Vertebrate Paleontology and Geology of High Elevation Tertiary Deposits in the Gravelly Range, Southwestern Montana

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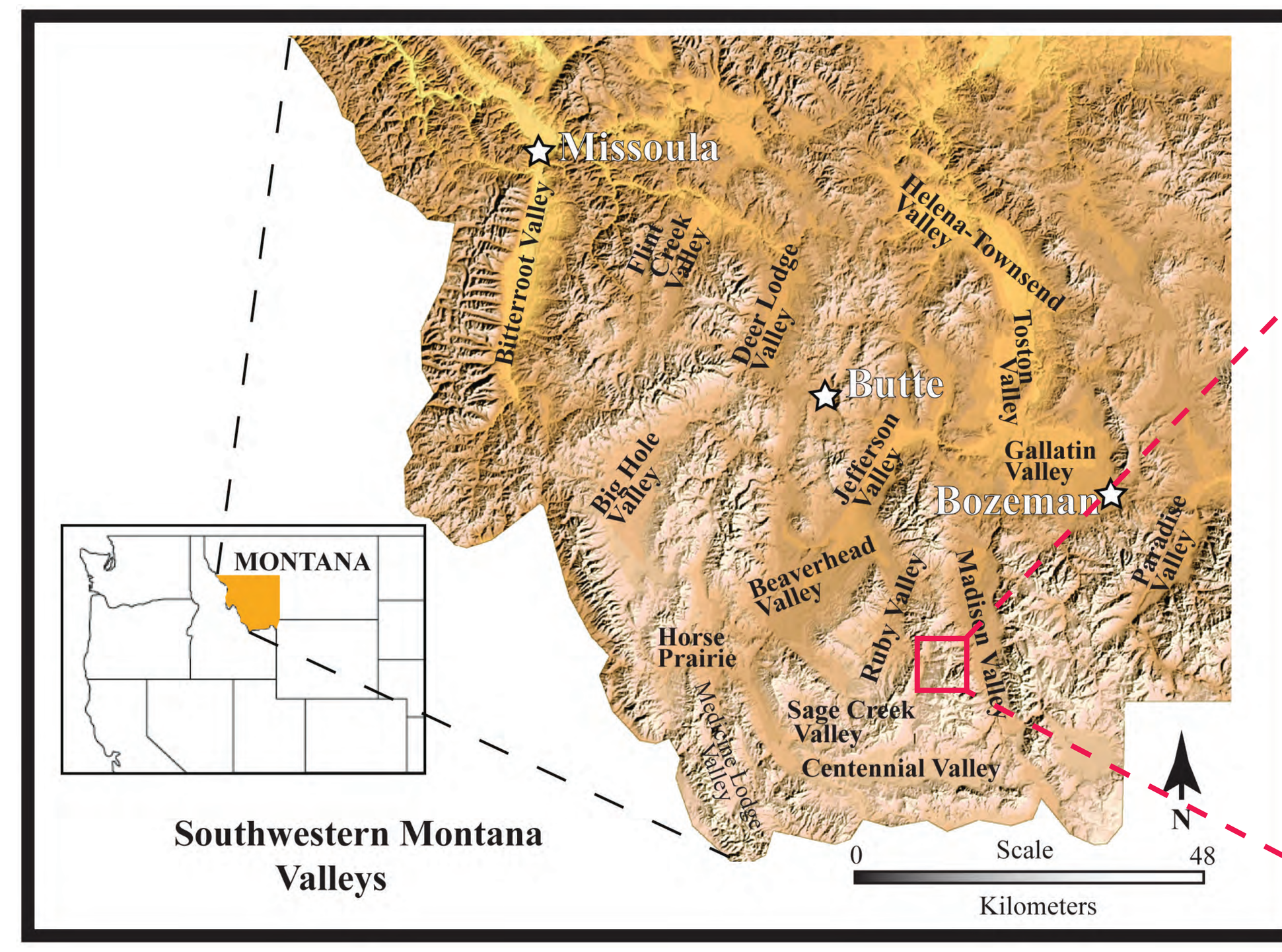
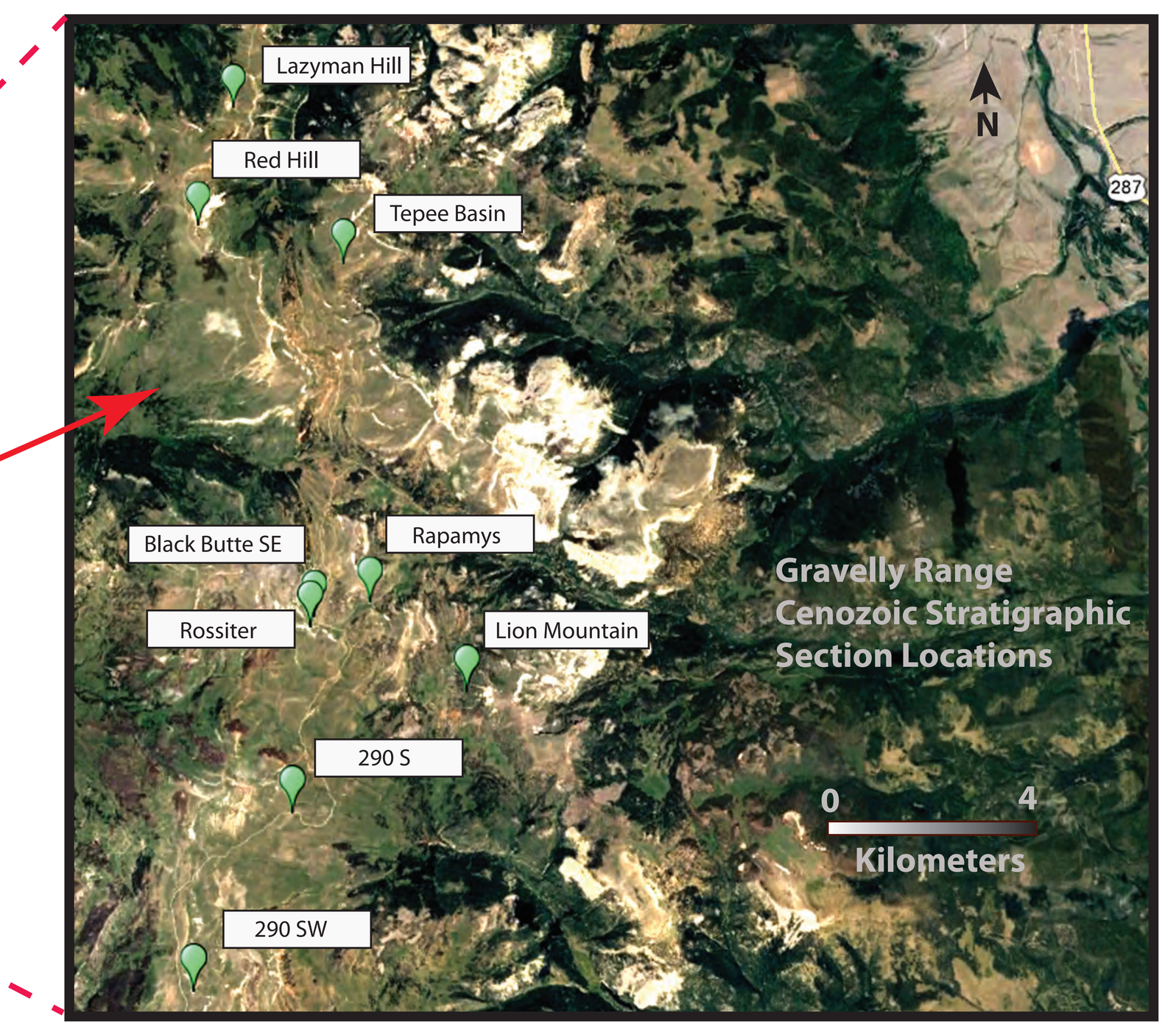
ABSTRACT

