpallidus* Mearns and *arenicola* Mearns are synonyms).

O. t. macrotis Elliott, 1903:155. Type locality head of San Antonio River, west slope of San Pedro Martir Mountains, Baja California.

O. t. yakiensis Merriam, 1904:124. Type locality Camoa, Rio Mayo, Sonora.

O. t. surrufus Hollister, 1914:472. Type locality Miquihuana, Tamaulipas.

O. t. canus Merriam, 1904:124. Type locality San Juan Capistrano, Zacatecas.

DIAGNOSIS. *Onychomys* is a short-tailed, stocky mouse with bicolored pelage. The head, back, and upper sides are pale brown to grayish or pinkish cinnamon and the underparts are white. The tail is usually bicolored and the tip is white. *Onychomys* is most easily distinguished from its peromyscan relatives by its relatively short, clublike tail, larger forefeet, and more hypsodont molars. *O. torridus* differs from *O. leucogaster* as noted in the key above, and as follows: mandible shorter (12.5 to 14.6 mm and 13.7 to 17.3 mm, respectively), zygomatic breadth narrower (11.9 to 13.7 mm and 12.6 to 17.3 mm, respectively), and smaller braincase (11.0 to 12.3 mm and 11.9 to 13.7 mm in width, respectively).

GENERAL CHARACTERS. *Onychomys torridus* has forefeet with five plantar tubercles, and hindfeet with four. The soles of feet are covered with fur from heel to beginning of tubercles. The pelage is sharply bicolored, with upper parts grayish to pinkish cinnamon, underparts white and distinctly separated (figure 1) from upper parts. The nasals are wedge-shaped, interorbital constriction narrow, zygomatic plate narrow and straight anteriorly. The length of baculum is 3.9 to 6.5 mm, width at base 0.4 to 0.9 mm. Total body length is 120 to 163 mm. The tail is short, relatively thick, and distally white. The dentition is i 1/1, c 0/0, m 3/3, total 16; the first and second upper molars are well developed and the third is reduced in size; M1 has two internal and three external cusps; M2 has two internal and two external cusps, and a narrow antero-external fold; M3 is broader than long; first lower molar (m1) with one anterior, two internal, and two external cusps, and a postero-internal loop; second lower molar (m2) with two

FIGURE 1. Photograph of *Onychomys torridus* consuming a house cricket (*Acheta domesticus*). By Frank W. Pine.

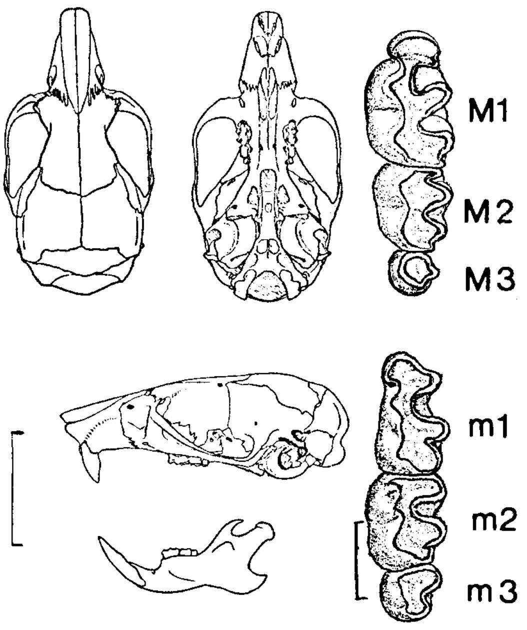

FIGURE 2. Skull, jaw, and dentition of *Onychomys torridus longicaudus;* dorsal view at upper left, ventral view at upper center, lateral view of cranium and jaw below (from Hall and Kelson, 1959:663, by permission of Ronald Press); left upper molar teeth at upper right and left lower molar teeth at lower right (from Merriam, 1889). Scales shown are 10 mm for skulls at lower left and 1 mm for teeth at right.

