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The natural history of small mammals from Aisén Region, southern Chile

La historia natural de los pequeños mamíferos de la Región de Aisén, sur de Chile

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ABSTRACT

Terrestrial small mammals from a transition between Valdivian temperate rainforest and Patagonian steppe were collected over a two and a half year period. Here I summarize some recent research on fourteen species from this region, and provide information on field identification, natural history, population structure, and reproduction in these species.

Key words: Sigmodontinae, Ecology, Patagonia, Valdivian rainforest

RESUMEN

Pequeños mamíferos terrestres de una zona de transición entre el bosque húmedo templado de Valdivia y la estepa Patagónica fueron recolectados por un período de dos años y medio. Presento un resumen de los datos recientes de catorce especies de esta región, e información sobre identificación en el campo, historia natural, estructura de la población, y reproducción en estas especies.

Palabras claves: Sigmodontinae, Ecologia, Patagonia, Bosque de lluvia Valdiviana

INTRODUCTION

The natural history of the Chilean mammal fauna is among the better known in South America, largely due to the pioneering efforts of Osgood (1943) and subsequent work by Mann (1978). Nonetheless, until recently some areas of this country have remained difficult to access, and the faunas correspondingly poorly known. Perhaps the final unexplored region of Chile is the southern extent of the Valdivian temperate rainforests and the Fuegian forests, which lie south of these, and the portions of Patagonian steppe which enter Chile along the border with Argentina. Southern Chile and adjacent parts of Argentina have recently experienced much research (e.g. Meserve et al. 1982, 1988, 1991a, 1991b, Patterson et al. 1989, 1990, Pearson & Pearson 1982, Kelt 1989, ms, Johnson et al. 1990, Kelt et al. ms, In press), and our knowledge of these areas is improving.

The present report is an informal summary of the natural history and ecology of the terrestrial small mammal fauna of Chile's XI Region. This report is based primarily on research conducted between 1985 and 1987, although relevant literature is incorporated where necessary. It is hoped that this will promote an appreciation of the fauna of this interesting region which currently is endangered by rapid human encroachment.

Chile's XI Region

The XI region of Chile lies between roughly 44o and 49o. The Andes decline in stature towards the south, and in this area the average pass elevation is ca. 1000 m. Because this region lies within the zone of the southern tradewinds, winds are predominantly from the west, depositing heavy precipitation on the western flanks of the Andes, and producing a rainshadow effect to the east. Precipitation declines from about 2500 mm at Pto. Aisén to roughly 240 cm at Chile Chico, an east-west distance

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of roughly 100 km. A marked vegetation gradient parallels the climatic trend, with Valdivian temperate rainforest on the western slopes being replaced eastward by deciduous forests dominated by southern beeches (*Nothofagus* spp.), park-like woods, matorrales, and finally the steppe and bunch-grass that is characteristic of Patagonia.

Because the two biotic regions here — Valdivian forests and Patagonian steppe — have had largely separate histories (e.g. Müller 1973, Heusser 1990, Villagran 1990), their faunas differ substantially. A total of 16 native species of rodent (Muridae, Sigmodontinae) plus two introduced rodents (Muridae, Murinae) from the Old World (house mouse, Norway rat) may be found here. Of these, only two could be considered truly cosmopolitan across both regions (Osgood 1943, Kelt 1989, ms). The remaining species are found in either Valdivian (four species) or Patagonian (eight species) habitat, or they straddle the transition zone (two species). It is notable that endemism of the Valdivian mammal fauna rivals that of New Zealand (Patterson 1992), long considered one of the great areas of endemism.

Not all species found in this region are considered in this report. The viscacia (*Lagidium viscacia*) and southern cavy (*Microcavia australis*) occur in isolated localities, and five bat species (*Myotis chiloensis*, *Histiotis montanus*, *H. macrotus*, *Lasiurus borealis*, and *L. cinereus*) may occur here (Osgood 1943, Pearson & Pearson 1989, Redford & Eisenberg 1992). My research here did not include these species however, and little data are available on their habits or life history. Finally, the introduced murids *Mus musculus* and *Rattus norvegicus* occur in towns and some other human dwellings. These two species are only rarely encountered away from human habitation, however, so they are dealt with only briefly (Table 2). Common names are presented in English and Spanish, and are taken, with some minor modification, from Tamayo et al. (1987).

Field efforts totalled almost 10,000 trapnights (see Kelt (ms) for details of trapping methods), and yielded 2,151 specimens, which have been shared between the Field Museum of Natural History (Chicago, ILL) and the Museo Nacional de Historia Natural (Santiago, Chile). Most measurements reported in the text and tables (Fig. 1) are standard and may be readily measured. Tooth wear was measured following Pearson (1975, 1983). Metric calipers are needed for certain cranial features, whereas a metric rule is required for external measurements. The species treated here possess four teeth on either side of the upper and lower jaw. These are an anterior incisor, which possesses a longitudinal groove on its anterior face in some species, and three molar teeth.

Biogeography and community structure

The transition from the Valdivian temperate rainforest to Patagonian steppe is one of the world's great biotic transitions (Quintanilla 1983, Veblen & Lorenz 1988). The marked gradient in precipitation was mentioned above, and this is paralleled by changes in mean temperatures as well as in both the flora and fauna. All species of small terrestrial mammal here display very heterogenous distributions across the transition, and there is almost complete faunal turnover across a region of about 100 km (Kelt 1989, ms). Interestingly, however, communities appear to retain a certain structure regardless of the location across this transition (Kelt ms). Site specific parameters such as number of species present, total biomass, species diversity, and trophic structure remain remarkably consistent across this transition, even in the face of almost complete faunal turnover. The mammal species in this region generally correspond to a Patagonian fauna or to a Valdivian fauna (Osgood 1943, Kelt ms), but they respond independently to local habitat characteristics, rather than as two distinct faunas (Kelt ms); this is also the case in many other regions (Brown and Kurzius 1987, Morton et al. In press). Competition has been implicated as a profound structuring force here (Kelt et al. ms), and may explain why the number of

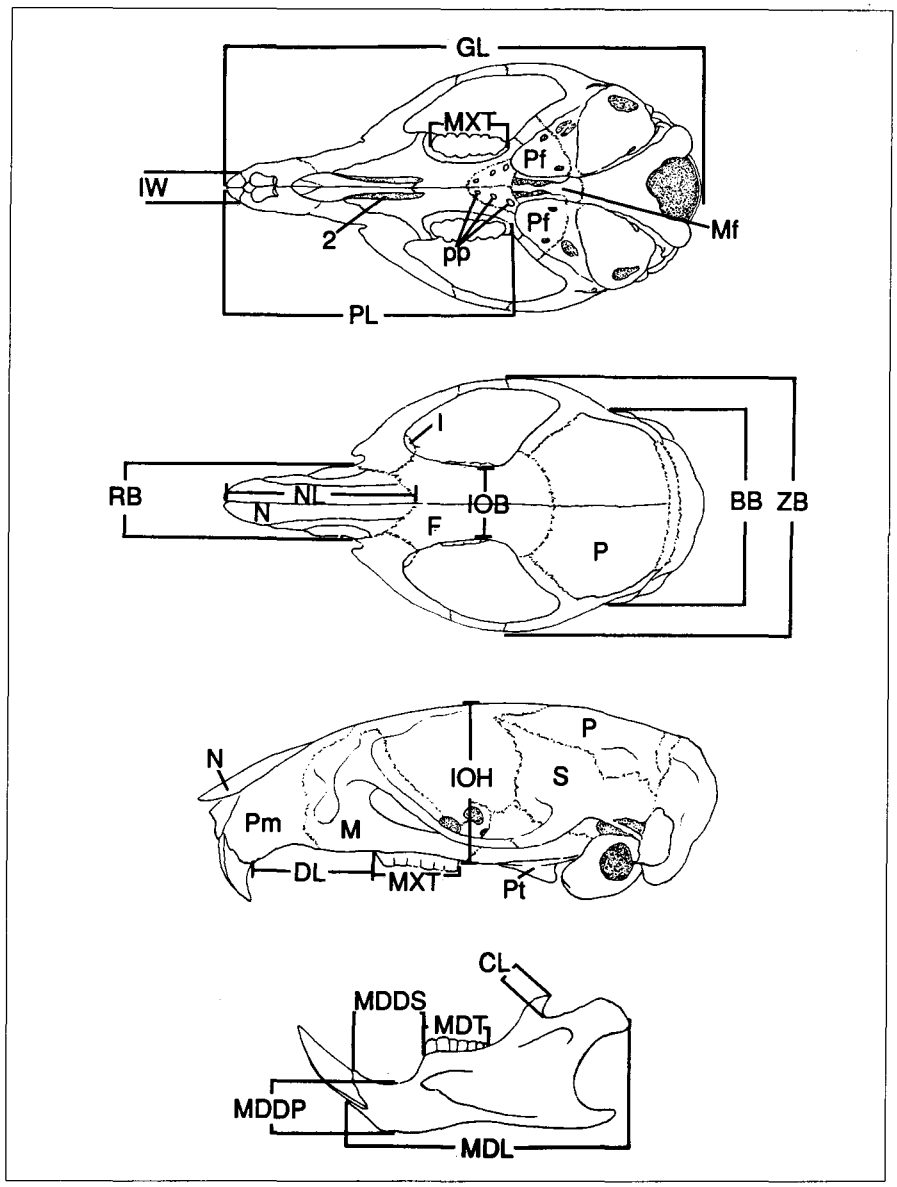

Fig. 1: Diagram of a standard rodent skull, showing the measurements used in the text. Abbreviations are: 1, orbital extension of the lacrimal bone; 2, incisive foramen; BB, breadth across the braincase; CL, length of the corynoid process; DL, length of the maxillary diastema; F, frontal bone; GL, greatest length of skull; IOB, interorbital breadth; IOH, interorbital height; IW, width of the incisors; M, maxilla; MDDP, depth of the mandible; MDDS, length of the mandibular diastema; MDL, length of the mandible; MDT, length of the mandibular toothrow; Mf, meso-pterygoid fossa; MXT, length of maxillary toothrow; N, nasal bone; NL, length of the nasal bones; P, parietal bone; Pf, parapterygoid fossae; Pm, premaxilla; PL, length of palate; pp, post-palatal pits; Pt, pterygoid bones; RB, breadth across the rostrum; S, squamosal bone; ZB, breadth across the zygomatic arches.

Diagrama del cráneo típico de un roedor, mostrando las medidas utilizadas en el texto. Las abreviaturas son: 1, extensión orbital del hueso lagrimal; 2, foramen incisivo; BB, ancho de la caja ceflica; CL, largo del proceso coronoideo; DL, longitud del diastema maxilar; F, hueso frontal; GL, longitud máxima del cráneo; IOB, ancho interorbital; IOH, altura interorbital; IW, ancho de los incisivos; M, maxila; MDDP, profundidad de la mandíbula; MDDS, longitud del diastema mandibular; MDL, longitud de la mandíbula; MDT, longitud de la línea dental mandibular; Mf, fosa meso- pterigoidea; MXT, longitud de la línea dental maxilar; N, hueso nasal; NL, longitud del hueso nasal; P, hueso parietal; Pf, fosas parapterigoideas; Pm, premaxilar; PL, longitud del paladar; pp, agujeros posteriores al paladar; Pt, huesos pterigoideos; RB, amplitud a lo largo del hocico; S, hueso escamoso; ZB, ancho del arco zigomatico.

TABLE 1

External, cranial, and mandibular measurements for the species considered in this report. Acronyms are as follows (see Fig. 1 for many of these measurements): ABLO = *Abrothrix longipilis*, AKOL = *Akodon olivaceus*, AKXA = *Akodon xanthorhinus*, AUMI = *Auliscomys* micropus, CHMA = *Chelemys macronyx*, ELMO = *Eligmodontia morgani*, EUCH = *Euneomys chinchilloides*, GEVA = *Geoxus valdivianus*, IRTA = *Irenomys tarsalis*, MUDO = *Mus domesticus*, OLLO = *Oligoryzomys longicaudatus*, PHXA = *Phyllotis xanthopygus*, REPH = *Reithrodon physodes*.