Tertiary strata exposed in four high elevation areas in the south-central Gravelly Range yield significant assemblages of Late Eocene to Oligocene mammals. The thickest stratigraphic sections of Tertiary strata are in the Lion Mountain-Black Butte area. The Lion Mountain section age is based primarily on American Museum of Natural History collections; the lower part of this section is Duchesnean-Chadronian (39-33 Ma) and the uppermost beds are Whitneyan (32-31 Ma). Age of the basal part of the Black Butte section is Duchesnean-Chadronian based on Harvard Museum of Comparative Zoology collections. Recent collections that include *Miohippus* indicate a probable Orellan age for uppermost exposures. The Tepee Mountain section is notable for abundant brontothere remains and is probably Duchesnean-Chadronian (approx. 39-33 Ma). The Rapamys site is the oldest vertebrate locality and is late Uintan to early Duchesnean (42-38 Ma) based on recently recovered specimens of *Rapamys*, *Protoreodon*, and *Lycophocyon*.

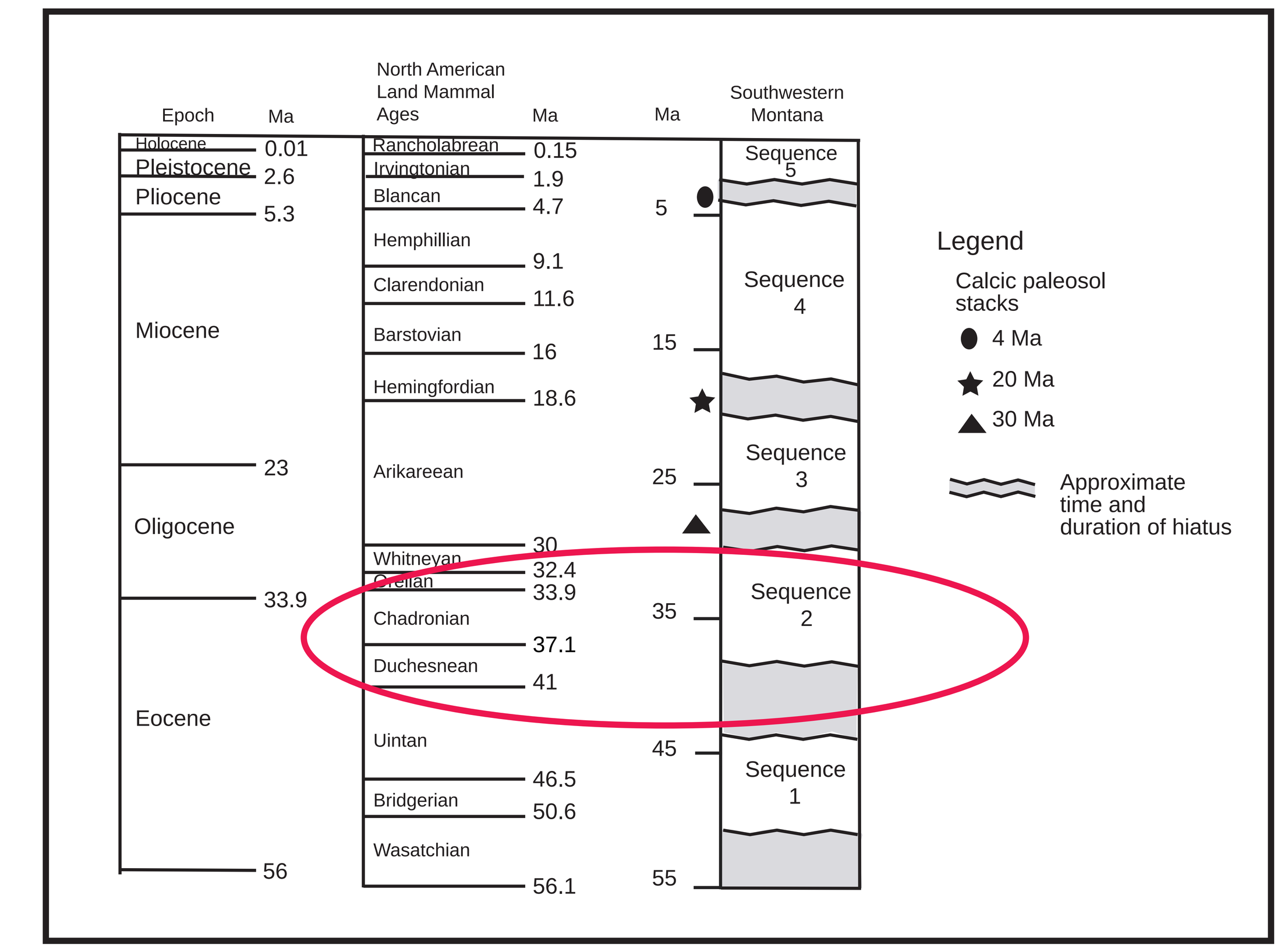
The Tertiary strata in this part of the Gravelly Range include fluvial, aeolian, and tufa deposits that are most likely mainly associated with localized Oligocene volcanism. The Lion Mountain section is about 270 meters in thickness; the lower half of the section is largely aeolian, with fluvial units comprising much of the upper section. Based upon age data, the 140 meter Black Butte section correlates to the lower 50-70 meters of the Lion Mountain section. The basal 20 meters of the Black Butte section contain some fluvial features, but much of the remaining section is largely aeolian in origin. Paleosols and extensive burrowing also occur within the Black Butte section. Stratigraphic section thickness decreases rapidly away from the Black Butte-Lion Mountain area, with section thicknesses of about 20 meters for the largely aeolian Rapamys and Tepee Mountain sections. Tufa deposits are located along the west-central edge of the Gravelly Range where they are associated with previously mapped thrust faults. Leaf imprint assemblages of Eocene-Miocene age are contained within these tufas. Strata previously mapped as Upper Cretaceous-Paleocene Beaverhead Formation are now variously reassigned to the lower Cretaceous Kootenai Formation, southwestern Montana Cenozoic Sequence 2, and diverse Quaternary units.



