Napaeozapus Preble, 1899

*Napaeozapus* Preble, 1899:33, proposed as a subgenus of *Zapus*, on 8 August. Type species *Zapus insignis* Miller, 1891:742, by monotypy.

**CONTEXT AND CONTENT.** Order Rodentia, Suborder Myomorpha, Superfamily Dipoidae, Family Zapodidae, Subfamily Zopodinae. One species is included in this genus as treated below.

*Napaeozapus insignis* (Miller, 1891)
Woodland Jumping Mouse

*Zapus insignis* Miller, 1891:742. Type locality Restigouche River, New Brunswick, Canada.

*Napaeozapus insignis*: Miller, 1899:330, 18 November.

**CONTEXT AND CONTENT.** Context noted in generic summary. The genus was monographed by Preble (1899). Five subspecies are currently recognized (Wrigley, in press), as follows:

*N. i. insignis* (Miller, 1891:742), see above (*algonquinensis* Prince and *gaspensis* Anderson are synonyms).

*N. i. achatorum* (Preble, 1899:36). Type locality Peninsula Harbor, north shore of Lake Superior, Ontario, Canada.


*N. i. fruteceus* Jackson (1919:9). Type locality Crescent Lake, Oneida Co., Wisconsin.

*N. i. saquenayanus* Anderson (1942:40). Type locality Trout Lake, near Moisie Bay, north shore of Gulf of St. Lawrence, Saguenay Co., Quebec, Canada.

**DIAGNOSIS.** *Napaeozapus* is monotypic and differs from *Zapus* and from *Eoapus* in having 3 rather than 4 molariform teeth. It further differs from *Zapus* in having the tip of the tail white, and from *Eoapus* in lacking a dark longitudinal stripe on the belly.

**GENERAL CHARACTERS.** A longer description is presented by Wrigley (in press). Females average slightly larger than males in most external and cranial characters. Mouselike in appearance; size medium, total length 204 to 256 mm, tail length 115 to 160 mm, body length 80 to 100 mm, hindfoot length 28 to 34 mm, ear length 15 to 18 mm, weight 17 to 26 g (without embryos or fat); tail long (59 to 63% of total length); hind feet elongated for saltation; front feet small; 4 pairs of teeth—1 pectoral, 2 abdominal, and 1 inguinal; mystacial vibrissae conspicuous; pelage coarse due to stiff guard hairs; pelage of dorsal stripe brown to black, on sides orange with yellow or red tint and with scattered dark guard hairs, undertars white; tail distinctly bicolored, grayish brown above, white below, virtually always with a white tip (to 42 mm). Skull murine in appearance (Figure 1); zygoma with jugal plates extending dorsally along maxillary ramus and articulating with lacrimal; infralabial foramen large and oval; nasals projecting considerably beyond the incisors; incisors colored orange or yellow, upper incisors grooved; premolars absent; molars rooted, semi-hypsodont, flat-crowned with complicated pattern of re-entrant folds and islands (Figure 2); dentition i 1/1, c 0/0, p 0/0, m 3/3, total 16.

The species exhibits marked clinal variation in numerous characters, with the northern populations averaging 12% (7 to 17) larger than those in the southwestern part of the range. Southern populations are characterized by reddish orange pelage, becoming more yellowish northward and eastward. In the northwestern populations display pale side coloration, dark dorsum and white ear edging.

**DISTRIBUTION.** *Napaeozapus* occurs throughout the northeastern United States and southeastern Canada (Figure 3). Elevational range is from near sea level north of the St. Lawrence region to 3000 to 6600 ft (900-2000 m) in the Appalachian Highlands. In the southern part of the range, many populations are isolated on mountain peaks and in cool moist coves (for example in the Roan and Smoky mountains and others of Tennessee and North Carolina) or in relict stands of forest (northeastern Ohio, western West Virginia) as a result of the post-glacial movement of the range northward. A record from west-central Indiana is probably in error (Whitaker and Mumford, 1971).

**FOSSIL RECORD.** The earliest known *Napaeozapus* is from the mid-Pleistocene deposits at Cumberland Cave, Maryland, at the periphery of the present range. The lower jaw, molars, and incisors are proportional in size to *N. insignis*

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**Figure 1.** Skull (from top to bottom) in dorsal, ventral, and lateral views, and dentary in lateral view, of AMNH no. 148936 from Mt. Katahdin, Maine. Photographed in ultraviolet light by Mr. R. E. Logan, Department of Photography, The American Museum of Natural History.
Figure 2. Upper and lower molariform dentitions of three genera of zapodids in occlusal views (from Krutzsch, 1954:360). Premolars and molars are identified by initials and numbers. Upper dentitions are at the left. Upper row is *Napaecus*us, middle row Zapus, and lower row Eozapus. Note the increasing complexity of teeth from bottom to top, and the loss of the P4 in *Napaecus*us.