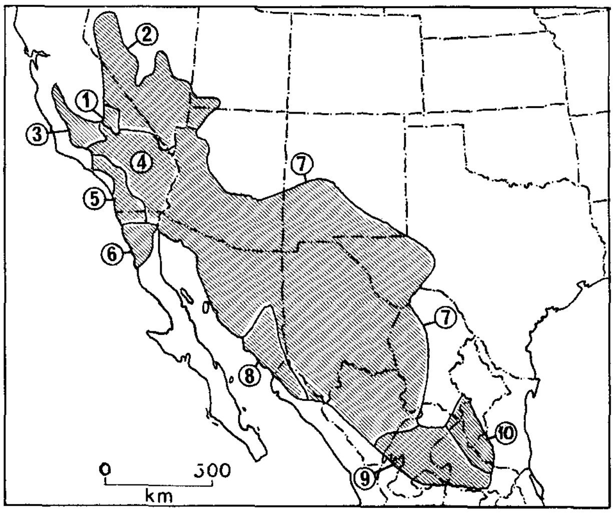

FIGURE 3. Range of *Onychomys torridus* and its subspecies (modified from Hall and Kelson, 1959). Subspecies are: 1, *O. t. clarus;* 2, *O. t. longicaudus;* 3, *O. t. tularensis;* 4, *O. t. pulcher;* 5, *O. t. ramona;* 6, *O. t. macrotis;* 7, *O. t. torridus;* 8, *O. t. yakiensis;* 9, *O. t. canus;* 10, *O. t. surrufus.*

internal and two external cusps, and antero-external and postero-internal folds; third lower molar (m3) subcircular in outline. The skull and teeth are illustrated in Figure 2. More detailed information on variability within the species is presented in the monograph of Hollister (1914) and the taxonomic review of Van Cura and Hoffmeister (1966).

DISTRIBUTION. Ten distinct subspecies of *Onychomys torridus* have been described (figure 3). *O. torridus* is principally found in low, arid, scrub and semiscrub vegetation of deserts in the Lower Sonoran Life-zone from western Nevada, southern California, and southwestern Utah, south to central Mexico, and east to western Texas (Bailey and Sperry, 1929; Hall and Kelson, 1959). In areas of sympatry with the northern grasshopper mouse (*Onychomys leucogaster*), there is evidence that *O. torridus* occupies areas of lower elevation (Gennaro, 1968).

FOSSIL RECORD. Fossil specimens of *O. t. ramona* are recorded from the Rancho La Brea site in Los Angeles, California (Dice, 1925; Stock, 1961). Six fossil species of *Onychomys* have been described:

O. pedroensis Gidley, 1922; Pleistocene; Curtis locality 14 mi. NW Tombstone, Arizona; type most closely resembles *O. leucogaster ruidosae.*

O. bensoni Gidley, 1922; Pleistocene; from Benson locality 2 mi. S Benson, Arizona; type resembles recent *O. torridus* in size of the jaw but there are differences in dentition.

O. larrabeei Hibbard, 1953; lower Upper Pliocene; collected from Saw Rock Canyon, Seward County, Kansas.

O. gidleyi Hibbard, 1941*a*; Upper Pliocene; from locality no. 2, Meade County, Kansas.

O. jinglebobensis Hibbard, 1955; late Pleistocene interglacial period; collected from Jinglebob Pasture, Meade County, Kansas; belonging to the *O. leucogaster* group but with a heavier, much deeper jaw and larger M3.

O. fossilis Hibbard, 1941*b*; Pleistocene; locality no. 9, Meade County, Kansas; size of *O. l. arcticeps* but with a lighter ramus and larger M3; larger than *O. bensoni.*

Several other records of fossil *Onychomys* sp. have been reported (Akersten, 1970; Schultz, 1938; Semken, 1966; White and Downs, 1961), but the specimens were not sufficiently complete for detailed classification. Most of these specimens resembled recent *O. leucogaster* more closely than they resembled *O. torridus,* however.

FORM. A complex pattern of pelage coloration has been noted by Hollister (1914) and Van Cura and Hoffmeister (1966). Juveniles are a uniform gray above until the beginning of the post-juvenile molt at 55 to 95 days of age. An adult molt occurs the following summer or autumn. Intraspecific variation in adult coat color of *O. torridus* may result from selection for protective coloration under different local environmental conditions.

Horner *et al.* (1964) studied the gastric morphology of *O. t. longicaudus.* The stomach is composed of three specific regions: 1) cardiac region located near the heart and esophagus; 2) pyloric region located near the pyloric sphincter and duodenum; and 3) fundic region, a reddish-brown area midway along the greater curvature. The cardiac region averaged 12 mm in length (7.5 to 20.0 mm) and the pyloric region 9.5 mm (4.5 to 14.0 mm range). The length of both regions varied considerably according to the volume of food contained in the lumen of the stomach. The fundic region had a mean length of 7.3 mm (6.0 to 9.0 mm) and a mean depth of 3.4 mm (2.7 to 4.3 mm). The fundic lumen was approximately 1.5 mm deep with a 1 to 2 mm diameter aperture surrounded by a thin membrane.

