MAMMALIAN SPECIES No. 102, pp. 1–3, 2 figs.

Baiomys musculus.

By Robert L. Packard and James B. Montgomery, Jr.

Published 21 September 1978 by the American Society of Mammalogists

Baiomys musculus (Merriam, 1892)

Southern Pygmy Mouse

Sitomys musculus Merriam, 1892:170. Type locality Colima, Colima.

Baiomys musculus Mearns, 1907, first use of current name-combination.

CONTEXT AND CONTENT. Order Rodentia, Family Cricetidae, Subfamily Cricetinae. The genus *Baiomys* contains two recent species and six extinct species. Eight subspecies of *Baiomys musculus* are currently recognized (see Packard, 1960:610) as follows:

B. m. brunneus (J. A. Allen and Chapman, 1897:203). Type locality, Jalapa, Veracruz.

B. m. grisescens Goldman, 1932:121. Type locality, Comyabuela [Comayagüela], just south of Tegucigalpa, Honduras.

B. m. handleyi Packard, 1958:399. Type locality, Sacapulas, El Quiché, Guatamala.

B. m. infernatis Hooper, 1952:96. Type locality, Teotitlán, Oaxaca.

B. m. musculus (Merriam, 1892:170), see above.

B. m. nigrescens (Osgood, 1904:76). Type locality, Valle de Comitán, Chiapas.

B. m. pallidus Russell, 1952:21. Type locality, 12 km NW Axochiapan, Morelos, (*nebulosus* Goodwin, a synonym).

B. m. pullus Packard, 1958:401. Type locality, 8 mi S Condega, Estelí, Nicaragua.

DIAGNOSIS. Size is large for the genus (extremes in external measurements of adults); total length is 100 to 135, length of tail vertebrae, 35 to 56, length of hind foot, 14.1 to 17, and length of ear, 9 to 12. *Baiomys musculus* may be confused easily with *B. taylori* (only adults and old adults fit this diagnosis); hind foot is 16 mm or more; occipitonasal length is 19 mm or more; zygomatic breadth is 10 mm or more; rostrum is not deflected ventrally at frontoparietal suture but, instead, curves gradually toward anteriomost point of nasals; cingular ridges and secondary cusps on teeth are pronounced; basihyal of hyoid apparatus has anterior point with entoglossal process, shoulders of basihyal protrude anteriorly (characteristic of all age categories); baculum has broad shaft with spatulate to knob-shaped tip, wings at base project anteriorly; baculum is more than 3 mm long; short process of incus is knob-shaped rather than attenuate; muscular process of posterior crus of stapes is prominent. Dentition is 1/1, 0/0, 0/0, 3/3. The molars of *B. musculus* have more pronounced cingular ridges than those of *B. taylori* and are somewhat more hypsodont.

GENERAL CHARACTERS. Mean and extremes of external measurements (mm) of eight adults of *B. musculus musculus* (largest subspecies) from Armería, Colima (Packard, 1960:621), are: total length, 125.5 (115 to 135); length of tail, 47.5 (42 to 54); length of body, 75.6 (69 to 81); and length of hind foot, 16.5 (16 to 17). Means and extremes of selected cranial measurements in millimeters of above adults are: occipitonasal length, 20.3 (19.8 to 20.7); zygomatic breadth, 10.7 (10.3 to 11.1); postpalatal length, 7.4 (7.1 to 7.7); least interorbital breadth, 4.0 (3.9 to 4.1); length of incisive foramina, 4.3 (4.1 to 4.5); length of rostrum, 7.3 (6.9 to 7.6); breadth of braincase, 9.8 (9.4 to 10.0); depth of cranium, 7.1 (6.7 to 7.2); and alveolar length of maxillary toothrow 3.4 (3.3 to 3.6).

The southern pygmy mouse varies in color of upper parts from dark reddish brown or ochraceous-buff to nearly black; underparts are pale pinkish buff to white or pale buffy. Young mice are more grayish than adults and lack colors distinctive of the described subspecies. There is little secondary sexual variation (see Packard, 1960).

There are three distinct pelages—juvenal, postjuvenal, and adult. The uniformly dusky gray juvenal mice begin their molt at about day 38 to 45 with the appearance of new brownish hair on the top of the head, and complete this molt by day 52 to 60. The molting sequence is similar to that of *Peromyscus* (for a detailed analysis of molt, see Packard, 1960).