(Gidley and Gazin, 1938). *Napaecus*us remains also have been found at four late-Pleistocene sites, two of which are on the southeastern periphery of the range—New Paris no. 4, Bedford Co., Pennsylvania (Gidlay et al., 1964), and Natural Chimneys, Augusta Co., Virginia (Gidlay, 1962); and two localities considerably outside the present distribution—Bootlegger Sink, York Co., Pennsylvania (Gidlay et al., 1965), and Robinson Cave in north-central Tennessee (McGrady and Schmidt, 1963, Gidlay et al., 1969). Specimens from New Paris no. 4 and Natural Chimneys average 10% larger than those now inhabiting the same areas, but closely approximate the large northern races.

FORM. The pelage (Wrigley, in press) of *Napaecus*us consists of underfur and guard hairs. The underfur is fine, wavy, and 2 to 6 mm long. The guard hairs are coarse or fine (overhairs), and are stiff, tapered at both ends, and elliptical in cross section. The coarse guard hairs are 9 to 11 mm long, and the overhairs are 5 to 10 mm long. The color and banding patterns of hairs vary with the area of the pelage. The vertebral column has 7 unfused cervical vertebrae; 12 thoracics; 7 large lumbar, the posterior 4 having pronounced neural and transverse processes; 4 sacrals with transverse processes fused; and 39 caudals, with small H-shaped semicircular bones between the larger caudals. The tail has been elongated by an increase in both number and length of vertebrae. The 5 metatarsals are enlarged (first and fifth subequal) but not fused. The tibia and fibula are fused proximally, the fibula finally with the tibia. Five digits are present on the front and hind limbs, though the pollex is reduced. In a study of the ear ossicles, Krutzsch (1954) found features of the malleus and incus that differentiated *Napaecus*us, *Zapus*, and *Eozapus*. The shape of the ceratohyal and thyrohyal elements of the hyoid apparatus differs in *Napaecus*us and *Zapus* (Wrigley, in press). The check-teeth (see Figure 2) of the Recent zapodids, *Eozapus*, *Zapus*, and *Napaecus*us—show a reduction of 1 in size and final loss of P4, increasing complexity of occlusal surface, and several other characters (Krutzsch, 1954). Dental abnormalities in *Napaecus*us were summarized by Wrigley (in press). Klingener (1964) presented a comparative myology of *Napaecus*us, *Zapus*, and related taxa, and reported no constant differences between the two jumping mice. The cardiac arterial system of *Napaecus*us is basically the same as in *Microtus* (Guthrie, 1963). The os penis structure and its position within the phallus are illustrated by Wrigley (in press). The os penis (Krutzsch, 1954), the os clitoris (Wrigley, 1966), and the os interpenis (Wrigley, in press) serve to differentiate the Recent zapodids. The os penis varies in size geographically, being larger in the northern races—average length 0.3 mm, width of base 1.0 mm, height at base 0.3 mm. The os clitoris in females specimens ranged from 0.2 to 0.4 mm in total length and from 0.17 to 0.25 mm in greatest width. The distal end of the glans penis is covered with numerous rows of epidermal spines, enlarged proximally as large scales tipped with spines. The glans is larger and more rectangular in *Napaecus*us than in *Zapus*. The male accessory reproductive glands consist of bulbo-urethral, vesicular, and 3 pairs of prostate glands, however ampullary and preprostatic glands have not been located. Wallerian fibers and Sudoriferous glands are lacking in zapodids although present in nearly all microtines and new world cricetines. Sebaceous glands are extremely large in zapodids, practically filling the subcutaneous area of the lower lip, and extending posteriorly over the ventral margin of the cheek (Quay, 1965).