The cardiac and pyloric regions are thin-walled, with linings of cornified stratified squamous epithelium. The more vascular fundic area represents a variety of different cell types. An area of mucous cells is located at the base of the membranous fold. The remainder contains the gastric glands, of which the lower one third is zymogenic cells, the middle one third parietal cells, and the upper one third neck-mucous cells.

The restriction of the delicate gastric glands to a fundic pouch in *O. torridus* may provide a measure of protection from the abrasive action of chitin fragments and ingested sand particles. Gastric secretions would act on the food mass in the large, non-glandular lumen (Horner *et al.*, 1964).

Taylor (1968) examined the ovarian histology of juvenile and adult female *O. t. longicaudus.* At two weeks of age, the ovaries were smooth and indistinct, with a small number of primary follicles up to 30 microns in diameter. The size of the ovaries and the number of follicles increased over the next two weeks. At 29 days, follicles were as large as 300 microns. At seven weeks of age, all stages of follicular development were present and ovulation could occur. The ovarian surface was granular in appearance as a result of protruding mature corpora lutea. Corpora lutea measured up to 850 microns in unmated adult females and 1400 microns in pregnant females (Taylor, 1968).

Hooper (1959) provided a description of the glans penis of *O. torridus.* The glans is composed of a large oval body and a small, budlike tip; a shallow groove separates the two regions. The glans has a dense covering of sharp, curved, overlapping spines (up to 5 mm in length) projecting proximally. The spines are absent at the extreme base of the oval body and the tip of the bud.

The morphology of the baculum of *O. torridus* has been described by several workers (Burt, 1960; Hooper, 1959; Van Cura and Hoffmeister, 1966). It consists of a proximal, inflated bulb and a gradually tapering, laterally flattened shaft. The shaft has a mean length of 4.87 mm (3.88 to 6.53 mm) and a mean width at the base of .70 mm (.51 to 1.02 mm) in 41 specimens collected in Arizona (Van Cura and Hoffmeister, 1966).

FUNCTION. The water balance of *O. torridus* has been studied by Schmidt-Nielsen and Haines (1964). Experimental animals were able to maintain body weight on a diet of raw pork liver with no other source of water. When the meat was boiled, reducing water content from 72% to 55%, all animals lost weight rapidly. Chew (1965) reported that *O. torridus* was maintained in the laboratory for more than three months on a diet of fresh mouse carcasses. On a diet of seeds, however, animals had to be supplied with drinking water.

The renal concentrating ability of grasshopper mice fed laboratory chow or boiled meat and provided with progressively concentrated solutions of sodium chloride was examined (Schmidt-Nielsen and Haines, 1964). The mean osmotic concentration of those animals maintained on the boiled meat-sodium chloride regimen (3180 mOsmolal) was greater than those on the laboratory chow-sodium chloride diet (2180 mOsmolal). The mean urea concentration of the boiled meat-sodium chloride subjects was 1710 mM. Results of this study indicate that grasshopper mice are able to survive the arid conditions of the desert because of their preference for animal foods with high water content (Schmidt-Nielsen and Haines, 1964).

Whitford and Conley (1971) examined several aspects of the physiological responses of grasshopper mice to environmental extremes. The thermal neutral zone for this species is 30 to 35°C, with a mean basal metabolic rate (BMR) of 1550 ± 500 mm^3O_2/g body weight/hr at 30°C. At 35°C, pulmocutaneous water loss was 7.6 ± 1.9 mg H_2O/cm^3 of O_2

used. When the temperature was increased to 37°C, pulmocutaneous water loss increased significantly to 14.9 ± 5.6 mg H_2O/cm^3O_2. This rate of evaporative water loss was considerably greater than seen in several other nocturnal desert rodents (Chew, 1965).

The amount of food intake for *O. torridus* was influenced by the availability of drinking water. On a diet of ground beef (63% water) and *ad lib* drinking water, food consumption was 1.1 g/day; on a diet of ground beef alone, 1.2 g/day; and a beef liver diet (72% water), 4.1 g/day. It was concluded that the problems of water conservation are probably greatest for *O. torridus* during the winter months when arthropod prey populations are reduced or absent (Whitford and Conley, 1971).

ONTOGENY AND REPRODUCTION. Taylor (1968) reported the gestation period for nonlactating *O. t. longicaudus* females to be 27 to 30 days. In *O. t. torridus*, 10 females bore litters 27 to 32 days following pairing, with seven falling within a 28 to 30 day range (Pinter, 1970). The interval between litters for lactating females varied from 26 to 35 days. There is no evidence to suggest the occurrence of delayed implantation (Horner and Taylor, 1968).