DISTRIBUTION. The species occurs in south-central México from southern Nayarit east through the transverse volcanic zone to Central Veracruz, thence south along the southern coastline and Mexican states of Oaxaca and Chiapas, extending as far south as central Nicaragua (see figure 2). The southern pygmy mouse is typically found in arid upper and lower divisions of the Tropical Life-zone.

FOSSIL RECORD. Six fossil species, all extinct, have been assigned to the genus. They range in time from early late Pliocene (Sawrock Canyon fauna of Hibbard, 1953) to late Pleistocene (see Packard and Alvarez, 1965).

Ancestral stocks of pygmy mice may have possessed relatively brachydont teeth, with raised cingular ridges (ectolophids and mesolophids) and relatively short orthodont to proodont incisors. *Baiomys sawrockensis*, or a stock similar to it, could have been ancestral to the living and other extinct species. *B. musculus*

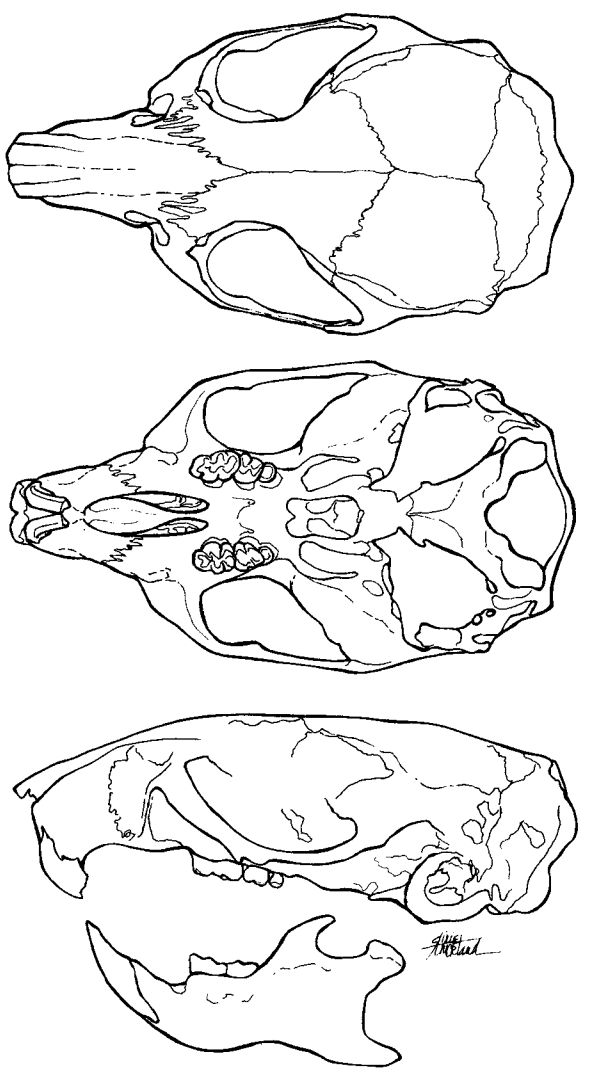

FIGURE 1. Dorsal, ventral, and lateral views of skull, and lateral view of lower jaw of *Baiomys musculus* (KU 71611, female) from 8 mi S Condega, Estelí, Nicaragua. Illustrations by Dixie R. Strickland.