FUNCTION. Relatively little physiological work has been done on this species, and much that has relates to hibernation. Brower and Cade (1966), working with 10 woodland jumping mice (average weight 20.3 g), found an average ad libitum water consumption of 160 mm$^3$/g of body weight. The deep body temperature of *N. insignis* remained at 37°C at ambient temperatures ranging from 5°C to 33.5°C, but increased when tested at 37°C (ambient). The maximum metabolism for 11 mice (at ambient temperature of 31°C and average weight of 21.6 g) used oxygen at 1800 mm$^3$/hr/g of body weight, and produced carbon dioxide at 1300 mm$^3$/hr/g. Pearson (1947) measured the basal metabolic rate of one mouse at 2400 mm$^3$/hr/g. Body heat was lost about 17% more rapidly (in the range of 20°C to 30°C) by jumping mice than by *Peromyscus maniculatus* (Brower and Cade, 1966). Evaporative water loss was 3.2 mg/hr/g body weight in seven *Napaecus*us at 29°C (average weight of 20.8 g), and this loss was 4.2 in mice at 23°C (average weight of 24.9 g). Brower and Cade hypothesized that this low evaporative water loss in a form of the moist forests was an adaptation for hibernation rather than for the active phase of the animal’s life. Neumann and Cade (1964) divided 10 jumping mice (8 *Napaecus*us and 2 *Zapus hudsonius*) into two groups of five, with other group on long days (16 hr of light, 8 of darkness) and other on short days (16 hr of darkness, 8 of light), in an effort to determine effects of photoperiod upon hibernation. Mice were housed individually in a refrigerator in which the ambient temperature was held at 2°C to 5°C. The mice on short days fattened before hibernation, and hibernated for longer periods of time (mean of 9.4 days), than did their long-day counterparts (mean of 3.3 days). The long-day mice gained weight for average periods of 2.9 days between periods of hibernation, as compared to 1.5 days in the short-day mice. Short-day mice averaged 27.8 g at the beginning of the experiment, increased to 30.0 g in the 2 weeks just prior to hibernation, and decreased rapidly just after the mice entered hibernation, then leveled off. In the long-day mice, the average weight was 27.4 g initially and decreased to 25.8 g in the 2 weeks just before hibernation, then continued to decrease and continually throughout their sporadic periods of hibernation, until death occurred.

Figure 3. Range of *Napaecus insignis* in eastern North America. Known Recent localities are shown by dots for the following subspecies: 1, *N. i. fructescens*; 2, *N. i. abietorum*; 3, *N. i. anguineynensis*; 4, *N. i. insignis*; and 5, *N. i. rosenatus*. Fossil locations are shown by circles labelled 6. Estimated ranges of the subspecies are outlined.
ONTGENY AND REPRODUCTION. Sheldon (1934) kept a few Napeocarpus alone in a cage for 29 d (days) before they gave birth, hence, in this case gestation was 29 d or longer. This seems long since the gestation of Zapus hudsonius is about 18 d, prolonged 2 to 3 d if the animal is lactating when mated (Quimby, 1931). Sheldon (1938) stated that only one female gave birth 23 d after being caged with males and that another produced a litter 25 d after being caught, hence these values can be considered as maximum and minimum gestations in these respective cases. Schwenk (1937) reported that there was no postpartum estrus in Napeocarpus, though it appeared possible to induce estrus by weaning the young. In contrast, Quimby (1931) found that Zapus could mate successfully soon after parturition while nursing continued. We have summarized reproductive information on 170 females from the central part of the range, drawing from personal work, the literature, and museum specimens. The earliest records of pregnancy are 8 and 9 May (Gifford and Whitehead, 1951) although few females carry young in May. Most females are pregnant or show signs of recent parturition in June, and those not breeding appear mainly to be indistinguishable in both sexes as light spots. Facial vibrissae were present, and the pinna of the ear was scalped and tightly folded. The eye was visible as a dark ring about 1.5 mm in diameter. Blunt claws appeared as tubercles on all digits of forefoot and hind foot. Standard measurements (total, tail, and hind foot lengths) of the newborn young were 35.2, 11.0, and 5.0, and the weight was 0.87 g. Sheldon (1934) presented standard measurements of two individuals one day old as 41 and 44 mm; 11 and 13 mm; and 4.5 and 6 mm. Measurements of a third individual found dead a few hours after birth were 39, 9.5, and 5 mm. In the young studied by Layne and Hamilton there was little change by the end of the first week, although the mystacial vibrissae were now about 2 mm long and the pinna was more prominent. By day 10 after birth, minute pigment spots were visible beneath the surface of the skin on the head, body, and tail, and the natal external auditory meatus was still closed. The eyes bulged slightly and a faint crease had appeared where the eyelids eventually separated. By day 12 the dorsal body region of the young was grayer and the tip of the tail was a red, flesh colored. Fine hairs were visible in the dorsal regions and on the limbs. The posterior mystacial bristles were now about 6 mm long and the plantar tubercles of the hind feet had become black. By day 14, the body, including the belly, was covered with fine hair, and the skull sutures and viscera were no longer visible through the skin. By day 19, the claws were well formed, and the lower incisors protruded through the gum about 0.2 to 0.3 mm. By day 21, the midventral dark color, which earlier had been distinct but then disappeared, had become distinct permanently. The lower incisors were about 0.5 mm long and the upper incisors were just evident. The teeth grow to full adult size. The incisors are the 25 and 27 g. 