At the time of parturition, the female sits on her haunches with hind legs widely spaced. The vulva and emerging young are vigorously licked and the neonate may be pulled by the hind legs to facilitate passage through the vulva. The young are groomed and nursed shortly after the female eats the amnion and the placenta (Horner and Taylor, 1968; McCarty, personal observations).

Litter sizes ranged from one to five (mean 2.6) for female *O. t. longicaudus*, and embryo counts go as high as seven. Females wild-trapped as adults had fewer litters in captivity per year than did females trapped as juveniles (1.6 and 3.8, respectively) and fewer young per female per year (4.0 and 9.8, respectively). *O. t. longicaudus* breeds throughout the year in the laboratory, but field data suggest a strong seasonality in breeding. Maximum litter production occurs from May to July, with a sharp decline in August (Taylor, 1968). In a sample of 213 laboratory-born litters, *O. t. torridus* females produced one to five young per litter (mean 2.4), with maximum reproduction from January to July (Pinter, 1970).

Horner and Taylor (1968) provided an excellent description of the developing young of *O. t. longicaudus* in a laboratory colony. At birth, the neonate was devoid of all hair except for the unpigmented mystacial vibrissae, which were less than 3.0 mm long. The viscera were visible through the pink translucent skin. Dorsal pigmentation occurred from birth to 36 hours. The umbilical scar was visible, the teats were absent, the digits were fused and pinnae were folded and sealed. The average weight was 2.34 g, and there was little capacity for conservation of body heat.

By day 1, the young were more vocal and dorsal pigmentation increased. Some measure of heat conservation and crawling movements were reported by day 6. On day 10, dark guard hairs were up to 3.0 mm long, ventral hairs were up to 1.0 mm, and body weight averaged 6.42 g. Ear opening occurred by day 13 and eye opening by day 15. Well-defined agonistic encounters between littermates were observed on day 17 and solid food was consumed on day 19. Subjects that were weaned on day 20 averaged 9.20 g.

The youngest male *O. torridus* with epididymal sperm was 40 days of age (Taylor, 1963). In the female, the vagina becomes perforate as early as six weeks of age (Horner and Taylor, 1968). The post-juvenile molt begins at 55 to 95 days of age and is usually complete by 80 to 110 days (McCarty, personal observation). The earliest successful breeding by *O. torridus* was reported for a brother-sister pair housed together following weaning; the first litter was born when they were three months old. *O. torridus* females usually give birth to their first litters at four to five months of age (Pinter, 1970).

Accurate data on the estrus cycle of *O. torridus* is lacking because of the absence of consistent changes in either the external genitalia or cell types in the vaginal smear (Taylor, 1968). The vaginal orifice is typically open in the estrus female but it may close between periods of estrus or during pregnancy. Thus, the condition of the vagina bears no consistent relationship to the reproductive status of the female. Studies of vaginal smears were also unsuccessful, for there was no consistent change in cell types. Leucocytes were found in nearly all smears and nucleated epithelial cells were also frequently observed. Cornified epithelial cells were usually absent, but occasionally persisted in the smear for up to three days. Smears taken during postpartum estrus regularly consisted of cornified cells, nucleated cells, and leucocytes. Ovulation is spontaneous in *O. torridus*, occurring in the presence or absence of the male (Taylor, 1968).

The reproductive efficiency of females declines rapidly following the first year. Taylor (1968) reported that only eight of 47 *O. t. longicaudus* females that bore young in the laboratory bred in their second year, and only one continued into the third year. *O. torridus* females seldom remain reproductively active in the laboratory after two years of age. The oldest female to successfully rear a litter was 24 months old. Although several litters were born to old females, none of the young survived to weaning. The oldest male to sire a litter was 31 months old (Pinter, 1970). Subjects can survive in the laboratory up to three years, but free-ranging *O. torridus* probably live less than 12 months in the field (Horner and Taylor, 1968).

Pinter (1971) reported on the successful interspecific hybridization of *O. torridus* with *O. leucogaster*. Hybrids were backcrossed to *O. torridus* and backcrossed progeny were mated to each other. Interspecific hybridization between sympatric populations in nature appears to be a rare occurrence due to a variety of anatomical, physiological, and behavioral barriers.