CHARACTER		SPECIES						
		ABLO	AKOL	AKXA	AUMI	CHMA	ELMO	EUCH
Total length (head + body + tail)	N	24	19	24	22	20	20	11
	Mean	189.83	170.26	141.21	224.50	185.65	158.10	188.09
	Std Dev	12.58	14.22	5.79	10.49	10.79	10.95	9.27
Tail length	N	24	18	23	22	20	20	11
	Mean	82.65	76.28	55.74	95.55	56.65	74.80	67.27
	Std Dev	7.22	7.00	3.18	6.77	3.87	5.78	3.93
Hind foot length	N	24	19	24	22	20	20	11
	Mean	25.10	22.87	21.63	27.95	25.63	22.08	26.32
	Std Dev	1.25	1.20	6.41	0.87	1.12	0.75	0.96
Ear length	N	24	19	24	22	18	20	11
	Mean	16.33	16.55	14.50	20.55	16.42	15.33	20.45
	Std Dev	1.12	0.66	0.83	0.84	0.58	0.98	1.04
Weight (gms)	N	24	19	24	22	18	20	11
	Mean	36.23	25.76	16.48	62.67	62.12	16.53	55.55
	Std Dev	7.10	6.46	3.10	10.80	14.06	3.40	9.37
Greatest length of skull	N	24	18	23	22	19	20	9
	Mean	28.33	25.72	23.86	31.41	30.67	23.49	30.23
	Std Dev	0.96	0.96	0.65	1.00	1.18	0.83	1.17
Length of nasal bone	N	24	18	23	22	20	20	11
	Mean	10.95	9.51	9.04	13.07	11.69	9.43	12.54
	Std Dev	0.55	0.57	0.39	0.65	0.60	0.38	0.39
Length of the maxillary diastema	N	24	19	24	22	20	20	11
	Mean	6.82	5.99	5.32	7.60	7.51	5.73	7.28
	Std Dev	0.40	0.33	0.22	0.53	0.52	0.37	0.37
Length of the maxillary toothrow	N	24	19	24	22	20	20	11
	Mean	4.18	3.78	3.52	5.98	5.76	3.74	5.95
	Std Dev	0.16	0.17	0.15	0.21	0.15	0.13	0.53
Length of palate	N	24	19	24	22	20	20	11
	Mean	11.33	10.03	9.17	14.09	13.00	9.93	13.54
	Std Dev	0.46	0.54	0.27	0.62	0.66	0.44	0.96
Breadth across rostrum	N	24	19	24	22	20	20	11
	Mean	4.07	3.74	3.66	4.89	5.09	3.22	4.77
	Std Dev	0.18	0.14	0.17	0.19	0.21	0.23	0.16
Breadth across the braincase	N	24	19	24	22	20	20	9
	Mean	12.65	11.86	11.42	13.79	13.85	11.26	13.82
	Std Dev	0.33	0.25	0.22	0.27	0.32	0.29	0.56
Breadth across the zygomatic arches	N	24	17	24	22	20	19	10
	Mean	13.45	12.48	12.07	17.83	17.04	12.43	17.73
	Std Dev	0.45	0.44	0.39	0.66	0.88	0.45	0.45
Width of the incisors (measured at the alveolus)	N	24	19	24	22	20	20	11
	Mean	2.52	2.29	2.38	3.48	3.28	1.94	3.28
	Std Dev	0.15	0.23	0.62	0.26	0.23	0.14	0.21
Inter-orbital breadth	N	24	19	24	22	20	20	11
	Mean	8.05	7.68	7.25	9.98	9.18	7.14	10.21
	Std Dev	0.26	0.32	0.20	0.35	0.41	0.34	0.46
Inter-orbital height	N	24	19	24	22	20	20	11
	Mean	8.05	7.68	7.25	9.98	9.18	7.14	10.21
	Std Dev	0.26	0.32	0.20	0.35	0.41	0.34	0.46
Length of the mandibular diastema	N	24	17	24	22	20	20	11
	Mean	3.03	2.64	2.31	3.41	3.38	2.76	3.35
	Std Dev	0.21	0.24	0.13	0.22	0.17	0.16	
Length of the mandibular toothrow	N	24	17	24	22	20	20	11
	Mean	4.44	3.88	3.58	6.08	5.76	3.77	6.19
	Std Dev	0.63	0.19	0.14	0.21	0.14	0.12	0.31
Greatest length of the mandible	N	24	17	24	22	20	20	11
	Mean	13.83	12.48	11.67	16.79	16.75	11.90	17.31
	Std Dev	0.57	0.56	0.34	0.62	0.69	0.41	0.50
Mandibular depth	N	24	16	24	22	20	19	11
	Mean	3.68	3.51	3.38	6.05	5.01	3.82	5.87
	Std Dev	0.15	0.21	0.19	0.30	0.31	0.22	0.27
Length of the corynoid process	N	24	17	24	22	20	10	11
	Mean	1.48	1.22	1.10	1.53	2.26	0.72	0.99
	Std Dev	0.20	0.16	0.20	0.22	0.27	0.16	0.20

Medidas externals, craniales, y mandibulares de las especies estudiadas. Acronimos son los siguientes (vez Fig. 1 para muchas de estas medidas): ABLO = *Abrothrix longipilis*, AKOL = *Akodon olivaceus*, AKXA = *Akodon xanthorhinus*, AUMI = *Auliscomys* micropus, CHMA = *Chelemys macronyx*, ELMO = *Eligmodontia morgani*, EUCH = *Euneomys chinchilloides*, GEVA = *Geoxus valdivianus*, IRTA = *Irenomys tarsalis*, MUDO = *Mus domesticus*, OLLO = *Oligoryzomys longicaudatus*, PHXA = *Phyllotis xanthopygus*, REPH = *Reithrodon physodes*.

CHARACTER		SPECIES					
		GEVA	IRTA	MUDO	OLLO	PHXA	REPH
Total length (head + body + tail)	N	19	12	3	20	20	19
	Mean	141.58	269.33	157.67	210.45	241.60	21.21
	Std Dev	10.62	20.58	5.86	15.76	14.99	9.87
Tail length	N	19	12	3	20	20	19
	Mean	45.58	160.17	82.67	118.55	120.40	83.89
	Std Dev	6.81	14.64	1.53	8.83	7.74	7.06
Hind foot length	N	19	12	3	20	20	19
	Mean	20.26	30.00	18.00	28.00	29.18	32.13
	Std dev	0.96	1.35	0	0.97	0.96	2.72
Ear length	N	19	12	3	20	19	16
	Mean	11.61	21.25	14.00	15.95	25.45	23.28
	Std Dev	1.01	1.08	1.00	0.90	1.07	0.95
Weight (grams)	N	19	11	3	20	20	16
	Mean	24.89	38.35	12.60	23.46	57.57	65.01
	Std Dev	4.27	7.38	0.72	6.87	10.86	9.79
Greatest length of skull	N	18	12	2	21	20	21
	Mean	26.44	29.80	20.60	25.44	31.39	33.29
	Std Dev	0.92	1.29	0.08	1.24	0.99	1.17
Length of nasal bone	N	19	12	3	21	20	21
	Mean	9.81	11.46	6.50	8.69	13.25	13.90
	Std Dev	0.68	0.88	1.39	0.84	0.79	0.69
Length of the maxillary diastema	N	19	12	3	21	20	21
	Mean	6.35	6.79	5.05	5.81	7.77	7.78
	Std Dev	0.36	0.46	0.04	0.51	0.47	0.38
Length of the maxillary toothrow	N	19	12	3	21	20	21
	Mean	3.46	5.62	3.45	3.86	5.46	7.24
	Std Dev	0.16	0.21	0.02	0.12	0.14	0.38
Length of palate	N	19	12	3	21	20	21
	Mean	10.28	12.13	9.14	10.46	13.85	15.84
	Std Dev	0.35	0.56	0.16	0.67	0.64	0.71
Breadth across rostrum	N	19	12	3	21	20	21
	Mean	4.03	4.09	2.96	3.47	4.33	4.91
	Std Dev	0.24	0.26	0.14	0.28	0.19	0.21
Breadth across the braincase	N	18	11	3	21	20	18
	Mean	12.15	13.18	9.64	11.66	13.84	15.53
	Std Dev	0.28	0.26	0.10	0.17	0.30	0.42
Breadth across the zygomatic arches	N	18	12	3	21	20	21
	Mean	12.35	14.82	10.53	12.90	15.99	18.75
	Std Dev	0.48	0.55	0.09	0.65	0.58	0.78
Width of the incisors (measured at the alveolus)	N	19	12	3	21	20	21
	Mean	2.59	2.60	1.53	1.82	2.79	2.82
	Std Dev	0.17	0.23	0.07	0.18	0.17	0.15
Interorbital breadth	N	19	12	3	21	20	21
	Mean	6.82	8.85	5.98	7.72	9.51	11.53
	Std Dev	0.22	0.34	0.04	0.42	0.38	0.49
Interorbital height	N	19	12	3	21	20	21
	Mean	6.82	8.85	5.98	7.72	9.51	11.53
	Std Dev	0.22	0.34	0.04	0.42	0.38	0.49
Length of the mandibular diastema	N	19	12	3	21	20	21
	Mean	3.19	2.92	2.70	2.65	3.45	3.81
	Std Dev	0.17	0.28	0.01	0.25	0.25	0.20
Length of the mandibular toothrow	N	19	12	3	21	20	21
	Mean	3.34	5.63	3.08	3.99	5.73	6.83
	Std Dev	0.20	0.18	0.10	0.16	0.23	0.23
Greatest length of the mandible	N	19	12	3	21	20	21
	Mean	13.50	15.33	10.34	12.61	16.84	18.67
	Std Dev	0.49	0.76	0.06	0.69	0.73	0.81
Mandibular depth	N	15	12	3	5	19	16
	Mean	3.04	5.16	3.21	3.74	5.54	6.09
	Std Dev	0.17	0.31	0.07	0.08	0.30	0.29
Length of the corynoid process	N	19	12	3	16	20	21
	Mean	1.15	1.11	0.82	0.94	1.32	1.02
	Std Dev	0.24	0.25	0.09	0.20	0.11	0.25

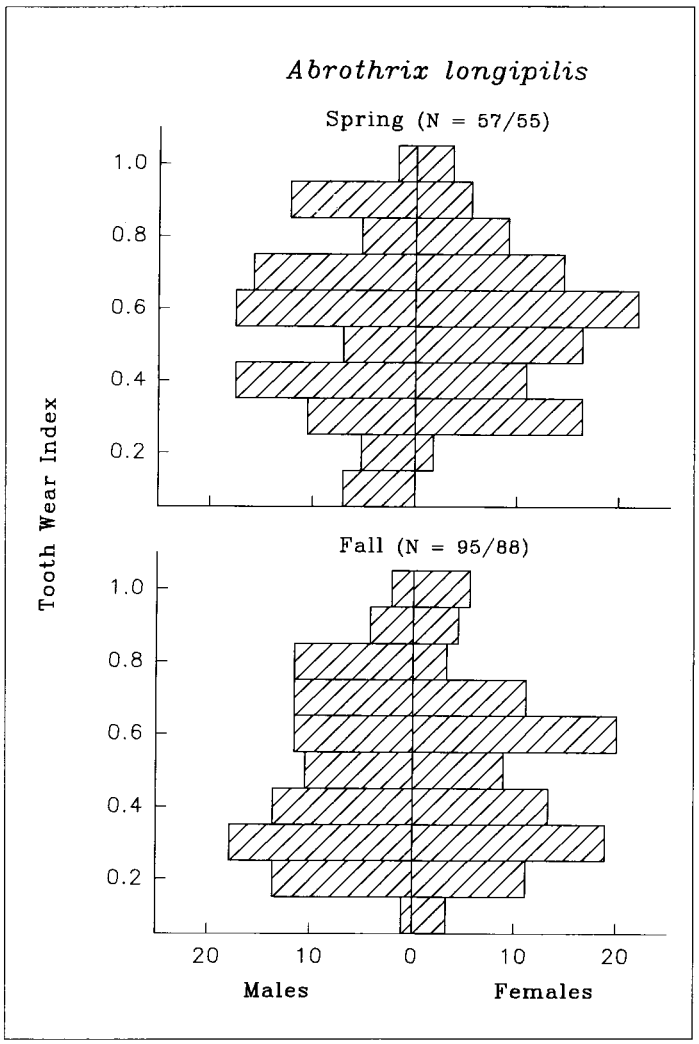

Fig. 2: Spring and fall population structure of *Abrothrix longipilis*, by sex. Tooth wear indices are presented such that larger values reflect older individuals. Bars represent the proportion of the population of a given sex at a certain season which fell into that category.

Estructura poblacional de *Abrothrix longipilis* en la primavera y otoño por sexo. Indices de desgaste de dientes son presentados, de manera que los valores mayores reflejan individuos de mayor edad. Las barras representan la proporción de la población de un sexo dado a lo largo de las estaciones de muestreo.

species at a site is less than expected at random (Kelt 1989, Kelt et al. ms). The number of species within the rainforest-steppe transition clearly increases, however (Pearson & Pearson 1982, Kelt ms), as a result of forest and pampa species «spilling» over into transitional habitats. This may partially reflect source-sink relationships (Pulliam 1988, mass effect of Shmida and Wilson 1985), in which transition habitats are unable to sustain reproductively independent populations but are maintained by constant immigration from source areas (forest or pampa). This is not entirely correct however, because most species which extend into the transition are indeed reproducing within the transition (unpublished data).

Whether forests are advancing or retreating here has been a point of debate (e.g. Kalela 1941, Auer 1958, 1966, Veblen & Lorenz 1988, Veblen & Markgraf 1988), but recent evidence supports the former (Veblen & Lorenz 1988, Veblen & Markgraf 1988). If this is correct, then we may expect the forest mammal species to follow, although such «movements» occur over time scales which may appear imperceptible to us.

