

AN EFFICIENT PLACENTAL AND BORN FURTHER DEVELOPED; EFFICIENT MAMMARY GLANDS; LARGER AND BETTER BRAIN; DENTAL FORMULA NOT OVER $\frac{3 \cdot 1 \cdot 4 \cdot 3}{3 \cdot 1 \cdot 4 \cdot 3}$ (EXCEPT WHALES); SOME EXTREME ADAPTATIONS TO ENVIRONMENT (SPECIALIZATION), PRINCIPALLY OF LIMBS AND TEETH.

BATS

(CHIROPTERA) FLEW BY MEANS OF A MEMBRANE OF SKIN AS EARLY AS PALEOCENE TIME.

MOST BATS ARE SMALL AND INSECTIVOROUS. A GROUP OF LARGER OLD WORLD TROPICAL BATS ARE FRUIT EATERS, WITH ESPECIALLY MODIFIED MOLAR TEETH. A FEW HAVE OTHER FEEDING HABITS.



MODERN "INSECTIVORES"

INCLUDE THE HEDGEHOGS, MOLES AND SHREWS.

ALL HAVE RATHER POORLY DEVELOPED EYES AND LONG SNOOTS. ALTHOUGH ALL ARE MORE SPECIALIZED THAN THEIR ANCESTORS, THE SHREWS HAVE CHANGED LEAST IN APPEARANCE. INSECTIVORES ARE KNOWN SINCE EOCENE TIME.



SHREWS, OF FEROCIOUS DISPOSITION, HAVE THE MIDDLE INCISORS ELONGATED AND HAVE LOST THE CANINES AND MOST OF THE PREMOLARS.



TRUE MOLES ARE ADAPTED FOR DIGGING ALTHOUGH PRIMITIVE MOLES ARE MORE SHREW-LIKE. A PRIMITIVE FEATURE OF MOLES IS THE LACK OF ENLARGED INCISOR TEETH.



MOST PRIMITIVE OF MODERN "INSECTIVORES," THE SPINY-SKINNED HEDGEHOGS ARE NOW OLD WORLD ANIMALS. THE CUSPS OF THEIR MOLARS ARE SIMPLE TUBERCLES.

EVOLUTION FROM PANTOTHERIA

JURASSIC

CRETACEOUS

PRIMITIVE INSECTIVORE-LIKE

LIPOTYPHILA

CHIROPTERA

MENOTYPHILA

CONDYLARTHS

TO OTHER MODERN PLACENTAL GROUPS

OREODONTS

TO CARNIVORES

TO UNGULATES

TO PRIMATES

Onychonycteris finneyi

The earliest known bat
Although this fossil skeleton looks a lot like the modern bat skeleton you see above in this display, *Onychonycteris* was different from modern bats in several ways. Unlike almost all other bat species that have ever lived, it did not use sonar to navigate in the darkness. Its wings were proportionally smaller than those of modern bats and it had claws on the end of every "finger" in its wings. Modern bats only have one or two claws remaining on each wing. Because of its smaller wings it probably wasn't able to fly as well as modern bats and wouldn't have been catching insects midflight. Instead, it likely spent most of its time crawling through trees looking for insects to eat. In fact, it may have only used its flight capacity to glide and flutter from one tree to the next in search of food.

TREE SHREWS

REPRESENTED BY THE LIVING *TUPAIA*, HAVE SOME PRIMATE-LIKE CHARACTERISTICS. RESEMBLING THE PRIMATE ANCESTORS IN APPEARANCE AND STRUCTURE, THEY ARE, INDEED, RATHER CLOSE TO THIS ANCESTRY, LITTLE KNOWN AS FOSSILS.