ECOLOGY. Grasshopper mice are unusual among North American cricetine rodents in having a diet composed almost entirely of arthropods (Bailey and Sperry, 1929; Chew and Chew, 1970; Hall and Kelson, 1959; Horner *et al*, 1964). Prey items include scorpions, beetles, grasshoppers, pocket mice (*Perognathus longimembris*), and harvest mice (*Reithrodontomys megalotis*).

Southern grasshopper mice are typically found in low densities in nature (Bailey and Sperry, 1929; Bradley and Mauer, 1973). Chew and Chew (1970) calculated an average density in Nevada for *O. torridus* of 1.83 mice per ha from capture-recapture data in a 12-month study of a desert shrub community. Taylor (1963, 1968) has provided detailed studies of the reproductive attributes of this species that contribute to the maintenance of naturally low densities. Females appear to be sexually active for a single breeding season, with a rapid onset of reproductive senility following the first year. Females born early in the year (April) may produce two or three litters prior to the end of the breeding season. Those females born late in the year would have the potential to produce up to six litters the following breeding season. Distinct lulls in the testicular activity of males during the course of the breeding season may also contribute to low densities (Taylor, 1963).

The habitat of *O. torridus* includes the hot, arid valleys and scrub deserts of the Lower Sonoran Life-zone (Bailey and Sperry, 1929; Hall and Kelson, 1959). The most consistent social unit appears to be a male-female pair with offspring occupying a burrow system within a large home range. Blair (1943) reported the home range of *O. torridus* males to be 7.8 acres (3.2 ha) and 5.9 acres (2.4 ha) for females. Chew and Chew (1970) calculated a mean trapping area for adult grasshopper mice of 11.45 ha, with a maximum distance between captures of 118.4 ± 8.0 m. Adult males are highly territorial and efficient spacing is aided by the frequent vocalizations during nocturnal activity. *O. torridus* was the second most persistent of 13 species of small mammals studied by Chew and Chew (1970), with an average estimated residence in the study area of 170 days. The lack of detailed studies of disease dynamics and parasite burdens of this species may be due in part to the relatively low densities found in nature.

Horner *et al.* (1964) have provided the most recent study to date of the food habits of *O. torridus*, supplementing the original studies of Bailey and Sperry (1929). The scats of 49, *O. t. longicaudus* were analyzed for content after live-trapping. Almost all of the food was of animal origin, mostly arthropods. Scorpion remains were found in more than 30% of the individuals, and orthopterans in more than 25%. Other ingested material included spiders, mites, ants, insect cocoons, caterpillars, beetles, and unidentified arthropods. Additional tests were conducted in small outdoor enclosures to determine the behavior of the mice toward potential prey items. Those items killed and eaten included crayfish, salamanders (*Plethodon cinereus*), lizards (*Anolis*, *Phrynosoma*), frogs (*Rana*), and a wide variety of insects.

Although *O. torridus* colonies have been established in several different laboratories (Horner and Taylor, 1968; Pinter, 1970), successful breeding is generally restricted to a few highly productive females (W. Langley, personal communication). High rates of cannibalism are common and many females in a colony never produce young. These reproductive shortcomings have generally discouraged more extensive use of this species in laboratory research.

The importance of *O. torridus* as a natural regulator of insect pest populations was suggested by Bailey and Sperry (1929). This species consumes a large number of insects but only a small quantity of grain.

BEHAVIOR. Interactions between *O. torridus* adults in the laboratory are characterized by vigorous bouts of boxing and naso-nasal and naso-anal grooming. Boxing usually is initiated with both animals face-to-face and standing on hind legs. In the course of the bout, one or both animals may fall to the substrate as the boxing and wrestling continues. Mortality may result when more than a male-female pair is housed in the same cage for an extended period of time.

The remarkable ability of grasshopper mice to attack and kill insect and mammalian prey has been reported by a number of investigators (Bailey and Sperry, 1929; Cole and Wolfe, 1970; Cyr, 1972; Horner *et al.*, 1964). Several specialized attack strategies have evolved to efficiently kill insect prey that possess defensive secretions (Eisner and Meinwald, 1966). In encounters with whip scorpions, *O. torridus* adults first immobilized the formidable tail, then attacked the head. Horner *et al.* (1964) reported that a grasshopper mouse was able to immobilize the tail of a scorpion within two minutes after introduction by repeated biting. Beetles of the genera *Elodes* and *Chlaenius* secrete a defensive substance from the tip of the abdomen to ward off potential predators. When attacking these opponents, the grasshopper mouse held the beetle prey in the forepaws and jammed the abdomen into the ground to avoid contact with the secretion (Eisner and Meinwald, 1966). Mammalian prey are killed by a bite through the spinal chord at the base of the skull. The extreme aggressiveness of *O. torridus* toward other rodent species tends to decrease with the amount of time in captivity. In all pairings (*Mus musculus*, *Peromyscus maniculatus*, and *Reithrodontomys megalotus*), however, grasshopper mice are socially dominant (Horner *et al.*, 1964).