SPECIES ACCOUNTS

Abrothrix longipilis (Waterhouse, 1837)
(Long-haired field mouse, Laucha de pelo largo)

General description. Abrothrix longipilis is a medium-sized mouse (25-50 g), with a tail roughly 75% of the head plus body length (Table 1). It is generally a dark grayish-brown with a reddish to rufous-brown dorsum. The ventrum is paler, occasionally approaching creamy white. The ears are moderate in length, and often support a number of reddish chiggers. Two subspecies occur in the XI Region. The forest subspecies (*A. l. apta*) is darker and heavier. *Akodon longipilis suffusa* occurs along the eastern fringe of the Cordillera and into the pampa, and is distinguished from apta by greater contrast between grayish sides and both the reddish-brown dorsum and creamy venter, by lighter

TABLE 2

Qualitative characters useful in identifying species covered in this report.

Caracteres cualitativos útiles en la identificación de las especies cubridas por este reporte.

	Incisors grooved?	Notched on anterior surface of M^1?	Orbital extension of the lacrimal?	Post. end of Incisive foramen	Inflated frontal region?	Palate vs M^3	Post-palatal pits apparent?	Width of mesopterygoid fossa vs parapterygoid fossa	Pterygoid bones diverge posteriorly?	Maxillary toothrows convergent anteriorly?	Size of M^3 vs M^2
Native species											
Abrothrix longipilis	n	n	n	post to P^1	y	ant	n	≈	=	n	<
Akodon olivaceus	n	n	n	" "	sl	sl ant	n	≈ or sl <	=	n	<
Akodon xanthorhinus	n	n	n	" "	sl	= or sl post	n	≈ or sl <	=	n	<
Auliscomys micropus	n	n	y	post to P^1 ant .5mm to M^1	n	=	y (linear, 4)	<	=	y	<
Chelemys macronyx	n	n	sl	sl. post to P^1	sl	ant or =	n	≈	=	div	<
Eligmodontia morgani	n	y	y	= or post. to P^1	n	sl post	n	<	= or sl div	div	<
Euneomys chinchilloides	y	n	y	post to P^1	n	≈	lg	<<	sl div	sl	<
Geoxus valdivianus	n	n	n	ant or = to P^1	y	post	n	=	=	y	<<
Irenomys tarsalis	y	n	n	post to P^1	n	=	n	=	=	sl	≈
Oligoryzomys longicaudatus	n	y	sl	" "	n (or sl)	post	y	<	=	n	<
Phyllotis xanthopygus	n	n	y	" "	n	post	y	<	y	n	<
Reithrodon physodes	y	n	st	" "	n	post	lg	<<	st div	sl	<
Introduced species (cheekteeth of these have 3 longitudinal rows of crowns)											
Mus domesticus	n	n	sl	" "	n	post	n	<	sl div	n	<<
Rattus norwegicus	n	n	sl	" "	n	post	n	>	y	n	<

NOTE: sl = slightly; div = divergent; post = posterior, ant = anterior; st = strongly.

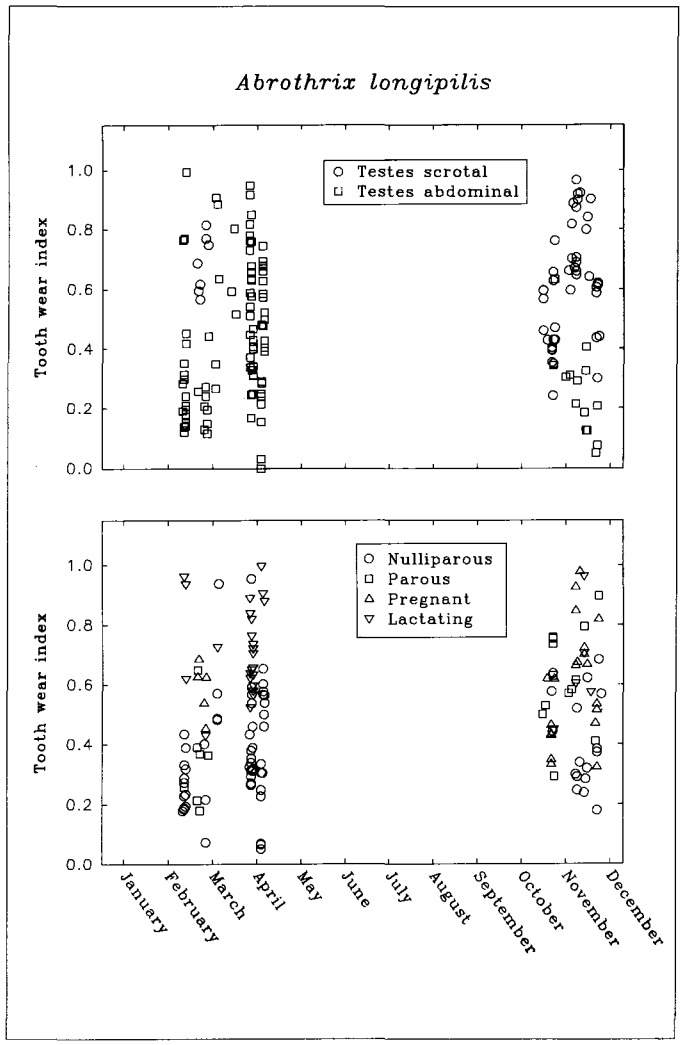

Fig. 3: Reproductive status for male (top) and female (bottom) specimens of *Abrothrix longipilis* presented as a function of their relative age (tooth wear). Sample sizes are given as males/females.

Estado reproductivo por macho (arriba) y hembra (abajo) en *Abrothrix longipilis* presentada como función de su edad relativa (desgaste de dientes). Tamaño de muestra dado como machos/hembras.

colored feet, and the more noticeably bicolored tail, with a sharper contrast between the dorsum and ventrum.

The crania of *Abrothix* are 24 to 30 mm in length, and the cheekteeth are unspecialized and small (toothrow < 5 mm). The interorbital and frontal regions are slightly inflated and rounded (Table 2), and the dorsal profile of the skull is flat, frequently with slightly upturned nasals. The zygomatic plate is narrow and the incisive foraminae extend posteriorly to roughly the anterior end of the molar toothrow. The incisors are narrow and ungrooved, and the maxillary toothrows run parallel to each other. *Abrothrix longipilis* is larger than the two *Akodon* in this region (until recently these were regarded as congeners), and the frontal and interorbital regions are more notably flared than in the two *Akodon*. The palate terminates anterior to the posterior end of M^3, and the mesopterygoid and parapterygoid fossae are of roughly equal width (Table 2). The toothrows and diastema are slightly larger than in *Akodon olivaceus* or *Akodon xanthorhinus* (Table 1), although this is difficult to distinguish in subadult or young animals.

Population structure & reproduction. Age structure remains relatively constant over the year in this species, although populations become somewhat more pyramidal (skewed towards younger individuals) in the fall (Fig. 2). *Abrothrix longipilis* breeds in spring, although some individuals are active in summer (Fig. 3). Males with descended testes have been collected in November (n = 31), December (n = 15), and March (n = 7); males with abdominal testes were collected in all months of study. In November and December only the youngest males have abdominal testes; by April, all males are nonreproductive (Fig. 3 top). Nulliparous females were collected in all months of study. Parous females were also captured in all months of study, but over half of these (13 of 23) were in the spring months, with the remainder in late summer and early fall. By November, most females are reproductively active, and in December they are pregnant or lactating. In late spring all females (save one specimen) were either nulliparous juveniles, or lactating (Fig. 3 bottom). Pregnant females were collected in November (n = 12), December (n = 9), and February (n = 6), and post-partum females were encountered in all months of study.

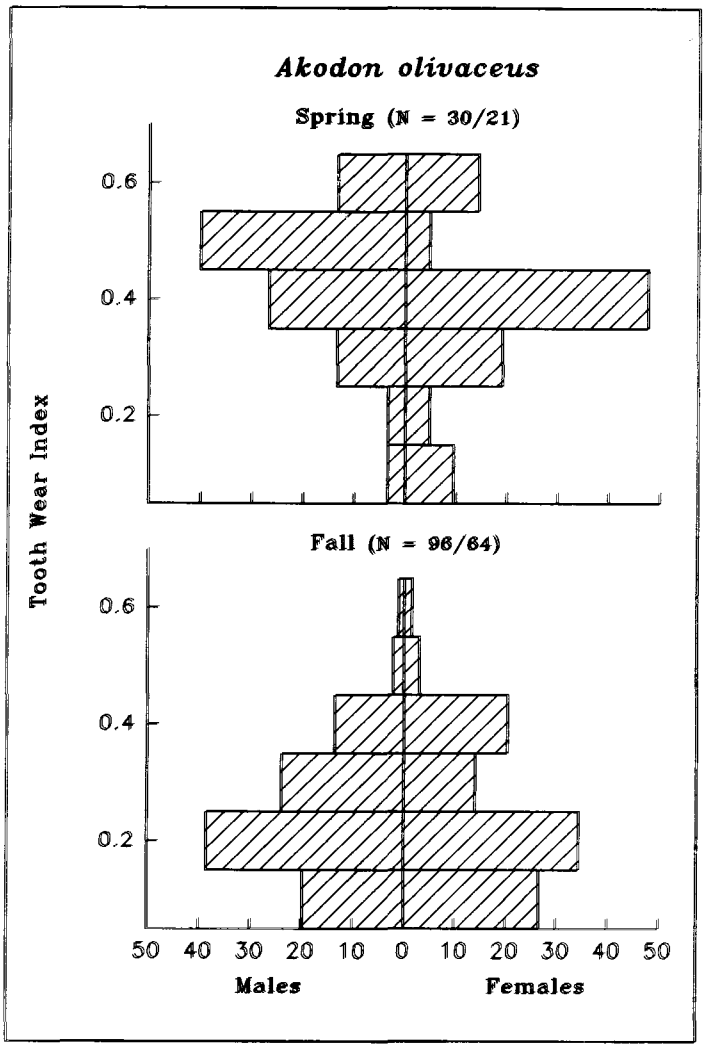

Fig. 4: Spring and fall population structure of *Akodon olivaceus*, by sex. Tooth wear indices and histogram bars are as in Fig. 3.

Estructura poblacional de *Akodon olivaceus*, por sexo. Indices de desgaste de dientes y, barras del histograma como en Fig. 2.

Habitat. This species is abundant in dense forests above ca. 180 m elevation (Meserve et al. 1991a), but occurs also in most other habitats in the XI Region (Kelt 1989, ms). It occurs occasionally in tussock grass and very rocky areas, although here it is uncommon.

Habits. Principally nocturnal, the diet of this species is incompletely known here. In northern Chile, *A. longipilis* is strongly insectivorous (Meserve 1981). In southern Chile it is strongly fungivorous (Meserve et al. 1988), but east of the Andes here it eats fungi, seeds, and invertebrates (Pearson 1983).

Similar species. Chelemys and *Geoxus* have shorter tails, smaller ears and eyes, and longer claws. *Akodon xanthorhinus* is buffy or rufescent in color, is smaller in all measurements, and has rusty or ochraceous fur on the feet, at the base of the tail, and about the nares. *Abrothrix longipilis* is most readily confused with *A. olivaceus brachiotis*, and young individuals especially may be difficult to distinguish. Both *A. olivaceus* and *A. xanthorhinus* have shorter ears and hindfeet, and are short-snouted akodons, with shorter measurements for most longitudinal cranial measurements (Table 2). Phallic morphology is distinctive; *Abrothrix longipilis* has an extremely elongated phallus with a long (> 50% of the shaft length) ventral cleft, and with a linear, ventrally curved, baculum lacking the distal portions entirely (Spotorno 1992). In both *Akodon* species present in the XI Region, the distal portion of the baculum exhibits lateral spurs and the glans lacks the ventral cleft of *longipilis*. *Auliscomys* is larger than *A. longipilis* and has a longer tail and larger ears, and broader, yellow incisors.

Additional references. See Pearson (1983, 1992), Meserve et al. (1988, 1991a, 1991b), Patterson et al. (1989, 1990), Kelt (ms), Kelt et al. (In press, ms). For relationships of this genus and species, see Reig (1987), Gallardo et al. (1988), Spotorno et al. (1990), and Smith & Patton (In press).