Field Area

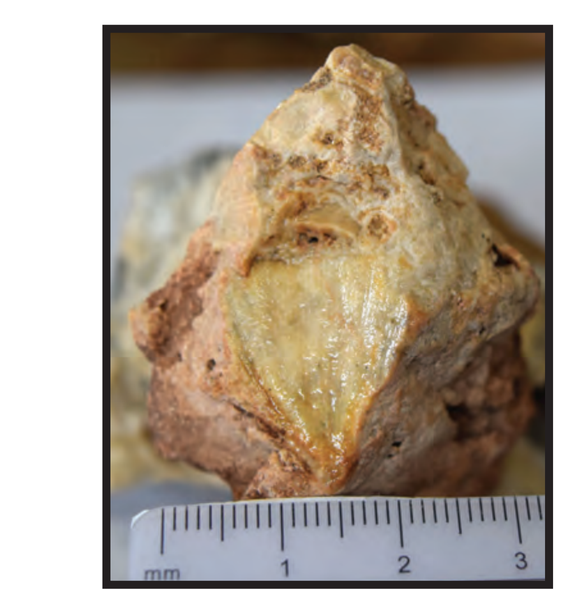


Although most Tertiary deposits are in southwestern Montana valleys, Tertiary strata are also found in the south-central Gravelly Range.