Horner and Taylor (1968) summarized the courtship behavior of 14 *O. torridus* pairs during post-partum estrus. The basic pattern of interaction included chasing in small circles, naso-nasal and naso-anal contact, and boxing and wrestling. During mounting, the male clasped the female behind the shoulders with his forefeet. The female exhibited a slight lordosis, with the tail positioned to one side. Five copulations and several locks were observed, varying in duration from several seconds to one minute. A variety of vocalizations were produced and odor appeared to be an important stimulus in courtship (Horner and Taylor, 1968).

A more recent quantitative study of copulatory behavior was reported by Dewsbury and Jansen (1972). Females were brought into estrus with injections of estrogen and progesterone. Shallow pelvic thrusting was frequently followed by a single deep thrust. During copulatory locking, the pair frequently fell to their sides for several seconds. The locks were generally terminated by the struggling of the female. In 48 observed pairings, the latency from pairing to the first lock was more than 27 minutes and the mean lock duration was 13.2 seconds.

Vaginal smears were taken after pairings involving mounts with and without deep pelvic thrusting to determine the efficiency of sperm transfer. In 84 of 91 pairings with copulatory locks, sperm were found in the smears. No sperm transfer occurred in 21 tests without copulatory locking (Dewsbury and Jansen, 1972).

Both male and female *O. torridus* assume an active role in the care of the developing young. Immediately following parturition, the male is excluded from the nest by the more dominant female for up to three days (Horner, 1961). When allowed back into the nest, the male may be active in grooming and huddling over the young pups. When the female leaves the nest, the pups often cling to the nipples. Displaced pups are retrieved and returned to the nest by both parents. During disturbance to the nest, both parents chirp and lunge to attack. There is no evidence to suggest that the presence of the male decreases the probability of pup survival (Horner and Taylor, 1968).

O. torridus is primarily nocturnal in its activity and is rarely seen during the day. Members of this species appear to remain active the entire winter, with no evidence of even partial hibernation (Bailey and Sperry, 1929).

Southern grasshopper mice have a rich vocal repertoire. Adult males emit a high-pitched call, lasting several seconds, while standing on the hind legs with head held high and mouth wide open. Calls are less frequently given by females. Calling appears to function in nature as a territorial advertisement and spacing mechanism. A variety of chirps are also produced during grooming, threats, and fighting (Bailey and Sperry, 1929; Horner and Taylor, 1968). The young are quite vocal from birth to 14 to 15 days of age. Ultrasonic calling characteristic of a number of rodent species has not been detected in *O. torridus* pups (McCarty, unpublished observations).

The nest of the grasshopper mouse is located in a burrow system that may have been abandoned by another small mammal (Bailey and Sperry, 1929; Hall and Kelson, 1959). Prey items that are killed on the surface may be consumed in the burrow by the parents and developing young (Horner *et al.*, 1964). Bailey and Sperry (1929) observed that captive *Onychomys* stored sunflower seeds in their nestboxes during the winter months. This cache was utilized only when no other source of food was available. In a recent quantitative study of food hoarding, isolated male and female *O. torridus* were individually housed in large laboratory enclosures for a five-day period with *ad libidum* supplies of food biscuits. Males were observed to hoard significantly more food biscuits in nest boxes than did females (McCarty and Southwick, 1975*a*).

Severe clonic-tonic seizures have been observed in the course of laboratory experimentation with *O. torridus*. The period of maximum susceptibility is between four weeks and four months of age (Horner, 1961; McCarty and Southwick, 1975*b*). The basic seizure pattern is similar to that described for the Mongolian gerbil, *Meriones unguiculatus* (Loskota *et al.*, 1974).

GENETICS. The diploid chromosome number is 48. Of the 46 autosomes, two are large subtelocentrics, 26 are metacentric and submetacentric, and 18 are acrocentric or telocentric. The distinctive X chromosome is a large submetacentric. The Y chromosome is acrocentric and is indistinguishable from several pairs of small acrocentric autosomes. There is evidence of considerable subspecific variation in the basic chromosomal morphology (Hsu and Benirschke, 1968).

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