Akodon olivaceus (Waterhouse, 1837)
(Olivaceous field mouse, Laucha olivacea)

General description. This is a mid-sized *Akodon* (20-30 g) with a tail slightly shorter (80%) than the head plus body length (Table 1). The ears are short but conspicuous, the feet of moderate length, and the rostrum short. It is a rich dark brown color above and generally olive-grayish below. Two

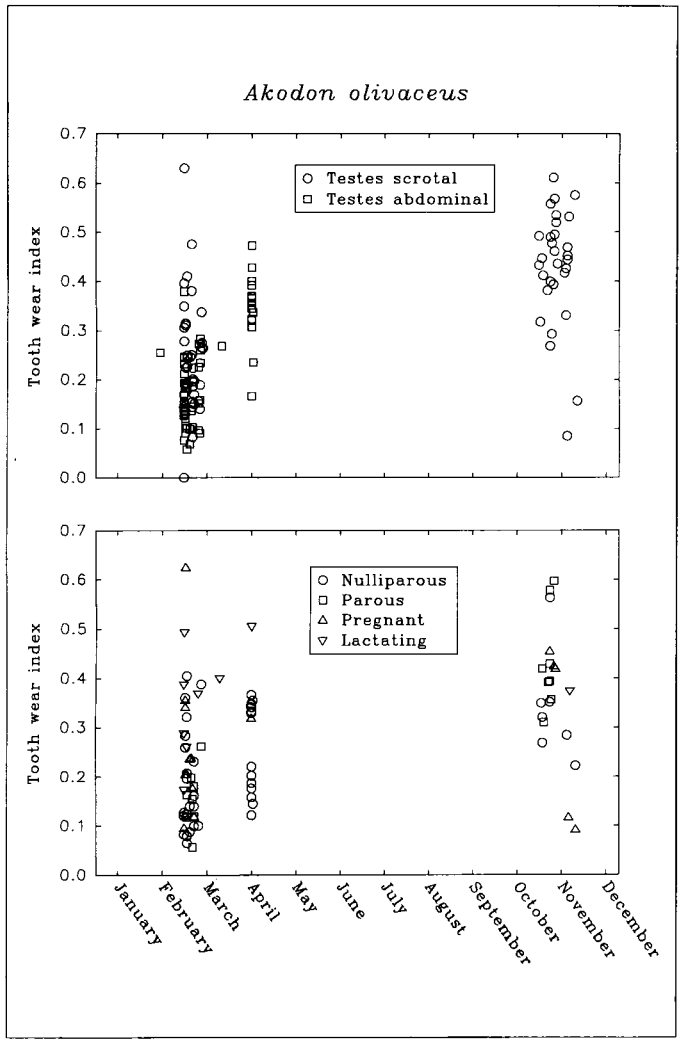

Fig. 5: Reproductive status for male (top) and female (bottom) specimens of *Akodon olivaceus*, presented as a function of their relative age (tooth wear). Sample sizes are given as males/females.

Estado reproductivo por macho (arriba) y hembra (abajo) en *Akodon olivaceus*, presentado como función de su edad relativa (desgaste de dientes). Tamaño de muestra dado como machos/hembras.

subspecies occur in the XI Region. *Akodon olivaceus brachiotis* is found in forested and many matorral areas and has an olive-brown venter. *Akodon olivaceus beatus* occurs in the transition areas between forest and pampa and has a much lighter ventral surface and occurs further to the east. See the account of *A. longipilis* for general cranial characters to identify this genus. *Akodon olivaceus* is smaller than *A. longipilis*, and tends to be larger than *A. xanthorhinus* (Tables 1,2). The skull of this species is very difficult to distinguish from that of *xanthorhinus* (Table 1). Pearson (1992 [in litt.]), working ca. 500 km north of here, found the premaxilla-frontal length in *olivaceus* to be > 16 mm, and the maxillary toothrow > 3.4 mm, with the product of both more than 55. In contrast, the premax-frontal length in *xanthorhinus* there was < 17 mm, the toothrow < 3.5 mm, and the product of the two is less than 55.

Population structure & reproduction. Population structure clearly reflects summer recruitment to the autumn population (Fig. 4). These mice reproduce from early spring through summer (Fig. 5). Males with descended testes have been collected in November (n = 31), December (n = 1), and March (n = 46). By April all males had abdominal testes (Fig. 5 top). Parous females have been collected in November (n = 8) and March (n = 8), pregnant females in November (n = 4), March (n = 12), and April (n = 1), and post-parous females in November (n = 2), March (n = 8), and April (n = 1). Even young females may become pregnant (see two individuals in November, Fig. 5 bottom).

Habitat. In southern Chile and Argentina, this species is primarily a forest dweller, but it may be found in most habitats within its range, including meadows, matorral, woods, and thick grassy areas (Kelt et al. In press, Pearson 1983).

Habits. Primarily nocturnal, but often diurnal as well. This species generally requires considerable vegetative cover (Meserve 1981, Patterson et al. 1990), and is strongly omnivorous throughout its range (Meserve 1981, Pearson 1983, Meserve et al. 1988).

Similar species. Abrothrix longipilis is larger and generally darker in color, with a reddish dorsum and lighter venter than *olivaceus*. It also has a thicker, coarser tail and is a long-snouted species (Glanz 1984). Its ears are stouter and often support

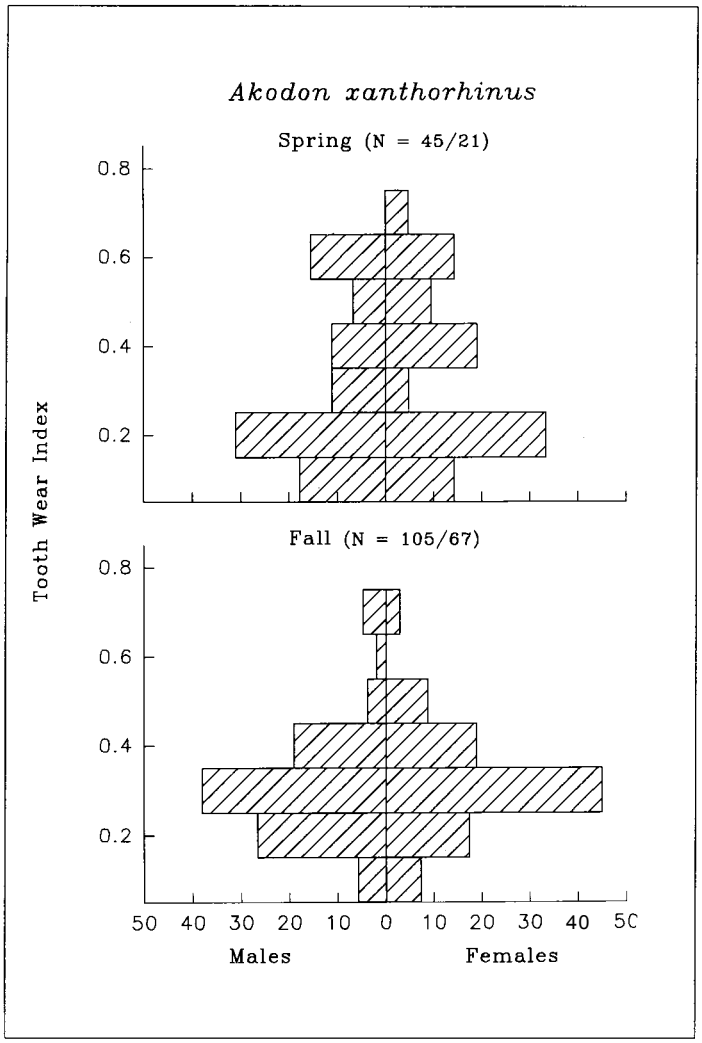

Fig. 6: Spring and fall population structure of *Akodon xanthorhinus*, by sex. Tooth wear indices and histogram bars are as in Fig. 3.

Estructura poblacional de *Akodon xanthorhinus*, por sexo. Indices de desgaste de dientes y, barras del histograma como en Fig. 2.

numerous red chiggers. The cranium is longer and slimmer than *olivaceus*. See the account for *A. longipilis* for comments on phallic morphology. *Akodon xanthorhinus* is generally allopatric to *olivaceus* (see the account for *xanthorhinus*), although they rarely co-occur (Kelt 1989, ms); habitat is therefore often a useful key distinguishing these species. *Akodon xanthorhinus* is smaller and buffier than *olivaceus*, and has yellow-orange hairs around the nose, the top of the feet, and the base of the tail. Cranial morphology of these differ only statistically — individuals frequently overlap. See General Characters for suggestions on distinguishing crania of these species. Young *Auliscomys* may be distinguished from *A. olivaceus* by the presence of juvenile pelage, a much stouter skull with broad, yellow incisors, and a greater tendency for the tail skin to slip off if the animal is grabbed by the tail.

Additional references. See Pearson (1983), Murúa et al. (1987), Gonzales et al. (1988), Meserve et al. (1988, 1991a, 1991b), Patterson et al. (1989, 1990), Kelt (ms), Kelt et al. (In press, ms). See Gallardo et al. (1988), Spotorno et al. (1990), and Smith & Patton (In press) for relationships of *A. olivaceus*.

Akodon xanthorhinus
(Waterhouse, 1837)
(Yellow-nosed field mouse, Laucha de nariz amarilla)

General description. Akodon xanthorhinus is a small *Akodon* (15-20 g) with a tail ca. 65% of head plus body length (Table 1). The pelage is grayish rufescent in color, with buffier, paler underparts. The fur about the nose, the top of the feet, and the base of the tail is ochraceus or rusty-orange. This is the typical *Akodon* of Patagonia. The tail is mostly rufescent with a dorsal dark stripe which often terminates in a black tip. See the account for *A. olivaceus* for suggestions on identification of crania of this species.

Population structure & reproduction. Fall recruitment skews population structure towards young individuals. By spring, age distributions are more even, although early spring recruitment is evident (Fig. 6). This species breeds primarily in spring, but limited activity continues through fall (Fig. 7). Males with descended testes have been collected in November (n = 6) and December (n = 28), and a very few in March (n = 1) and April (n = 3). By March, most males are sexually inactive (Fig. 7

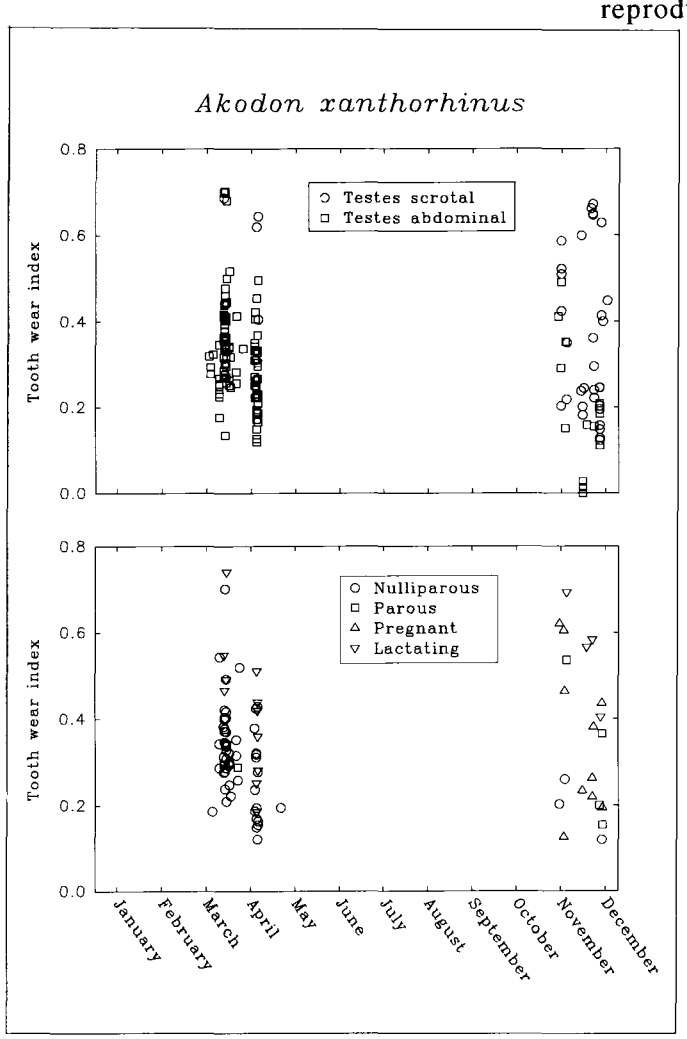

Fig. 7: Reproductive status for male (top) and female (bottom) specimens of *Akodon xanthorhinus*, presented as a function of their relative age (tooth wear). Sample sizes are given as males/females.

Estado reproductivo por macho (arriba) y hembra (abajo) en *Akodon xanthorhinus*, presentado como función de su edad relativa (desgaste de dientes). Tamaño de muestra dado como machos/hembras.

top). Nulliparous females have been found in all months of study, parous females in November (n = 2) and December (n = 5) (plus one each in March and April), and 12 pregnant females were collected in November (n = 5) and December (n = 7). Postpartum females were collected in November (n = 1), December (n = 3) , and in March (n = 3) and April (n = 10). In November and December most females are reproductively active; by March and April the majority are reproductively inactive, although pregnant and lactating individuals are found into early April (late Fall; Fig. 7 bottom).

Habitat. This is one of the most characteristic species of Patagonia, where it is found in matorral and bunchgrass habitats. Whether competitive interactions or other factors maintain this and *A. olivaceus* generally allopatric deserves further study (Kelt et al. ms).

Habits. Principally nocturnal, this species is omnivorous, although no detailed dietary analysis has been conducted.

Similar species. Akodon xanthorhinus is confused only with *A. olivaceus*, with which it is generally allopatric; some authors consider these species to be synonyms (Yañez et al. 1979). Confusion between the two may arise in ecotonal habitats where they may overlap (Kelt ms). Externally these species may best be distinguished by size, color, and relative tail length (Table 2). Cranial characters differ only statistically, and there is much overlap; *Akodon xanthorhinus* is generally smaller in most characters. See the account for *A. olivaceus* for suggestions on cranial identification of this species. Collections made along a transect from Coyhaique to the border east of Coyhaique Alto indicate considerable external variation in the short-snouted *Akodon*, and they have been collected syntopically near Coyhaique Alto. Morphological intergradation in characters suggests that hybridization may occur here, although genetic studies are needed to test this conjecture.