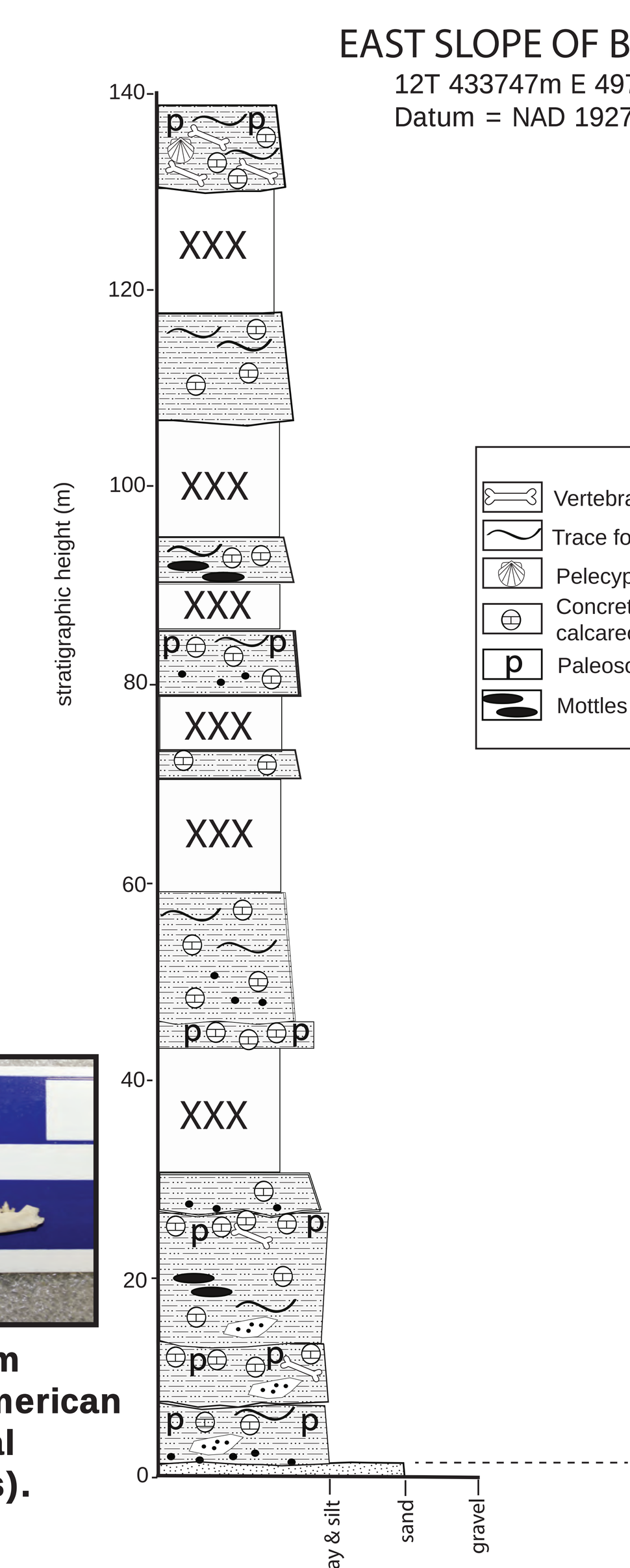
Tertiary strata range in age from late Uintan to Whitneyan (42 Ma - 31 Ma) based on contained vertebrate fossils and isotopic ages.

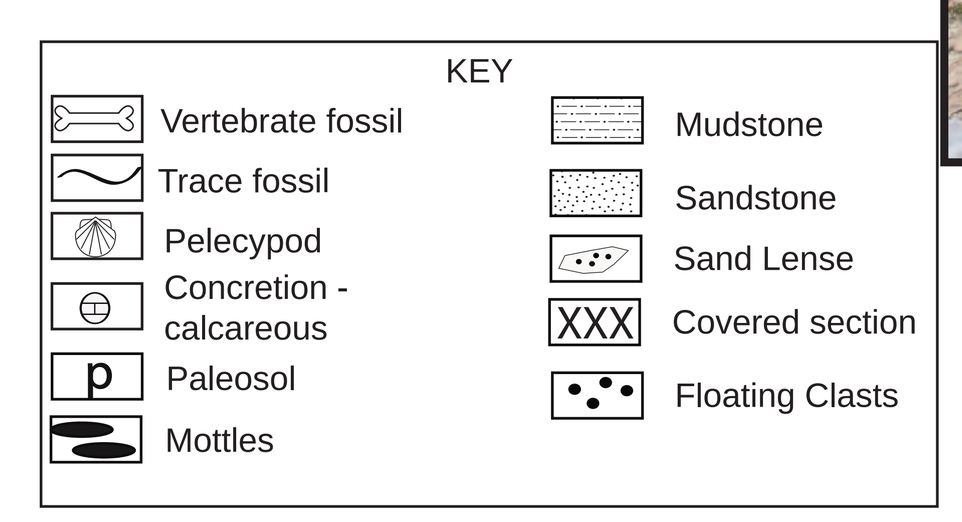
Tufa at Lazyman Hill - probably Eocene to Miocene in age based on contained leaf imprints.