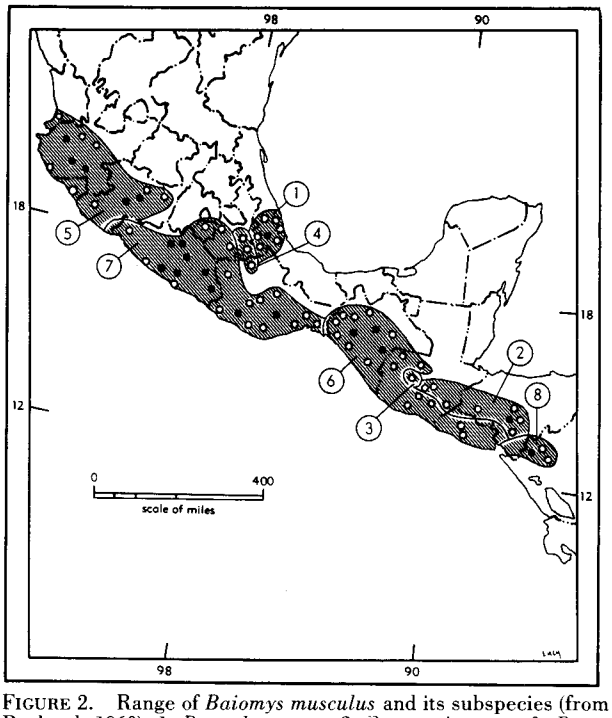

FIGURE 2. Range of *Baiomys musculus* and its subspecies (from Packard, 1960): 1, *B. m. brunneus*; 2, *B. m. grisescens*; 3, *B. m. handleyi*; 4, *B. m. infernatis*; 5, *B. m. musculus*; 6, *B. m. nigrescens*; 7, *B. m. pallidus*; 8, *B. m. pullus*.

could have evolved from a *B. sawrockensis*, *B. minimus*, *B. intermedius* phyletic line (see Packard, 1960, and Packard and Alvarez, 1965). *B. musculus* seems more primitive than *B. taylori* (the other extant species) based on dental and lower jaw features. The presence of the anterior median fold between the anterolingual conulid and the anterolabial conulid is regarded as primitive in pygmy mice.

Baiomys intermedius occurred in central México in the late Pleistocene and, although material is fragmentary, might be closely related to *B. musculus*. *B. sawrockensis* may have occupied semiwooded to shrubby-grass habitats (based on Hershkovitz's assumptions, 1955). The teeth of *B. minimus*, a late Pliocene species, suggest a grassy-shrub habitat, whereas *B. intermedius* may have occupied a habitat similar to that of *B. musculus*.

Certain of the combinations of tooth structure possessed by *B. sawrockensis* suggest a relationship of *Baiomys* to hesperomyine mice. This suggestion on the part of Packard (1960) was denied by Hershkovitz (1962) and attributed to convergence.

FORM. The baculum of *Baiomys* first was described by Blair (1942) based on that of *B. taylori*. Packard (1960) described the baculum of *B. musculus* in detail and pointed out the relatively low degree of morphological variation in this structure. The baculum of *B. musculus* (average in mm of 58 specimens, 3.32, range 2.80 to 3.88) is considerably larger than that of *B. taylori* (average of 108 specimens, 2.53, range 2.00 to 3.12). The baculum of *B. musculus* resembles that of *Ochrotomys nuttalli* as well as that of *Calomys laucha*.

The glans penis of *Baiomys* was described by Hooper (1959). He pointed out the superficial resemblance between the glans of *Baiomys* and that of *Ochrotomys nuttalli*. In *B. musculus*, the glans is stubby with the greatest length less than twice the greatest diameter. The surface is densely covered with small and proximally directed spines, except in the central crater area and a narrow band about the base of the glans. The glans is rather evenly cylindrical, with the rim of the crater finely striated. Small grooves and ridges spiral into the crater and then up onto the medial mound that houses the tip of the baculum. The *meatus urinarius* lies in a depression in the central mound.

Packard (1960) described the hyoid apparatus of *B. musculus* in detail. The combination of shape of basihyal combined with its length serves to separate this species from *B. taylori*. The basihyal seems of greater taxonomic worth than the ceratohyals and thyrohyals. The hypohyal fuses in adults with the basihyal.

The gastric anatomy of *B. musculus* is similar to that of *Ochrotomys nuttalli* (Packard, 1969). There is an internal fold that delimits the pyloric region from the rest of the stomach. In addition, the *incisura angularis* in the ventral floor of the stomach is lacking or poorly developed in *B. musculus*. According to Carleton (1973), the extension of the cornified epithelium into the antrum is somewhat similar in *Baiomys*, *Ochrotomys*, and *Reithrodontomys*.

The auditory ossicles are useful in differentiating the two extant species. *B. musculus* differs from *B. taylori* in: orbicular apophyses of malleus oblong rather than ovoid; anterior process of malleus less acutely pointed with longer, less recurved neck; short process of incus knob-shaped, not elongated; lenticular process small relative to size of incus; posterior and anterior crus of stapes less curved, posterior crus with prominent muscular process.