Additional references. See Marconi & Kravetz (1991), Kelt (ms), Kelt et al. (ms). For relationships of this species see Gallardo et al. (1988), Afpelbaum & Reig (1989), Spotorno et al. (1990), Spotorno (1992).

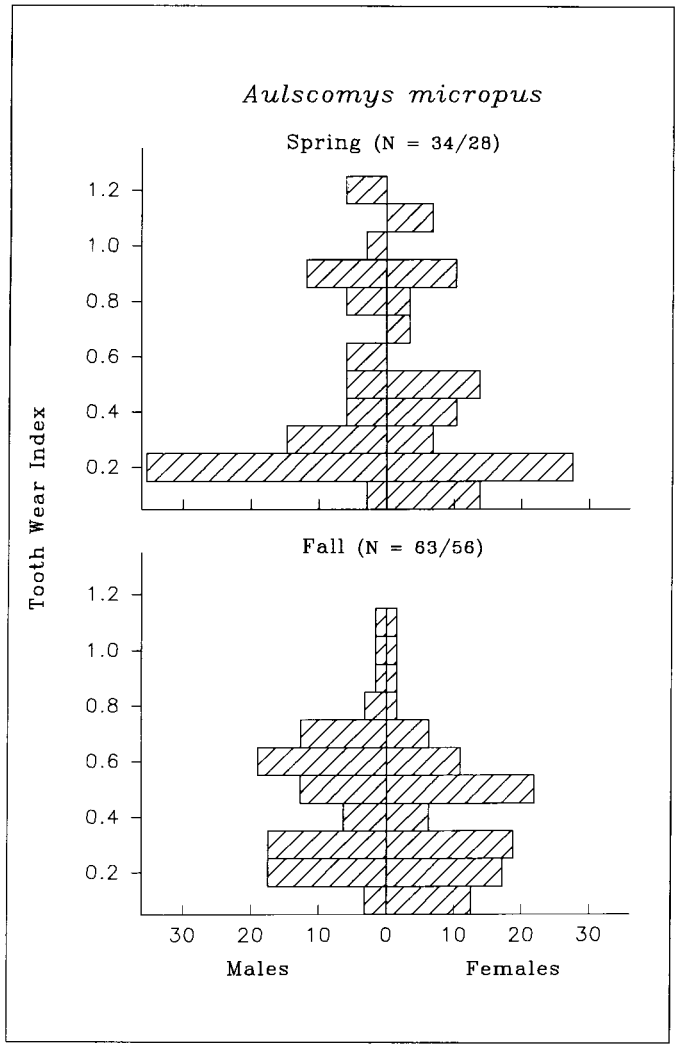

Fig. 8: Spring and fall population structure of *Auliscomys micropus*, by sex. Tooth wear indices and histogram bars are as in Fig. 3.

Estructura poblacional de *Auliscomys micropus*, por sexo. Indices de desgaste de dientes y, barras del histograma como en Fig. 2.

Auliscomys micropus (Waterhouse, 1837) (Austral greater mouse, Pericote austral)

General characters. This is a large and readily identified rodent, with medium-length ears, large eyes, and a tail about 75% head plus body length (Table 1). The pelage is thick and soft, and a chocolate brown or brown mixed with ochre overall with the ventrum only slightly lighter than the dorsum. The upper incisors are broad and yellow, often with wavy or notched tips. There is a linear series of four tiny foraminae along the posterior palate. M^3 lies parallel with the posterior end of the palate. The mesopterygoid fossa is narrower than the parapterygoid fossae, and the M^3 is smaller than M^2. The posterior end of the palate lies parallel to that of the toothrow, and the posterior end of the incisive foramen is just posterior to the anterior end of the toothrow (parallel with the middle of P^1; Table 2).

Population structure & reproduction. Early Spring recruitment strongly skews the age structure to very young animals, whereas by Fall these animals mature, yielding a relatively even structured population with a few older individuals (Fig. 8). This species breeds in spring; limited activity continues into early Fall (Fig. 9). Twenty one of 25 males with descended testes were captured in November and December. In Spring only the youngest animals are not reproductively active; most were females pregnant or parous. By mid-February and March, few animals remain reproductively active, and in April most females are either nulliparous or are lactating. Nine of 13 parous females, and 14 of 18 pregnant females, were captured in November and December, while all post-partum females (n = 13) were collected in April.

Habitat. This species prefers meadowy areas with lush grasses and loose soils, although they may also occur in open-canopied or second growth forests of coigue (*Nothofagus dombeyi*) or ñirre (*N. antarctica*).

Habits. Mainly nocturnal, but may exhibit considerable diurnal activities at times. This species is highly herbivorous, but eats seeds, fruits, flowers, and fungi as well (Pearson 1983, Meserve et al. 1988).

Similar species. Young *Auliscomys* may be confused with *A. olivaceus*, but are distinguished on the basis of relative tail length, incisor width, and general cranial robustness and molar structure. This species is darker than any other phyllotines in southern Chile.

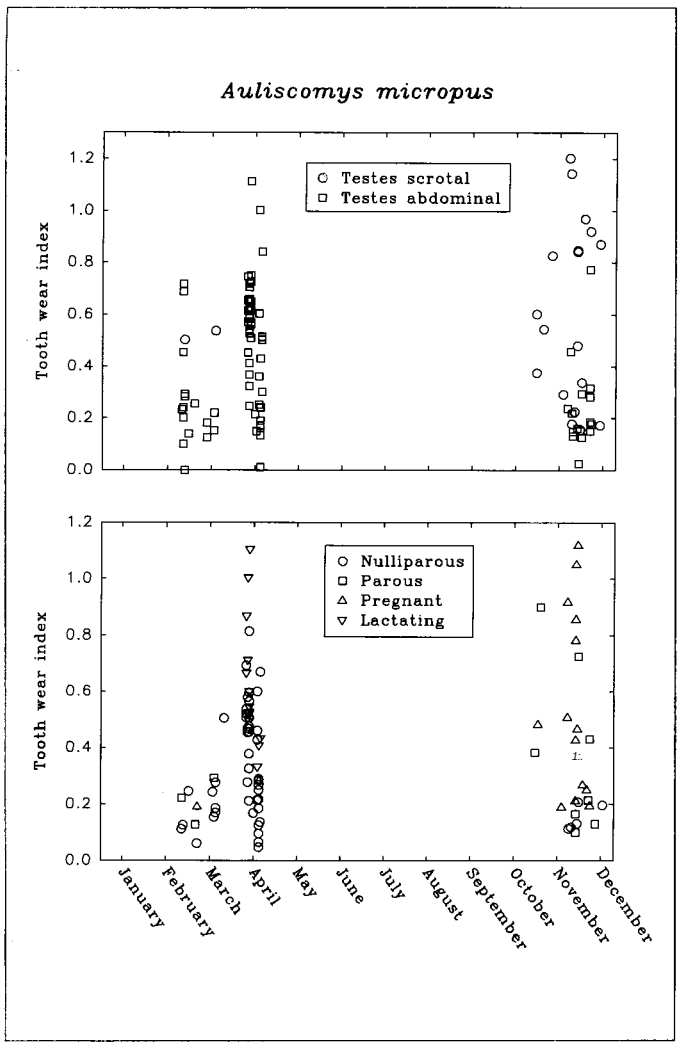

Fig. 9: Reproductive status for male (top) and female (bottom) specimens of *Auliscomys micropus*, presented as a function of their relative age (tooth wear). Sample sizes are given as males/females.

Estado reproductivo por macho (arriba) y hembra (abajo) en *Auliscomys micropus*, presentado como función de su edad relativa (desgaste de dientes). Tamaño de muestra dado como machos/hembras.

Additional references. See Pearson (1983), Meserve et al. (1988, 1991a, 1991b), Patterson et al. (1989, 1990), Kelt (ms), Kelt et al. (In press, ms).

Chelemys macronyx (Thomas, 1894)
(Mountain mole-rat, Rata topo cordillerana)

General description. This is a robust species (60-65 g); the ears and tail are relatively short (Table 1), the nails on the forefeet long, and the skin is loose, adapting *Chelemys* well to a semi-fossorial existence. The fur is short but thick, and a dark olive brown dorsally, fading to a buffy brown on the sides and light buffy brown or nearly white venter. The M^3 lies posterior to or equal with the posterior end of the palate, and the incisive foramina terminates slightly posterior to the anterior end of P^1. Cheekteeth converge posteriorly, but not strongly. The mesopterygoid and parapterygoid fossae are roughly of equally width. The M^3 is smaller than M^2. There are no post-palatal pits (Table 2).

Population structure & reproduction. Limited data suggests that spring recruits do not venture out of their burrows until late spring, yielding a seemingly adult-skewed population. By Fall, these young individuals are more active and dominate the trappable population (Fig. 10). Males become reproductively active by November, and a few are active until late February and early March (Fig. 11 top). Most females become parous by November; many are pregnant or lactating by this time (Fig. 11 bottom; see also Pearson 1983). In February some females are pregnant or parous, but by March and early April most are nulliparous. Pregnant females were collected in November (n = 6) and March (n = 1), and post-partum females were caught in November (n = 4) and December (n = 4).

Habitat. In the XI Region *Chelemys* is found in areas of lush grasses and loose soils, often with a scattered canopy of lenga (*Nothofagus pumilio*) or ñirre (*N. antarctica*). It may also be found in dryer Valdivian forest and rarely in matorral habitat.

Habits. This animal is primarily subterranean, although it may make occasional forays on the surface. Nocturnal and diurnal, its diet is incompletely known. Eats various plant parts as well as fungi and invertebrates (Pearson 1983).

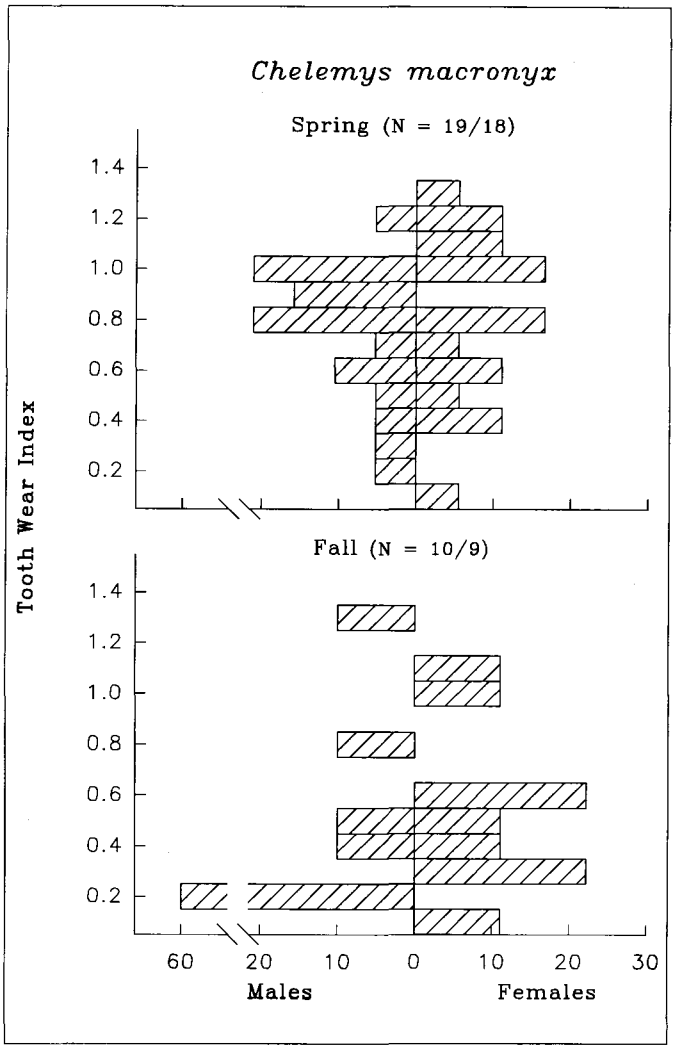

Fig. 10: Spring and fall population structure of *Chelemys macronyx*, by sex. Tooth wear indices and histogram bars are as in Fig. 3.

Estructura poblacional de *Chelemys macronyx*, por sexo. Indices de desgaste de dientes y, barras del histograma como en Fig. 2.

Similar species. *Geoxus* is smaller and more delicate. Young *Chelemys* can be distinguished from *Geoxus* by the juvenile pelage and more robust skull, and the broader incisors. *Auliscomys* occurs syntopically with *Chelemys* but has longer, finer fur, shorter claws, longer ears, larger eyes, and a longer tail. Young of this species are occasionally confused with young of *Abrothrix longipilis*. *Chelemys* may be distinguished from *A. longipilis* by the shorter tail, the long claws on the forefeet, the more uniform pelage coloration, longer and wider incisors, and general cranial robustness.

Additional references. See Pearson (1983, 1984), Kelt (ms), Kelt et al. (ms.