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Wrigley (in press) studied the molt sequence in 270 specimens. No subadult molt was found. Young from spring litters exhibited new hair in late August and September (at 2 months of age) while those from summer litters molting in late September and October, or the following spring. Adults molted once a year, from mid-June to early September (mostly in August). New hair first appeared on the cheeks and sides of the neck, then spread to the rostrum, shoulders, and forelimbs. The molt progressed posteriorly along the sides, spreading later to the back and belly, and lastly to the rump and hind limbs.

ECOLOGY. Napeocarpus inhabits the spruce-fir and hemlock-hardwood forests in the eastern half of North America. The range coincides well with the range of the white pine, jack pine, fir (except in the forest-tundra ecotone of the boreal forest) and eastern hemlock. Data on habitat from every province and state in which the species occurs are summarized by Wrigley (in press). Napeocarpus selects cool, moist environments within the forest or forest-edge. However, the overall distribution seems to be restricted more by the availability of suitable vegetation than by direct physiological stress of low temperature, temperature extremes, or short growing season in the north. Brower and Cade (1966) found no restriction to particular kinds of woody vegetation. Napeocarpus inhabits bogs (Morris, 1946) and Sphagnum swamps (Sheldon, 1936). It has been reported as a resident of wet areas (Preble, 1956) and of dry areas (Sheldon, 1934). Whittaker (1963) presented information on relative numbers of Napeocarpus taken in various habitats. Swamps, musk woods, and wet woods were most often inhabited in New York; damp rocky areas also were favorable. Preble (1956) stated that greatest populations are found within grass, sedge, and alder bordering small streams, and in moist areas of sedges and grasses in the forest floor. Brower and Cade (1966), Whittaker (1963), and Connor (1960) all found that there was no special association with habitats near water, but Whittaker (1963), Snyder (1924), and Brower and Cade (1966) found a strong association with growth cover. Brower and Cade indicated that this cover was often in the form of low woody vegetation, whereas Whittaker (1963) found that herbaceous vegetation was preferred. Zapus and Napeocarpus are fairly well segregated ecologically in different stages in the successional sequence of plant communities, with Zapus primarily in meadows and Napeocarpus primarily in woods. Only in the intermediate stages are the two species commonly found together, particularly in shrub or forest-edge situations. Hamilton (1935), Preble (1956), and others found Zapus invading Napeocarpus habitats, but not the reverse. Whittaker (1963) concluded that the two species had little or no direct effect on the distribution of each other. Brower and Cade (1966) and Wrigley (in press) concurred, except in forest-edge situations where the abundance of one species usually exceeded that of the other. Wrigley (1956), Wrigley (in press), and the trapping results of other studies show a complementary pattern of local distribution between Napeocarpus and Clethrionomys gapperi, which may result from the aggressive behavior of the two species. Wrigley thought that local aggregations were due to isolation of suitable habitats. Wrigley (in press) studied population structure by examining 2100 museum specimens; between 15 May and 15 September, 35% were males. Juveniles (less than 7 months old) first appear above ground in late June, reach a peak of 17% of the population in early August. A second but lower peak of juveniles in early September results from the
offspring of summer litters. Subadults (7 to 10 weeks old) increase in late July from a low level and comprise 25% of the population during August and September. In September, before the older adults become dormant, animals born that season form almost 70% of the population. Approximately 10% of the sample exhibited attrition of the molars down to or near the cingulum. Inasmuch as wear is likely only during the annual nonhibernating period of 5 to 6 months, some individuals may well be 3 or 4 years old. Townsend (1935) found that *Napaeozapus* comprised 8 to 21% of the small mammal community in central New York. Blair (1941) and Manville (1949) estimated 2.7 and 0.26 woodland jumping mice per acre (6.7 and 0.64 per hectare), respectively, in Michigan, and Brower and Cade (1966) reported 5.2 jumping mice per acre (12.8 per hectare) at Whiteface Mountain, New York. Townsend (1935) gave values of 2 to 24 per acre (4.9 to 59 per hectare). Highest capture success in the study whitaker (1963) was 0.21 per 100 trap-nights. High densities also have been reported by Hamilton (1935), Connor (1965), and Preble (1956). Females have a home range of from 1.0 to 6.5 acres (0.4 to 2.6 hectares) and males, 1.0 to 9.0 acres (0.4 to 3.6 hectares) according to Blair (1941). One male was known to travel 117 yards (107 m) in 24 hours (Sheldon, 1938).

