

= Eastern mole =

The eastern mole or common mole ( *Scalopus aquaticus* ) is a medium @-@ sized , overall grey North American mole and the only member of the genus *Scalopus* . Its large , hairless , spade @-@ shaped forefeet are adapted for digging . The species is native to Canada ( Ontario ) , Mexico , and the eastern United States , and has the widest range of any North American mole .

The species prefers the loamy soils found in thin woods , fields , pastures , and meadows , and builds both deep and shallow burrows characterized by discarded excess soil collected in molehills . Its nest is composed of leaves and grasses , and its two to five young are on their own at about four weeks . Its diet consists principally of earthworms and other soil life , but the mole will eat vegetable matter .

Dogs , cats , foxes , and coyotes prey upon the mole , and the species hosts a variety of parasites . Unlike gophers , moles do not eat vegetation and pose no threat to human concerns ; the occasional damage to lawns is offset by the aeration provided the soil and consumption of insects . The construction of golf courses has provided the mole with ideal habitat . The species is abundant , occurs in protected areas , faces no major threats and is of little concern to conservationists .

= = Description = =

The eastern mole is a small , sturdy animal which lives principally underground and is highly specialized for a subterranean way of life . Its body is somewhat cylindrically shaped with an elongated head . A fleshy , moveable snout projecting over the mouth with nostrils on the upper part is used as an organ of touch . The minute , degenerative eyes are hidden in the fur ; the eyelids are fused and sight is limited to simply distinguishing between light and dark . The ear opening is small and concealed in the fur , but hearing is fairly acute . A short , thick tail is lightly furred and is used as an organ of touch , guiding the mole when it moves backward in the tunnel .

The very large front feet are broader rather than long with well @-@ developed claws , and possess a specialized sesamoid bone attached to the wrist that aids digging . The front feet are normally held in a vertical position with the palms facing outward . Both the front feet and the small hind feet are fringed with sensory hairs that help the mole in its excavations . The bones of the front limbs and the breast are hugely enlarged , and provide strong support for the attached muscles used in digging . The hip girdle is narrow , permitting the mole to turn around in its tunnel by doing a partial somersault or doubling back upon itself .

The mole has grey @-@ brown , plush like fur with paler or browner underparts , and may appear to have a silver sheen depending on the angle it is viewed . The fur offers little resistance to backward movement in the tunnel . Compared to the female , the male tends to have a brighter orange strip on the belly being caused by secretion of skin glands in the region . Albinos occur but these may appear white , orange , or cinnamon yellow depending on the skin gland secretion . The face , feet , and tail are whitish to pink . Molting occurs in the spring and fall with the new pelage appearing first on the underparts . On the back , the new fur appears first at the tail then works forward . A distinct line usually marks the old and new fur , and there is no distinct underfur . The hairs are of equal length , and , when viewed microscopically , are seen to possess a whip @-@ like tip unlike the hairs of any other mammal .

The sexes are determined externally by the number of openings in the groin area : the female has three ? the forward one is the urinary opening ( in the urinary papilla or projection ) , the second is the vagina , and the third is the anus at the tail . The male has two openings ? the combined urinary / reproductive opening in the penis , and the anus . The testes never descend into a scrotum but remain within the body cavity . There are six teats on the belly ? a pair at the chest , a pair at the groin , and a pair between the two . A rank , musky odor is emitted from a scent gland on the belly , and is left on the floor of the tunnel as the mole passes . It probably serves as a form of communication between the sexes during the breeding season , and to discourage predators . Other scent glands are found at the anus .

## = = Measurements = =

The mole is about 16 cm ( 6 @. @ 3 in ) in length including a 3 cm long tail and weighs about 75 g ( 2 @. @ 6 oz ) . Males collected from various parts of the species ' range showed the following extremes in measurements : total length 152 ? 184mm , tail 22 ? 30mm , hind foot 18 ? 21 mm , and females displayed extremes of : total length 144 ? 16 mm , tail 15 ? 28 mm , hind foot 18 ? 21 mm , weight 40 ? 50 grams . Males are larger than females and males collected in the northern Midwest were largest of all . Twelve adults from northeastern Florida averaged : total length 142 , tail 24 @. @ 5 , hind foot 17 @. @ 8 mm . In Hillsborough and Pasco Counties in Florida , the eastern mole is still smaller , and in the area north of Tampa Bay , total length does not exceed 140 mm , and the hind foot rarely exceeds 17 mm . The smallest and darkest moles are those found in the Miami area . In Pennsylvania , specimens range in weight from 40 to 64 grams . The tooth count numbers 36 ( I3 / 2 ; C1 / 0 ; P3 / 3 ; M3 / 3 ) , and the chromosome diploid number is 34 .

## = = Distribution and habitat = =

The eastern mole is native to Canada ( Ontario ) , Mexico , and the United States , and has the widest range of any North American mole . In the United States , the species is found from southern South Dakota and southern Wisconsin to eastern Massachusetts and south to the tip of Florida and Louisiana and west to Nebraska , Kansas , and central Texas . It is absent from the Appalachian Mountains , most of Canada , and Northern New England .

The species is found in the southern tip of Ontario , and northern Tamaulipas , Mexico . Its distribution , however , is patchy . Colonies in southwestern Texas and Coahuila , Mexico and Tamaulipas , Mexico are isolated and small .

The species prefers well @-@ drained , loose , sandy or loamy soil , and avoids heavy clay , stony or gravelly soils , and very dry or very wet soils . It frequents pastures , open fields , meadows , and thin woods . In some marginal areas , human activities such as the building of roads and golf courses often provide beneficial habitat due to higher quality soils and adequate moisture .