Ctenomys coyhaiquensis (Kelt & Gallardo, 1994)
(Tuco-tuco de Coyhaique)

General description. This is a relatively small species of *Ctenomys*. Coloration is typical of many tuco-tucos, with long dusky-brown fur over the body and a dark mid-dorsal streak. The ears and tail are very short, the eyes reduced, and the nails long. The incisors are large, procumbent, broad, and yellow, and the molar teeth are uniquely L-shaped. The skull is broad and very robust, and not readily confused with any other species of the region.

Population structure & reproduction. These animals breed in early spring. Two males with descended testes, and two pregnant females, were collected in November. Nulliparous females were collected in November, December, March, and April, and three parous females were collected in November.

Habitat. To date this species is known only near Coyhaique Alto and Chile Chico, in dry, loose soiled habitat with tussock grass and matorral (Kelt & Gallardo 1994).

Habits. This species is wholly subterranean and active both diurnally and nocturnally. Its diet has not been studied in detail, but is primarily vegetation.

Similar species. *Ctenomys* are distinguished from all other rodents here on the basis of size and robustness, and their wholly subterranean habit. Additionally, the large procumbent incisors and L-shaped molar teeth are distinctive. *Ctenomys magellanicus osgoodi* is larger than *coyhaiquensis*, may occur in the XI Region, but is endangered in Chile (Glade 1988) and likely extinct in this region.

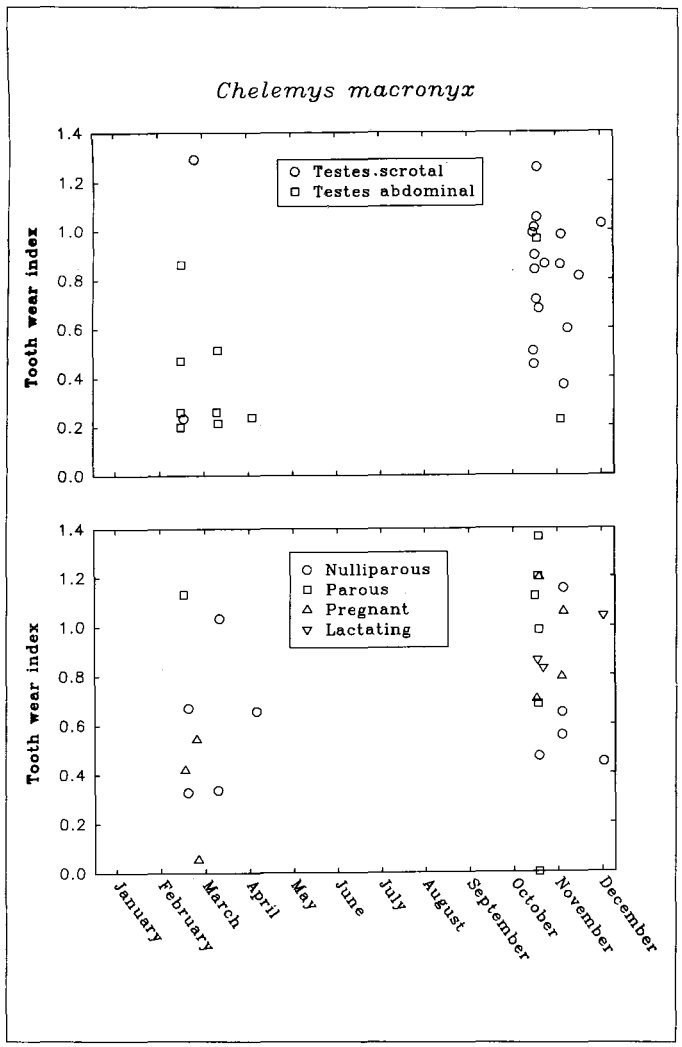

Fig. 11: Reproductive status for male (top) and female (bottom) specimens of *Chelemys macronyx* presented as a function of their relative age (tooth wear). Sample sizes are given as males/females.

Estado reproductivo por macho (arriba) y hembra (abajo) en *Chelemys macronyx*, presentado como función de su edad relativa (desgaste de dientes). Tamaño de muestra dado como machos/hembras.

Additional references. See Kelt & Gallardo (1994).

Eligmodontia morgani (Allen, 1901) (Patagonian silky-footed mouse, Ratita patagonica de piel sedosa)

General description. Eligmodontia is a small mouse with a tail equal to or slightly shorter than the head-body length (Table 1). It has light colored, silky fur; the chin and throat are pure white to the roots of the hairs, and the ventrum is covered with pure white hairs which have gray roots. The soles of the hindfeet are at least partly furred. The mesopterygoid fossa is narrower than the parapterygoid fossa, and the M^3 is smaller than M^2. The anterior end of M^1 bears a notch, there are post-palatal pits, and the palate terminates posterior to the toothrow. The posterior end of the incisive foramen is equal to or slightly posterior to P^1 (Table 2).

Population structure & reproduction. Data on population structure are limited (Fig. 12). The youngest animals captured were evidently subadults based on tooth wear (Fig. 13). The breeding season appears prolonged in this species (Fig. 13). Males with descended testes (Fig. 13 top) were captured in December (n = 2) and in April (n = 4). One parous female was caught in March, and one pregnant female in December (Fig. 13 bottom). Three post-partum females were captured in December and April.

Habitat. Eligmodontia may be found in tussock grass habitat, and less frequently in open shrubland with bunchgrasses.

Habits. This mouse is nocturnal and eats seeds and insects.

Similar species. Phyllotis is larger and heavier, and has larger ears and naked soles. *Akodon xanthorhinus* has a shorter, less haired tail, and has notable rufescent or orange coloration (see account of that species).

Additional references. See Pearson et al. (1987), Kelt (ms), Kelt et al. (ms). For recent taxonomic status, see Ortells et al. (1989) and Kelt et al. (1991).

Euneomys chinchilloides (Waterhouse, 1839) (Chinchilloid silky mouse, Ratón sedosa chinchilloide)

General description. Euneomys chinchilloides is a large bodied phyllotine (55 g)

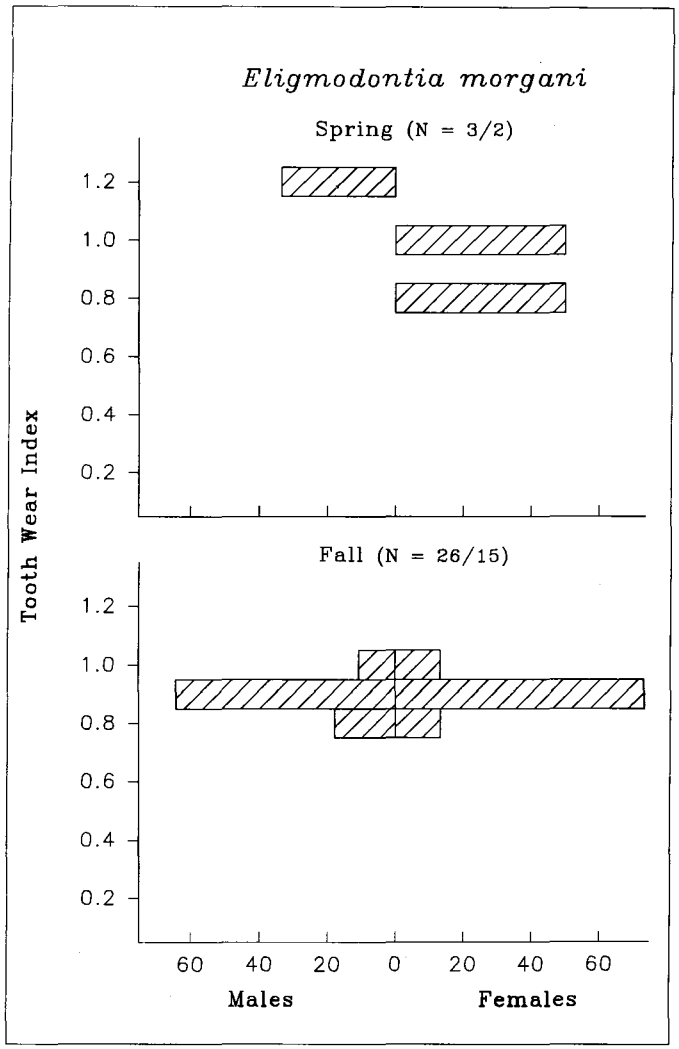

Fig. 12: Spring and fall population structure of *Eligmodontia morgani* by sex. Tooth wear indices and histogram bars are as in Fig. 3.

Estructura poblacional de *Eligmodontia morgani*, por sexo. Indices de desgaste de dientes y, barras del histograma como en Fig. 2.

with a large head, short ears and tail, and relatively short feet. The tail is roughly half the length of the head plus body (Table 1). Its fur is soft and richly colored tawny and ochraceous buffy with black lines. The soles of the hindfeet are naked. The upper incisors bear lateral grooves. The skull is robust, and possesses a distinctive post-palatal depression in the mesopterygoid fossa. The nostrils in this species (as in *Reithrodon*) are notably flared laterally. The root of I_1 forms a substantial projection along the lateral surface of the mandible. The lacrimal bones extend over the anterior portion of the orbit (Table 2).

Reproduction. *Euneomys* were collected only in December. Two males had descended testes. One female was nulliparous, whereas three females were pregnant.

Habitat. Barren, rocky, often windswept slopes. This species is encountered at seemingly bleak sites with little vegetation.

Habits. *Euneomys chinchilloides* here is strictly nocturnal, and eats seeds and insects.

Similar species. *Euneomys* is most readily confused with *Reithrodon*, both of whom have grooved incisors. These may readily be distinguished by the following characteristics. *Reithrodon* has longer hindfeet (32 mm vs 26 mm), with reduced 1st and 5th toes and furry soles, and a longer tail (80-85 mm vs 65-70 mm). The palate of *Reithrodon* extends posterior to the molar toothrow, whereas in *Euneomys* it terminates roughly parallel or slightly posterior to M^3. Additionally, the pterygoid bones diverge strongly from parallel in *Reithrodon*, but less strongly in *Euneomys*. The suture between the frontal and parietal bones is different in these two taxa; in *Reithrodon* the suture runs perpendicular to the medial suture, whereas in *Euneomys* the frontal-parietal suture runs latero-posterior from the medial suture. Finally, *Reithrodon* is generally allotopic to *Euneomys*, occurring in moist seeps and areas with abundant short grasses. *Irenomys* has grooved incisors, but these are thinner than in *Euneomys*. Additionally it has a much longer tail, shorter feet, and the molars are distinctively prismatic and deeply dissected. Other large-bodied rodents in this region lack grooved incisors and are darker in color.

Additional references. See Pearson (1987), Pearson & Christie (1991), Kelt (ms), and Kelt et al. (ms). For recent taxonomic status, see Reise & Gallardo (1990).

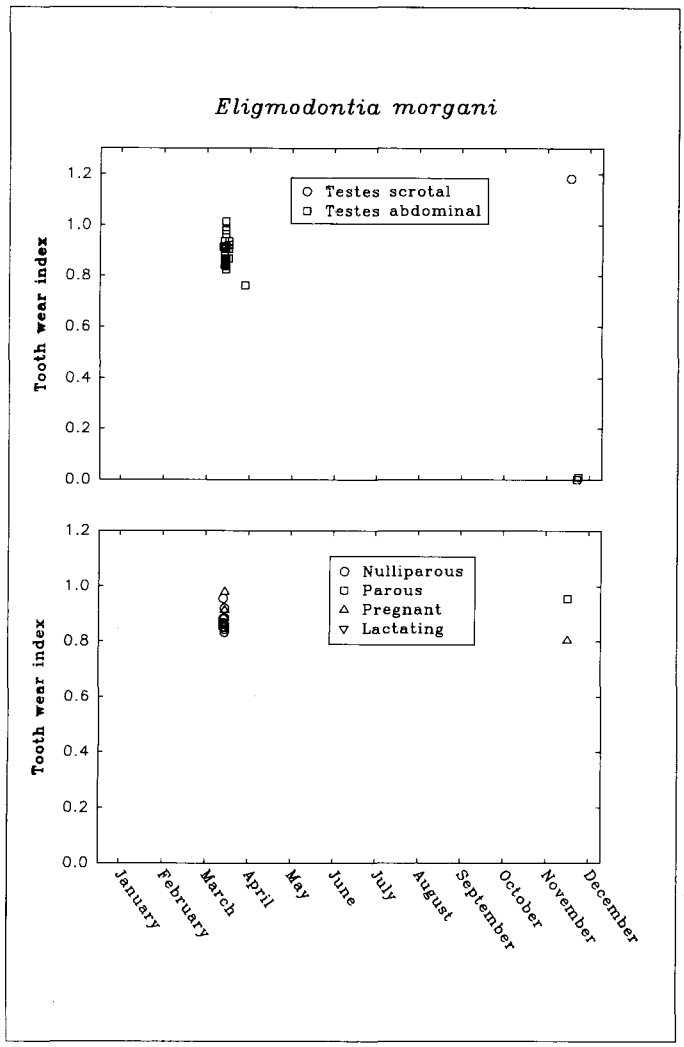

Fig. 13: Reproductive status for male (top) and female (bottom) specimens of *Eligmodontia morgani*, presented as a function of their relative age (tooth wear). Sample sizes are given as males/females.