Connor (1966) examined the stomachs of 47 individuals and found 77.8% of the contents to be seeds and other plant materials, and 22.2% insects. *Endogone* and other fungi, larval Lepidoptera, adult Coleoptera, larval Diptera, berries, raspberries, small seeds and nuts, mitrewort (*Mitella diphylla*), may apple (*Podophyllum peltatum*), fronds of *Asplenium*, leaves and other green vegetation, grubs and enchyridid worms, and fragments of a cranefly, ctenoplectra, and other small invertebrates were found in stomachs examined by Hamilton (1935, 1941). Connor (1960) reported that seeds, roots, and basal parts of plants comprised 70% of the food in 14 stomachs, and animal material, including lepidopteran larvae, comprised 30%. Saunders (1921) believed that *Napaeozapus* had eaten elder fruits. Whitaker (1963) examined 103 stomachs from Ithaca, New York, 24 from Slide Mountain, Ulster Co., New York, and 18 from North Carolina, Tennessee, and New Hampshire. The most abundant food in all three samples was the subterranean fungus, *Endogone*. It comprised 33.5, 27.6, and 33.5%, respectively, by volume. This fungus was fairly used by small mammals as food (Whitaker, 1962; Williams and Finney, 1964). To the uninitiated, this food may appear as a clump of dirt in the stomach, with the individual chlamydospores becoming clear at 25 to 30 power or more (Figure 4). Seeds, cotyledons, and the total volume of food in the Ithaca sample, and fruits comprised 11.2%. Lepidopterous larvae and seeds of *Impatiens* were important, forming 10.3 and 6.0%, respectively, of the volume of food in the sample.

Several internal parasites have been found in *Napaeozapus*. The protozoan genus *Hexamita* was found in the only two mice examined (Whitaker, 1963). Freeman (1959) found the cestode *Hymenolepis bennetti* Freeman and the larval cestode *Cladotaenia globifera* Batsch in woodland jumping mice from Ontario, and Whitaker (1963) found *Hymenolepis* sp. in specimens from New York. The nematode, *Cistelinoidea zappos* Dikmans has been found by Dikmans (1939) and Whitaker (1963), and the latter author also found *Rictularia* sp., whereas Lichtensels (1970) reported *Hydrorhadinia* (=? *Rictularia*) perkeri Lichtensels. Freeman and Wright (1960) found *Capillaria hepatica* Bancroft in *Napaeozapus* from Ontario.

The most abundant external parasite appears to be the hypovalve stage (nonfeeding, taeniuri) of the larva of the dipterous *Neodermacentor variabilis* Say. This parasite has been reported from *Napaeozapus* from Nova Scotia (Dodds et al., 1969). Fleas reported include: *Megabothris quinini* (Rothschild) by Holland (1949), Benton and Krug (1956), Jordan (1929), and Grear (1939); *Fomycopsylla suturalis* (Jordan) by Holland (1949); *Ctenoplectron pseudagrytes* (Baker) by Hamilton (1935); *Ctenoplectron hirudinaceum* by Linney and Linney (1968), G. H. Holland (personal communication), Holland and Beaton (1968), and Benton and Krug (1956); and *Orchopeas luscopus* Baker by Whitaker (1963). Snyder (1924) found a nest of young *Napaeozapus* that was "infested with fleas," Bottles, Cuterbera sp., were reported by Blair (1941), Siegmond (1964), and Abbott and Parsons (1961); Sheldon (1934, 1938) reported *Cuterbera fonticilla* Clark from *Napaeozapus* from Vermont and Nova Scotia.