The auditory ossicles of *Baiomys* resemble those of *Calomys*, *Thaptomys*, and *Akodon*. However, this resemblance may be only superficial and result from convergence (Hershkovitz, 1962). *Baiomys musculus* and *Peromyscus* (*Podomys*) *floridanus* both possess a knob-shaped short process on the incus.

ONTOGENY AND REPRODUCTION. Packard (1960) suggested, on the basis of notations on specimen labels concerning lactation and embryos, that breeding may occur in all months. A decline in breeding, however, seems to occur during winter and spring. No females collected by Hooper (1955) in the Mexican states of Colima, Jalisco, and Michoacán in February gave evidence of breeding and none of 13 females collected by Hall and Villa-R. (1949) in March from Michoacán was pregnant. Felten (1958) noted that females in El Salvador were not pregnant in January, February, March, October, November, or December, although he mentioned finding a female with three young in November. In addition, Burt and Stirton (1961) noted four pregnant females collected in the period December 9 to January 9 in El Salvador. Packard (1960) stated he had no records of pregnant or lactating females in January, April, May, or June.

Litter and embryo counts of 26 females ranged from one to four with a mean of 2.92 (Packard, 1960).

ECOLOGY. *Baiomys musculus* occurs primarily in the arid upper and lower divisions of the Tropical Life-zone. Allen and Chapman (1897) described this species as common in weedy fields and abundant in uncleared cornfields near Jalapa, Veracruz, and Goodwin (1934) reported one specimen from a grassy abandoned cornfield bordered by brush at Chanquejelve, Guatemala. Goodwin (1934) also reported 37 specimens from a hot, dry, sandy region of Sacapulas, Guatemala. These mice were living among high cactus hedges that protected the grass from overgrazing by cattle. In the arid lowlands of Morelos, *B. musculus* was most abundant along rock fences separating fields and in other rocky situations (Davis and Russell, 1954). Also in México, this species was collected in rocky areas of semidesert grasslands in Guerrero (Davis, 1944), rocky grazed areas near sugar cane fields in Puebla (Packard, 1960), and sparse grass in an open thorn forest on a rocky hillside in Colima (Hooper, 1955).

B. musculus also occurs in other situations. Hooper (1955) collected 15 specimens from a growth of cane grass, shrubs, and mesquite near an irrigation ditch in Michoacán and Goodwin (1942) and Felten (1958) reported this species from scrubland in Honduras and brushy areas in El Salvador, respectively. From La Primavera, Guatemala, Goodwin (1934) noted that five specimens were collected from the edge of a brush covered Mayan Indian mound in the center of a sugar plantation. Packard (1960) captured specimens in Puebla along a stream in heavy grass bordered by cypress, willow, fig, and bamboo. Hooper (1955) collected specimens from beneath the shrubs and litter of nut-palm (coconut and oil-palm) groves on a moist bottomland plantation in Colima and, in Jalisco, from a mixed growth of large trees that was being cleared to plant coco-palms. In Veracruz, these mice were found in dense stands of ground vegetation, mostly grasses (Davis, 1944; Hall and Dalquest, 1963). These collection data and field notes indicate that *B. musculus* habitat is primarily grassy areas where cover is provided by brush and shrubs, rocks, or dense vegetation.

Nest sites vary with the local situation. In dense grass, these mice apparently live in underground burrows, whereas in arid, rocky areas they live under rocks (Davis, 1944), Felten (1958) described a nest of finely chewed vegetable material under loose bark beneath a huge kapok tree (*Ceiba pentandra*).

According to Packard (1960), *B. musculus* is primarily vegetarian. The diet includes nuts, bark, grass, seeds, and leaves.

Most predators of small rodents that occur within the range of *B. musculus* could be listed as enemies. Remnants of this mouse were recovered from owl pellets (thought to be those of a barn owl, *Tyto alba*) by Packard (1960).

In central México, where the ranges of *B. musculus* and *B. taylori* meet, *B. musculus* is predominant in the arid tropical lowlands and *B. taylori* typically occurs in the adjoining arid temperate highlands (Hooper, 1952). At three localities in Jalisco, Hooper (1952) collected both species in the same traplines, but was unable to determine any ecological separation. However, he noted large disparities in the numbers of each species captured (one to

33, 25 to six, 35 to six, of *B. taylori* to *B. musculus*, respectively). Some other small mammals reported as occurring with *B. musculus*, are *Liomys irroratus*, *L. pictus*, *L. salvini*, *Neotoma mexicana*, *Oryzomys palustris*, *O. fulvescens*, *Peromyscus boylii*, *P. gymnotis*, *P. melanophrys*, *P. mexicanus*, *P. truei*, *Reithrodontomys fulvescens*, *R. gracilis*, *R. sumichrasti*, *Sigmodon hispidus*, and *Tylomys nudicaudus*. (Davis, 1944; Genoways, 1973; Goodwin, 1934).