Estado reproductivo por macho (arriba) y hembra (abajo) en *Eligmodontia morgani*, presentado como función de su edad relativa (desgaste de dientes). Tamaño de muestra dado como machos/hembras.

Geoxus valdivianus (Philippi, 1858) (Valdivian mole-mouse, Ratón topo valdiviano)

General description. *Geoxus* is a small mouse (25 g, 100 mm head plus body length; Table 1). The eyes and ears are very small and the claws on the forefeet are long. The pelage is short and thick. Two subspecies occur in the XI Region. In the forest subspecies (*G. v. valdivianus*) the dorsal and ventral pelage is not strongly contrasted, and varies from cinnamon brown to nearly black in color. *Geoxus valdivianus bicolor* occurs east of the forests, and is lighter in color, generally with an olive-gray to grayish-white venter. The skull is slender and delicate, the rostrum long, and the molars small. The maxillae are inflated and there is a short shelf behind M^2. The anterior end of the mesopterygoid fossa is U-shaped and lies posterior to the molar toothrow. The premaxillary extends to or slightly anterior of the nasals. There is a large foramen in the parapterygoid fossa. The last upper molar is much smaller than the second. The mesopterygoid and parapterygoid fossae have roughly the same diameter. There are no post-palatal pits. The posterior end of the palate lies roughly equal to the posterior end of M^3, and the incisive foramina terminates anterior to the anterior end of the toothrow (Table 2).

Reproduction. Specimens have been collected in the XI Region only in March and November. Males with descended testes have been captured in both months. A single parous female was captured in March, and nulliparous females have been captured in March and November.

Habitat. The nominal subspecies is a forest dweller, although it occassionally spills out into woods habitat or lush meadows bordering forests. *Geoxus valdivianus bicolor* occurs further east, where it is uncommon and has been captured in thick matorral near Coyhaique Alto.

Habits. *Geoxus valdivianus valdivianus* is primarily nocturnal, and eats small invertebrates, vegetation, and fungi (Pearson 1983, Meserve et al. 1988). It is partly subterranean, but often is found in dense litter or herbaceous vegetation, or in runways alongside logs. Very little is known about the habits of *G. v. bicolor*.

Similar species. *Akodon* all have longer tails, shorter claws, and larger eyes and ears, even when young. *Chelemys* is larger

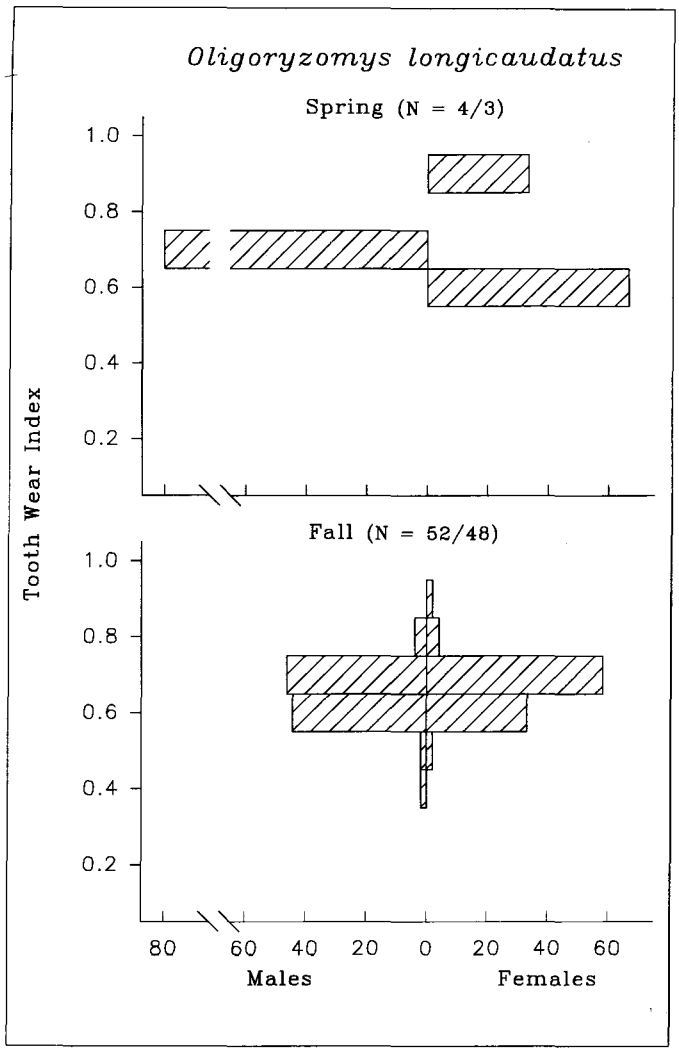

Fig. 14: Spring and fall population structure of *Oligoryzomys longicaudatus*, by sex. Tooth wear indices and histogram bars are as in Fig. 3.

Estructura poblacional de *Oligoryzomys longicaudatus*, por sexo. Indices de desgaste de dientes y, barras del histograma como en Fig. 2.

and more robust. *Geoxus* may be distinguished from young *Chelemys* by the adult pelage and less robust body. Additionally, the dentition of *Chelemys* is much more robust, with the molar teeth of even young individuals larger than in adult *Geoxus*.

Additional references. See Pearson (1983, 1984), Meserve et al. (1988, 1991a, 1991b), Patterson et al. (1989, 1990), Kelt (ms), and Kelt et al. (In press, ms).

Irenomys tarsalis (Philippi, 1900) (Chilean arboreal-rat, Rata arbórea)

General description. Irenomys tarsalis is readily recognized as a large mouse with a tail much longer (about 150%) than the head plus body (Table 1). The eyes are very large and the pelage is thick and soft. The dorsum is grayish cinnamon rufous, and the ventrum is buffy cinnamon with plumbeous under color. The molar teeth are distinctive, being deeply dissected and prismatic, with deep reentrant angles opposite each other (not alternate) and perpendicular to the toothrow, and nearly meeting. The nasals extend beyond the premaxillary bones by ca. 1-1.5 mm. In mature specimens there is often a marked ridge on the lateral side of the mandible, delineating the masseteric fossa. The mesopterygoid and parapterygoid fossae are equal in diameter. There is generally a single post-palatal pit. The incisive foramina terminates posterior to the anterior end of the molar toothrow, and the posterior end of the palate lies even with the posterior end of the toothrow (Table 2).

Reproduction. I have captured this species in the XI Region only in March. Two males had scrotal testes, two females were nulliparous, and a third female had six embryos.

Habitat. This is strictly a forest species, and may be largely arboreal. They are frequently captured in traps placed along logs or at the bases of trees, or in subterranean caverns formed by superficial roots and boulders covered with lichens and mosses.

Habits. Nocturnal, this species climbs very readily. It is herbaceous, eating large amounts of vegetation, seeds, and fruits (Pearson 1983, Meserve et al. 1988).

Similar species. Oligoryzomys longicaudatus lacks grooves on the incisors and is generally smaller and thinner than *Irenomys*, and it is more readily agitated. *Phyllotis* occurs in dryer, non-forested habitats, and lacks grooves on the incisors.

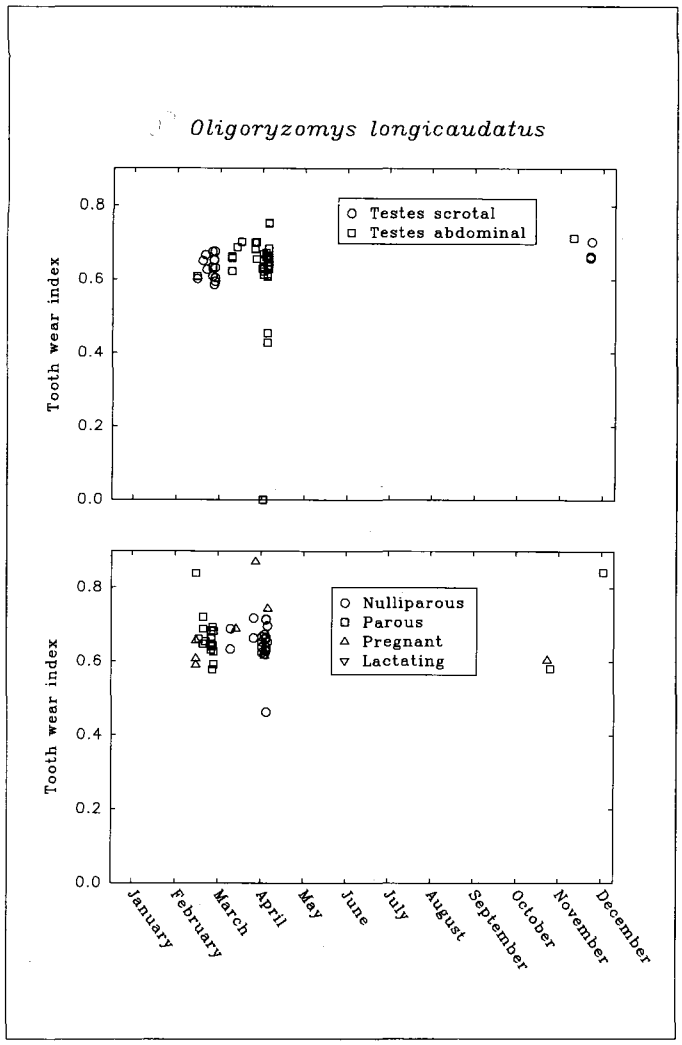

Fig. 15: Reproductive status for male (top) and female (bottom) specimens of *Oligoryzomys longicaudatus*, presented as a function of their relative age (tooth wear). Sample sizes are given as males/females.

Estado reproductivo por macho (arriba) y hembra (abajo) en *Oligoryzomys longicaudatus*, presentado como función de su edad relativa (desgaste de dientes). Tamaño de muestra dado como machos/hembras.

Its head-body length is greater than *Irenomys*, it is heavier, has longer ears and a shorter tail.

Additional references. See Pearson (1983), Meserve et al. (1988, 1991a, 1991b), Patterson et al. (1989, 1990), Kelt (1993, ms), and Kelt et al. (In press, ms).

Oligoryzomys longicaudatus
(Bennett, 1832)
(Long-tailed rice rat, Ratón de los espinos)

General characters. This is a small mouse with long hindfeet and a nearly hairless tail much longer than the body (130 percent of head plus body; Table 1). The pelage is short and dark buff. A noticeable character is the nervous excitability of this species; it is readily agitated when handled, and generally appears tense or high-strung. The skull is rounded and bears a large, rounded infraorbital canal and a large post-palatal canal. The mesopterygoid fossa is narrower than the parapterygoid fossae, and M^3 is smaller than M^2. Post-palatal pits are present, the palate terminates posterior to the toothrow, and the incisive foramen terminates posterior to the toothrow (Table 2).

Population structure & reproduction. Limited data here suggests that winter survival is low (Fig. 14). Fall populations are large, with few very young or very old individuals. By spring, populations appear much reduced. This ability for populations to increase rapidly under favorable environmental conditions has been demonstrated in populations in Valdivian forests (Murúa et al. 1986). This species breeds from early spring through late summer (Fig. 15). Most individuals captured in spring were sexually active. Seventeen of 25 males captured in March had descended testes, and 20 of 25 females were pregnant. Post-partum females were captured in November, March and April. As late as March, most individuals were active. In April, however, the majority of individuals were sexually inactive.

Habitat. Oligoryzomys is found in any habitat with available water nearby. Populations are eruptive, and respond rapidly to local food availability; conversely, they may be very rare locally when conditions are poor.

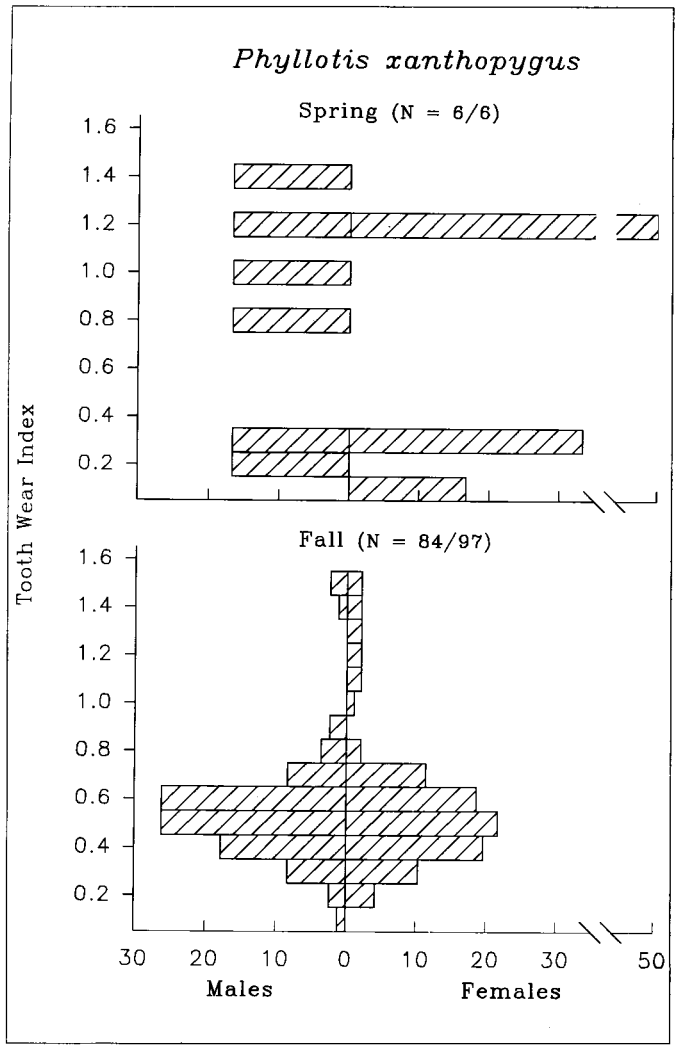

Fig. 16: Spring and fall population structure of *Phyllotis xanthopygus*, by sex. Tooth wear indices and histogram bars are as in Fig. 3.