**BEHAVIOR.** Sheldon (1938) and Layne and Hamilton (1954) found that the young squeak continuously after birth, and that they are soon active, moving their hind quarters in
rhythmic whirling motions. At a week of age, they are capable of sharp squeaks when disturbed, and they utter faint sucking sounds continuously. By day 12 after birth, they stand on all four feet, though shakily, and are able to take a few steps before falling on their sides. By day 19, they yaw, stand, and attempt "washes" and attempt leaps of an inch or so, but they usually land on their sides kicking. By day 26, when the eyes open, they are active and no longer make sucking sounds. They are carried by slow hops, with the large hind legs pointing outward at about a 45° angle. At day 28, the young are able to jump about a foot, and one individual at this age exhibited the tail drumming seen in adults. At day 34, the young animals could fit for size. Weaning occurred at this time; the young were seen to eat solid food. The young occupied different parts of the cage from the adult. At day 38, the young attempted to copulate with each other and with the adult. *N. p. canadensis* progresses by a quadrupedal walk when moving slowly and a quadrupedal hop for a greater speed. Six feet (1.8 m) is about the maximum distance attained in one jump (Hamilton, 1935; Sheldon, 1934; Wrigley, in press) and jumps of 2 or 3 ft (0.6 or 0.9 m) in length and 1 or 2 ft (0.3 or 0.6 m) in height are more common when retreating (Sheldon, 1938; Wrigley, in press). The animal takes several moderate leaps, stops abruptly under the nearest cover, and remains motionless unless pursued (Sheldon, 1934; and Hamilton, 1935). Although the species climbs well in bushes (Sheldon, 1934; Hamilton, 1935) it does not ascend trees. Hamilton (1935) observed *N. p. canadensis* swimming on the surface of the water (Preble, 1939) and observed a jumping mouse named *N. p. canadensis* swimming underwater. However, Wrigley (in press) found it to have poor endurance (exhaustion in 3 minutes) compared to other rodents. When swimming underwater, only the hind feet are utilized and in unison. On the surface, the animal utilizes all four limbs in a strenuous rocking motion, resembling the quadrupedal hop.

*N. p. canadensis* is mainly nocturnal but may be active in late morning and early evening (Sheldon, 1934), particularly if the weather is rainy or cloudy (Bider, 1968). Hamilton (1935), Bider (1968), and Thibault (1969) found increased activity on rainy or cloudy nights. Brower and Cade (1966) and Wrigley (in press) noted no effect, and Sheldon (1934) reported an inverse relationship. Activity may be higher during cold nights than warm (Brower and Cade, 1966; Thibault, 1969) and may continue even at 4°C (Hamilton, 1935). Individuals prepare for hibernation by accumulating large reserves of fat (often one-third of body weight). Neumann and Cade (1964) showed that decreased day length stimulated fat deposition. This normally occurs about 2 weeks prior to hibernation. Klein (1957) found that captives were more apt to enter hibernation if food and water were not supplied. Juveniles and subadults usually lack fat until late in season—late September (Preble, 1939; Connor, 1960). Marked adults show fat deposition by late August (Goodwin, 1924), most by mid-September (Blair, 1941), and the majority are hibernating by the end of September (Wrigley, in press). Young of the year, particularly from late litters, are active until October. There is no difference between the sexes in time of entrance into dormancy. Late seasonal records are 24 October in New York (Connor, 1960), 29 October in Pennsylvania (Grimm and Roberts, 1959), and 27 November in the Great Smoky Mountains (Linsey and Linsey, 1968). Food in the digestive tract of a hibernating animal results in death (Sheldon, 1934; Hamilton, 1935). Food is not stored in the hibernaculum, consequently individuals without sufficient fat reserves to last for at least 6 months probably perish. Hamilton (1935) illustrated the folded position of the body and appendages during dormancy. The majority of males emerge from hibernation in early May, but most females are not abroad until the latter half of May. Early records are 16 April in Quebec (Wrigley, 1969) and late April in Pennsylvania (Roslund, 1951). There do not appear to be age differences in time of emergence.

Sheldon (1934) found that woodland jumping mice eat by squatting on hind legs and tail and using forepaws to hold food and transfer food to the mouth. They dig their own burrows, use those of other small mammals. The entrance is concealed during the day. The nest is composed of dry leaves and grass, and may be situated in brush piles or undergrowth (Snyder, 1924). When first captured, jumping mice are extremely nervous, often mortally injuring themselves in attempts to escape. Tail drumming is abundant, in the absence of food. The nest is used in which to hide, individuals become docile within a month and may be handled and handled.


Snyder, L. L. 1924. Some details on the life history and behavior of Napatopoeus insignis abietorum (Presby). Jour. Mammal. 5:233-274.


Wrigley, R. E. 1969. Ecological notes on the mammals of southern Quebec. Canadian Field-Nat. 83:201-211.


The editor of this account was S. Anderson.