Four species of mites (Acarina), *Pseudoschongastia hoffmannae* Brennan, *P. inevicta* Brennan, and *Whartonia whartoni* Hoffmann of the family Trombiculidae, and *Dermacarus mexicanua* Fain of the family Labidophoridae are known to occur on *B. musculus* (Brennan, 1960; Fain, 1969; Radford, 1954). In addition, a flea, *Anomiopsyllus oaxacae* Barnes (Siphonaptera: Hystrichopsyllidae), usually considered a parasite of *Neotoma* was collected from *B. musculus* (Lewis, 1974). Lopez *et al.* (1966) included *B. musculus* in a list of possible reservoirs of kala-azar (visceral leishmaniasis) in the high Balsas river basin of México.

BEHAVIOR. *Baiomys musculus* shows a tendency toward diurnal and crepuscular activity. Packard (1960) reported captures during the afternoon, and Davis and Russell (1954) noted that this species was the first small mammal to appear in the evening and that many were caught in traps before nightfall. Hall and Villa-R. (1949) also noted a crepuscular habit.

REMARKS. Merriam (1892) described *Sitomys musculus* based on specimens from Colima and Jalisco. True (1894) regarded these mice as a subgenus, *Baiomys*, of *Sitomys*, and Mearns (1907) accorded *Baiomys* generic rank. Osgood (1909) revised *Baiomys* as a subgenus of *Peromyscus*, but Miller (1912) gave pygmy mice generic status. Packard (1960) concluded that *Baiomys* is a distinct genus and suggested a possible affinity to South American phyllotine rodents, a supposition denied by Hershkovitz (1962). *B. musculus* does seem more primitive than *B. taylori* because it resembles extinct fossil pygmy mice in characters of the teeth and lower jaw.

LITERATURE CITED

Allen, J. A., and F. M. Chapman. 1897. On a collection of mammals from Jalapa and Las Vigas, state of Vera Cruz. Bull. Amer. Mus. Nat. Hist. 9:197–208.

Blair, W. F. 1942. Systematic relationships of *Peromyscus* and several related genera as shown by the baculum. Jour. Mammal. 23:196–204.

Brennan, J. M. 1960. Eight new species of *Pseudoschöngastia* from Mexico and Panama with a revised key to species (Acarina: Trombiculidae). Acarologia 2:480–492.

Burt, W. H., and R. A. Stirton. 1961. The mammals of El Salvador. Misc. Publ. Mus. Zool., Univ. Michigan 117:1–69.

Carleton, M. D. 1973. A survey of gross stomach morphology in New World Cricetinae (Rodentia, Muroidea), with comments on functional interpretations. Misc. Publ. Mus. Zool., Univ. Michigan 146:1–43.

Davis, W. B. 1944. Notes on Mexican mammals. Jour. Mammal. 25:370–403.

Davis, W. B., and R. J. Russell, Jr. 1954. Mammals of the Mexican state of Morelos. Jour. Mammal. 35:63–80.

Fain, A. 1969. Les deutonymphes hypopiates vivant en association phorétique sur les mammifères (Acarina: Sarcoptiformes). Bull. Inst. Royal Sci. Nat. Belgique 45:1–262.

Felten, H. 1958. Nagetiere (Mammalia, Rodentia) aus El Salvador. Senckenb. Biol. 39:133–144.

Genoways, H. H. 1973. Systematics and evolutionary relationships of spiny pocket mice, genus Liomys. Spec. Publ. Mus., Texas Tech Univ. 5:1–368.

Goldman, E. A. 1932. Two new mammals from Honduras. Proc. Biol. Soc. Washington 45:121–123.

Goodwin, G. G. 1934. Mammals collected by A. W. Anthony in Guatemala, 1924–1928. Bull. Amer. Mus. Nat. Hist. 68:1–60.