Estructura poblacional de *Phyllotis xanthopygus*, por sexo. Indices de desgaste de dientes y, barras del histograma como en Fig. 2.

Habits. This species is nocturnal and granivorous, although it also eats berries. fruits, and some insects (Meserve 1981, Pearson 1983, Meserve et al. 1988).

Similar species. Irenomys is generally much larger than *Oligoryzomys*, and is readily distinguished by the grooved incisors, deeply dissected molar teeth, the larger ears and eyes, and the thicker tail. *Phyllotis* has much larger ears and is a much heavier animal with a shorter tail.

Additional references. See Pearson (1983), Murúa et al. (1986, 1987), Meserve et al. (1988, 1991a, 1991b), Patterson et al. (1989, 1990), Kelt (ms), and Kelt et al. (In press, ms). See Carleton & Musser (1989) and Gallardo and Palma (1990) for relationships with other oryzomyine rodents.

Phyllotis xanthopygus (Waterhouse, 1837)
(Austral leaf-eared mouse, Lauchón orejudo austral)

General characters. The leaf-eared mouse is a large phyllotine, with large ears and a well-haired tail equal to its head-body length (Table 1). It is a dark buff color mixed with brown, and the ventrum is heavily washed with ochraceous buff. The mesopterygoid fossa is narrower than the parapterygoid fossae. M^3 is smaller than M^2. The palate terminates posterior to the anterior end of the toothrow, and the posterior end of the incisive foramen lies posterior to the anterior end of the toothrow (Table 2).

Population structure & reproduction. Data on spring population structure are limited, but appears adult dominated (Fig. 16). By March, most captures are of young, sexually inactive individuals. These are spring breeders (Fig. 17). Five of seven males with descended testes were captured in November (n = 3) and December (n = 2). By February and March most males are sexually inactive (Fig. 17 top). Six parous females were collected in November (n = 2), February (n = 1), and March (n = 3), and ten pregnant females were captured in November (n = 2), December (n = 6), and February (n = 2). Post-partum females were collected in November and February (n = 1 each month), March (n = 7), and April (n = 8). By March and April, most females are young and nulliparous, and the larger individuals are lactating (Fig. 17 bottom).

Habitat. Phyllotis occurs in rocky slopes and cliffs in drier areas.

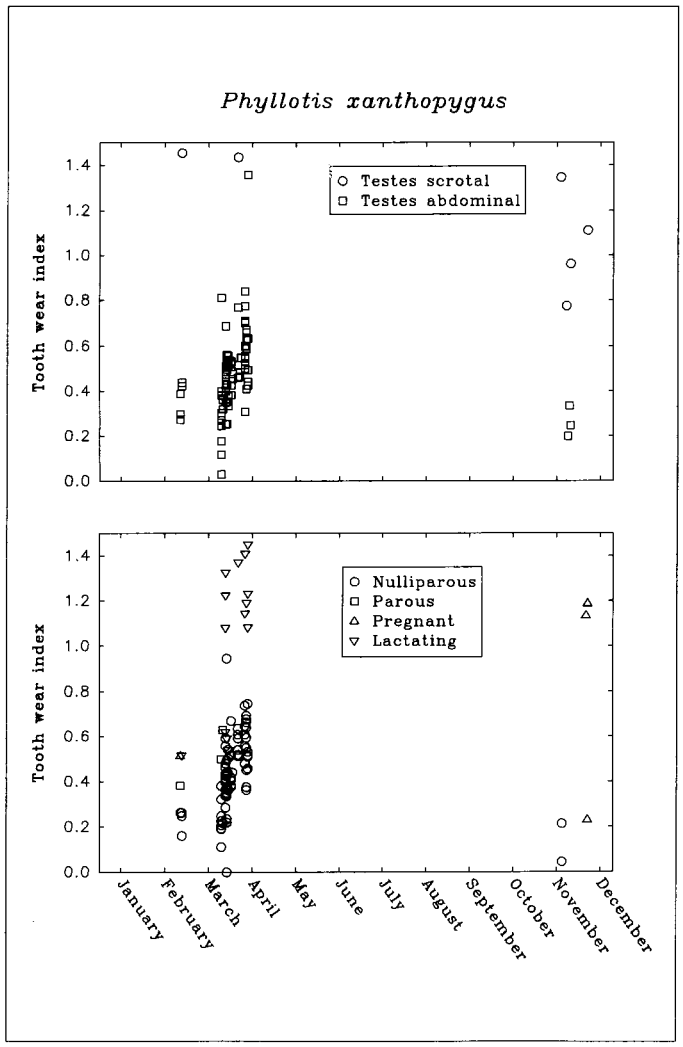

Fig. 17: Reproductive status for male (top) and female (bottom) specimens of *Phyllotis xanthopygus*, presented as a function of their relative age (tooth wear). Sample sizes are given as males/females.

Estado reproductivo por macho (arriba) y hembra (abajo) en *Phyllotis xanthopygus*, presentado como función de su edad relativa (desgaste de dientes). Tamaño de muestra dado como machos/hembras.

Habits. This species is nocturnal. Its diet has not been quantified, but they are largely herbivorous, also eating seeds and insects.

Similar species. Reithrodon, *Euneomys*, and *Irenomys* all have grooved upper incisors; the former two species have short tails, while *Irenomys* has a much longer tail than *Phyllotis*. *Auliscomys* has a relatively longer tail (75% head plus body length) and uniform chocolate brown coloration. *Eligmodontia* is smaller and has a relatively longer tail.

Additional references. See Kelt (ms), Kelt et al. (ms). For recent taxonomy, see Walker et al. (1984).

Reithrodon physodes (Olfers, 1818) (Rabbit rat, Rata conejo)

General characters. This mouse has the general appearance of a small rabbit. It is a large rodent (65 g) with a short tail (65% of head plus body length) and medium-length, rounded ears (Table 1). The ventrum is strongly washed with ochraceous hairs with gray roots. The hindfeet are very long, with reduced first and fifth digits, and well furred soles. The fur is silky and loose. The upper incisors are grooved. There is a notable anterior projection from the pre-orbital portion of the zygomatic plate, forming a large, oval infraorbital canal. The styloid process bears a thin projection lateral to the occipital condyles. The mesopterygoid fossa is narrower than in *Euneomys*, and the parapterygoid fossae bear a large anterior depression. The posterior end of the palate bears a depression and several tiny foraminae. The reentrant angles in the maxillary cheekteeth run posteriorly, while those on the mandibular cheekteeth are anteriorly directed. The incisive foramina is long (to the middle of P^1). Lateral to the incisive foraminae the maxillary and premaxillary bones are ridge-shaped. There is a large fossa (> 2 mm diameter) in the frontal bones of the optic wall. The lacrimal bones are large, extending into the antero-dorsal portion of the orbit (Table 2).

Population structure & reproduction. Data are limited for this species, but suggest recruitment through spring and summer (Fig. 18). Winter survivors dominate the spring age structure; these mature by fall, yielding a more even age distribution, and producing young which will overwinter. These mice breed in spring (Fig. 19). Ma-

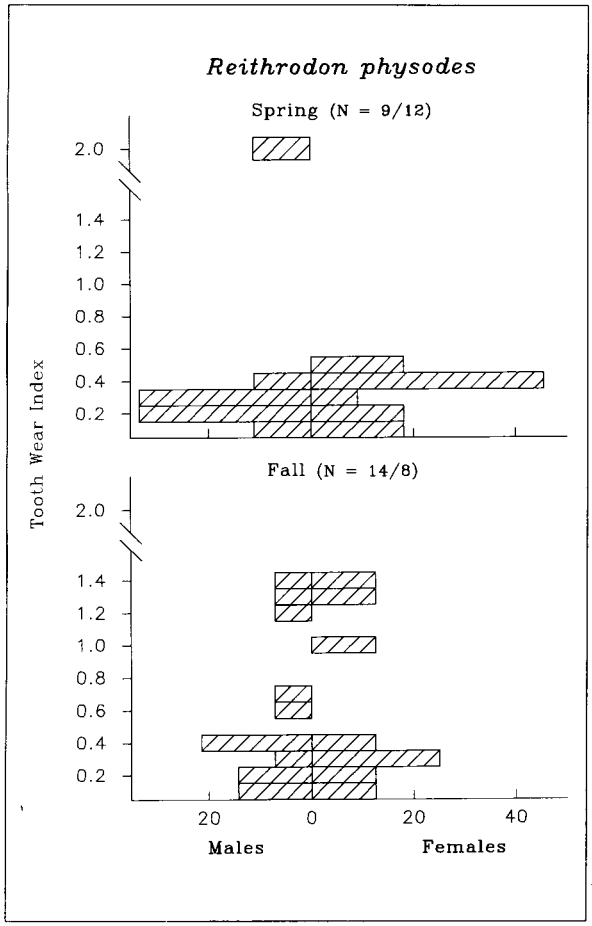

Fig. 18: Spring and fall population structure of *Reithrodon physodes*, by sex. Tooth wear indices and histogram bars are as in Fig. 3.

Estructura poblacional de *Reithrodon*, por sexo. Indices de desgaste de dientes y, barras del histograma como en Fig. 2.

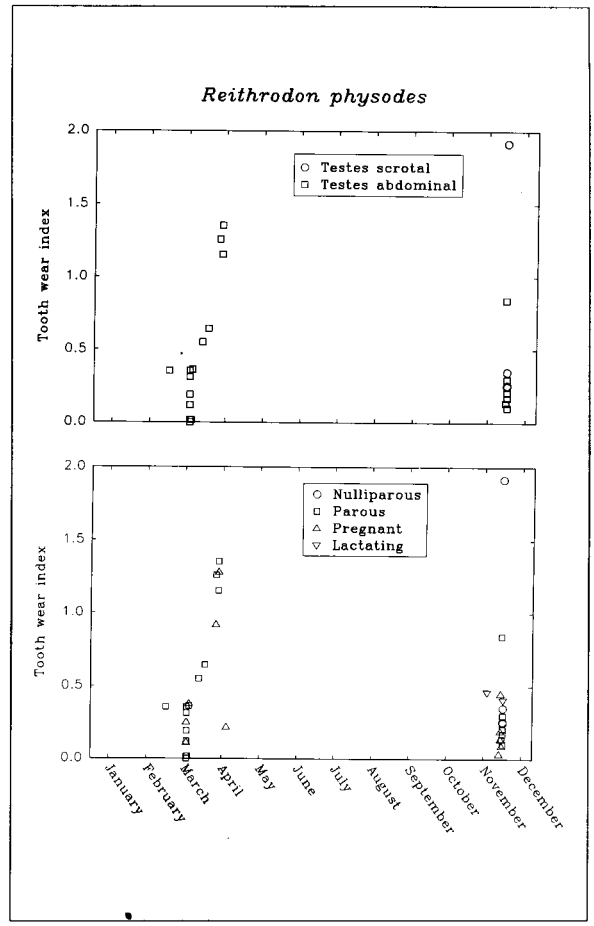

Fig. 19: Reproductive status for male (top) and female (bottom) specimens of *Reithrodon physodes*, presented as a function of their relative age (tooth wear). Sample sizes are given as males/females.

Estado reproductivo por macho (arriba) y hembra (abajo) en *Reithrodon physodes*, presentado como función de su edad relativa (desgaste de dientes). Tamaño de muestra dado como machos/hembras.

les in December had descended testes. Two parous females were collected in November and December, and six pregnant females were collected n November (n = 3), December (n = 2), and March (n = 1). A single post-partum female was captured in April.

Habitat. Reithrodon lives in subterranean burrows, generally where sufficient moisture provides a continuous carpet of grasses. They may occur in matorrales if grasses are nearby.

Habits. These nocturnal herbivores eat mainly grass, and may consume their body weight in grass in a single night (Pearson 1988).

Similar species. Reithrodon has very long hindfeet and is unique here in having reduced first and fifth digits on the hindfeet. Additionally, *Euneomys* has a shorter tail,smaller ears, and shorter hindfeet. *Irenomys* is found only in forested areas, and has much longer tail. All other large rodents here lack grooved incisors. *Phyllotis* has larger ears and a longer tail. *Auliscomys* is dark in color and has broader, yellow incisors. *Chelemys* has a shorter tail and shorter ears, and long claws.

Additional references. See Pearson (1988), Kelt (ms), Kelt et al. (ms).

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