## = = Population characteristics = =

In a study from 1976 , home range areas of seven moles were calculated after each had been located periodically during periods ranging from 11 months to 3 years . The mean home range area was 0 @. @ 74 hectares ( 1 @. @ 8 acres ) ; males averaged 1 @. @ 09 hectares ( 2 @. @ 7 acres ) , and females 0 @. @ 28 hectares ( 0 @. @ 69 acres ) . Because the male range is so large , males generally predominate in samples . The species ' fossorial habit tends to limit its dispersal and gene flow , and soil character often limits populations . Eastern moles are good swimmers and not limited by rivers , but heavy clay soils associated with some waterways may limit dispersal .

Moles probably have a long life span due to a paucity of predators and a low reproductive rate . The young are grayer than the adults , and , with age , the skull flattens and the teeth display wear . Females live longer than males . Longevity has been estimated at 6 years with mark @-@ recapture methods in South Carolina . In Kansas , longevity was estimated at greater than 3 @. @ 5 years . The eastern mole is common in most of the United States , but populations in southern Texas and Mexico are considered extremely rare and possibly extinct .

## = = Behavior = =

The species is more abundant in warm climes rather than cool or cold climes , and in the southern United States , cultivated fields will often be riddled with their burrows after a penetrating rain . The eastern mole is active at all hours , with peaks in activity near dawn and at dusk . The length of time between bouts of activity averages about three hours , but may last up to 6 @. @ 5 h .

## = = Diet = =

The eastern mole is voracious and will daily consume food equal to 25 to 100 % of its weight . In captivity , it will eat almost anything , including ground beef and dog food . In its natural environment , the species principally feeds on earthworms when these are available , but will eat many other foods , including slugs , snails , centipedes , larval and adult insects , scarab beetle grubs , and ants at all their life stages . Vegetable matter is consumed in great quantities and Indiana specimens collected in 1974 were found to have stomachs completely filled with grass seeds .

#### = = = Burrowing = = =

The eastern mole digs both deep , permanent burrows and shallow , temporary ones just under the surface , used for foraging . The regular , permanent highway is often built 25 cm or more below the surface and is used as a retreat during hot , dry weather or when frost has descended . The oxygen levels in the tunnels can be as low as 14 @. @ 3 % , and carbon dioxide as high as 5 @. @ 5 % .

When digging new burrows , the mole will push excess soil up through vertical shafts called " molehills " . New burrows just below the surface are marked by ridges and molehills , and such burrows appear to be used to facilitate the capture of earthworms and other soil life after a rain . In building burrows and probably at other times , the mole uses its nose as a tactile organ , poking about here and there . In friable soil , the species can burrow at a rate of 6 m / h .

The mole 's nest is built of leaves and grasses , and is usually situated several inches to a foot or more below the surface . It is typically found beneath a boulder , stump , or bush , and has several approaches , including one that enters from below . The eastern mole in Florida is reported to not build a nest .

#### = = = Vocalizations = = =

Moles vocalize by making high @-@ pitched squeals , harsh , guttural squeaks , short snorting sounds , and grating the teeth .

#### = = = Reproduction = = =

Gestation is usually 45 days and a single litter of two to five young is produced between mid @-@ April and June . In warm climates , the young may be born in March . They are born blind and naked , and are relatively large compared to the size of the mother . At 10 days , they exhibit a fine , velvety light @-@ gray fur which is retained for several weeks . Rapid growth permits the young to leave the nest and shift for themselves at about four weeks .

#### = = = Survival = = =

Dogs , cats , foxes , and coyotes are some of the predators of the species . The eastern mole harbors many parasites . One hundred four moles taken in Indiana exhibited four species of fleas , one species of sucking louse , one species of beetle , and at least 20 species of mites , several of them entirely new species , with one of them , Scalopacarus , constituting a new genus .

#### = = Scientific and common names = =

Linnaeus based the original description of the species upon a specimen found dead in the water , a fact noted on the collection label . He named the species aquaticus , certainly a misnomer because the species is the least aquatic of North American moles .

The first part of the scientific name , Scalopus , is from two Greek words which mean " digging " and " foot " ( skalops , " mole " , derived from the word " to dig " and pous , " foot " ) . The word refers to the species ' large front feet which are used for digging .

The second word of the name , aquaticus , is Latin and means " found in water " . The word is

misleading but was given to the species because its webbed foot suggested it was accustomed to a water habitat , and the original specimen was found dead in water .

The first part of the common name , " eastern " , refers to the species ' range , and the second part , " mole " is from the Middle English molle which in turn is related to another Middle English word , mold @-@ warpe , which means " earth @-@ thrower " .

= = Fossils = =

Fossil remains have been reported from the upper Ohio Valley in Pennsylvania and West Virginia , and Pleistocene cave faunas in Texas .

= = Interaction with humans and conservation = =

Moles till and form soil , feed on destructive insects such as cutworms and Japanese beetles , and dig tunnels that aerate the soil and permit moisture to penetrate deeper soil layers . The pelt is small and does not take dyes well ; it is thus of no commercial interest to the fur industry . When moles disfigure lawns , damage the roots of garden plants while searching for food , or take sprouting corn , they are considered undesirable . In one anecdote , a homeowner reported the animal completely eradicated the Japanese beetles on his grounds .

The species is listed as Least Concern on the IUCN Red List because of its wide distribution , presumed large population , occurrence in a number of protected areas , tolerance to some degree of habitat modification , and because it is unlikely to be declining at nearly the rate required to qualify for listing in a threatened category .