——— 1942. Mammals of Honduras. Bull. Amer. Mus. Nat. Hist. 79:107–195.

——— 1959. A new pygmy mouse of the genus *Baiomys* from Oaxaca, Mexico. Amer. Mus. Novit. 1929:1–2.

Hall, E. R., and B. Villa-R. 1949. An annotated checklist of the mammals of Michoacán, México. Univ. Kansas Publ., Mus. Nat. Hist. 1:431–472.

Hall, E. R., and W. W. Dalquest. 1963. The mammals of Veracruz. Univ. Kansas Publ., Mus. Nat. Hist. 14:165–362.

Hershkovitz, P. 1955. South American marsh rats genus *Holochilus* with a summary of sigmodont rodents. Fieldiana: Zool., Chicago Nat. Hist. Mus. 37:637–673.

——— 1962. Evolution of Neotropical cricetine rodents (Muridae) with special reference to the phyllotine group. Fieldiana: Zool. Chicago Nat. Hist. Mus. 46:1–524.

Hibbard, C. W. 1953. The Sawrock Canyon fauna and its stratigraphic significance. Papers Michigan Acad. Sci. Arts and Letters 38:387–411.

Hooper, E. T. 1952. Notes on the pygmy mouse (*Baiomys*), with a description of a new subspecies from Mexico. Jour. Mammal. 33:90–97.

——— 1955. Notes on mammals of Western Mexico. Occas. Papers Mus. Zool., Univ. Michigan 565:1–26.

——— 1959. The glans penis in five genera of cricetid rodents. Occas. Papers Mus. Zool., Univ. Michigan 613:1–11 + 5 pls.

Lewis, R. E. 1974. Notes on the geographical distribution and host preferences in the order Siphonaptera, Part 3, Hystrichopsyllidae. Jour. Med. Entomol. 11:147–167.

Lopez, R. A. Martinez, J. L. Molinari, and F. Biagi. 1966. Kala-azar en México: primeras observaciones sobre posibles reservorios. Rev. Fac. Med., Univ. México 818:533–539 (from Biol. Abstr., 1967, 97465).

Mearns, E. A. 1907. Mammals of the Mexican boundary of the United States . . . Pt. 1, families Didelphidae to Muridae. Bull. U.S. Nat. Mus. 56:xv + 1–530.

Merriam, C. H. 1892. Descriptions of new mammals collected by E. W. Nelson in the states of Colima and Jalisco, Mexico. Proc. Biol. Soc. Washington 7:164–174.

Miller, G. S. 1912. List of North American land mammals in the United States National Museum, 1911. Bull. U.S. Nat. Mus. 79:xiv–1–455.

Osgood, W. H. 1904. Thirty new mice of the genus *Peromyscus* from Mexico and Guatemala. Proc. Biol. Soc. Washington 17:55–77.

——— 1909. Revision of the mice of the American genus *Peromyscus*. N. Amer. Fauna 28:1–285.

Packard, R. L. 1958. New subspecies of the rodent *Baiomys* from Central America. Univ. Kansas Publ., Mus. Nat. Hist. 9:397–404.

——— 1960. Speciation and evolution of the pygmy mice, genus *Baiomys*. Univ. Kansas Publ., Mus. Nat. Hist. 9:579–670.

——— 1969. Taxonomic review of the golden mouse, *Ochrotomys nuttalli*. Misc. Publ. Mus. Nat. Hist., Univ. Kansas 51:373–406.

Packard, R. L., and T. Alvarez. 1965. Description of a new species of fossil *Baiomys* from the Pleistocene of central Mexico. Acta Zool. Mexicana 7(4):1–4.

Radford, C. D. 1954. The larval genera and species of "harvest mites" (Acarina: Trombiculidae). Parasitology 44:247–276.

Russell, R. J. 1952. A new subspecies of *Baiomys musculus*, from Morelos, Mexico. Proc. Biol. Soc. Washington 65:21–22.

True, F. W. 1894. On the relationships of Taylor's mouse, *Sitomys taylori*. Proc. U.S. Nat. Mus. 16:757–758.

Principal editor of this account was SYDNEY ANDERSON.

ROBERT L. PACKARD AND JAMES B. MONTGOMERY, DEPARTMENT OF BIOLOGICAL SCIENCES AND THE MUSEUM, TEXAS TECH UNIVERSITY, LUBBOCK, 79409.