Ginkgo leaf imprint from Lazyman Hill tufa.

Metasequoia branch imprint from Lazyman Hill tufa.



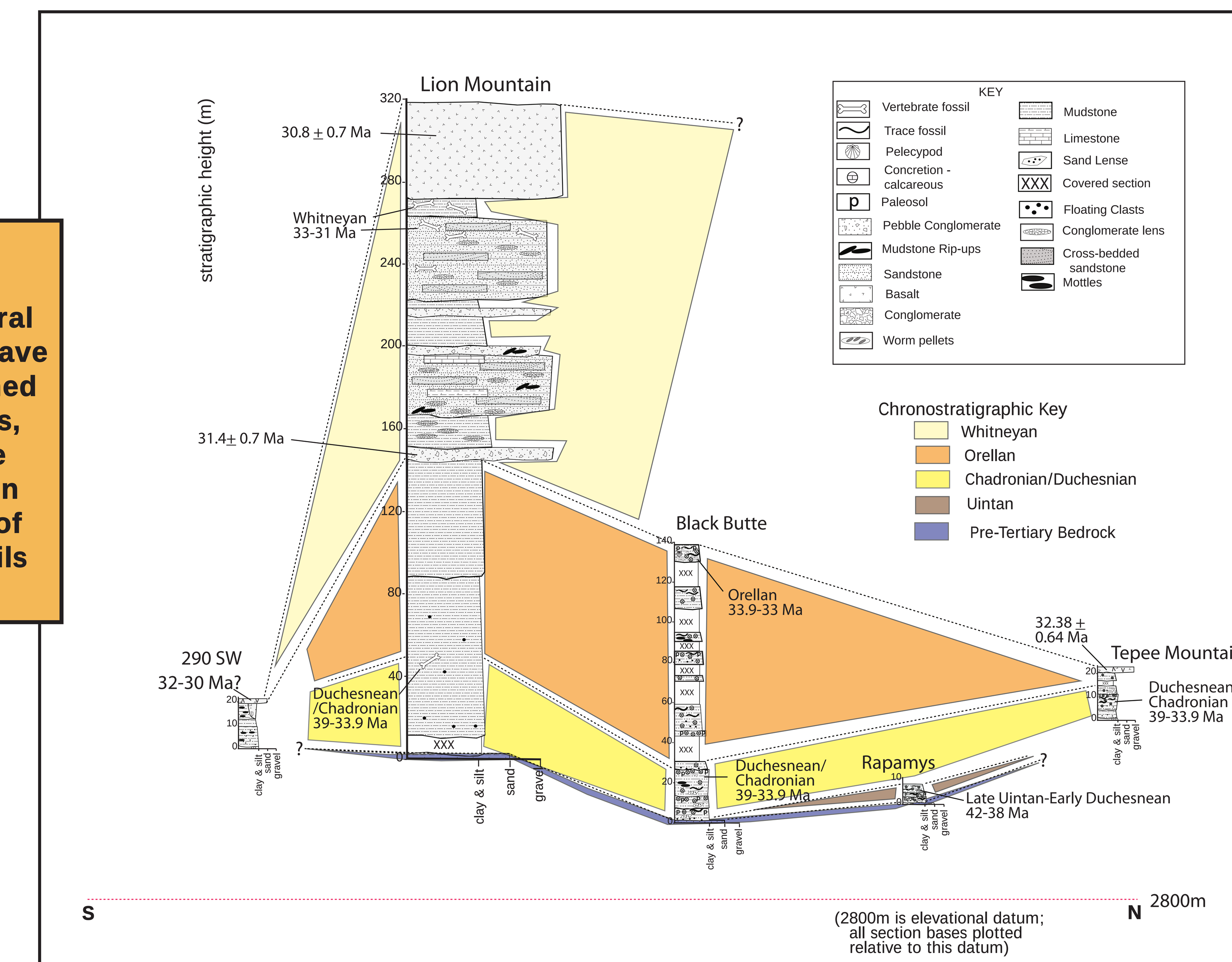


Uppermost fossiliferous mudstone unit at Black Butte SE section. This is also the Harvard vertebrate locality of their 1958 field season.

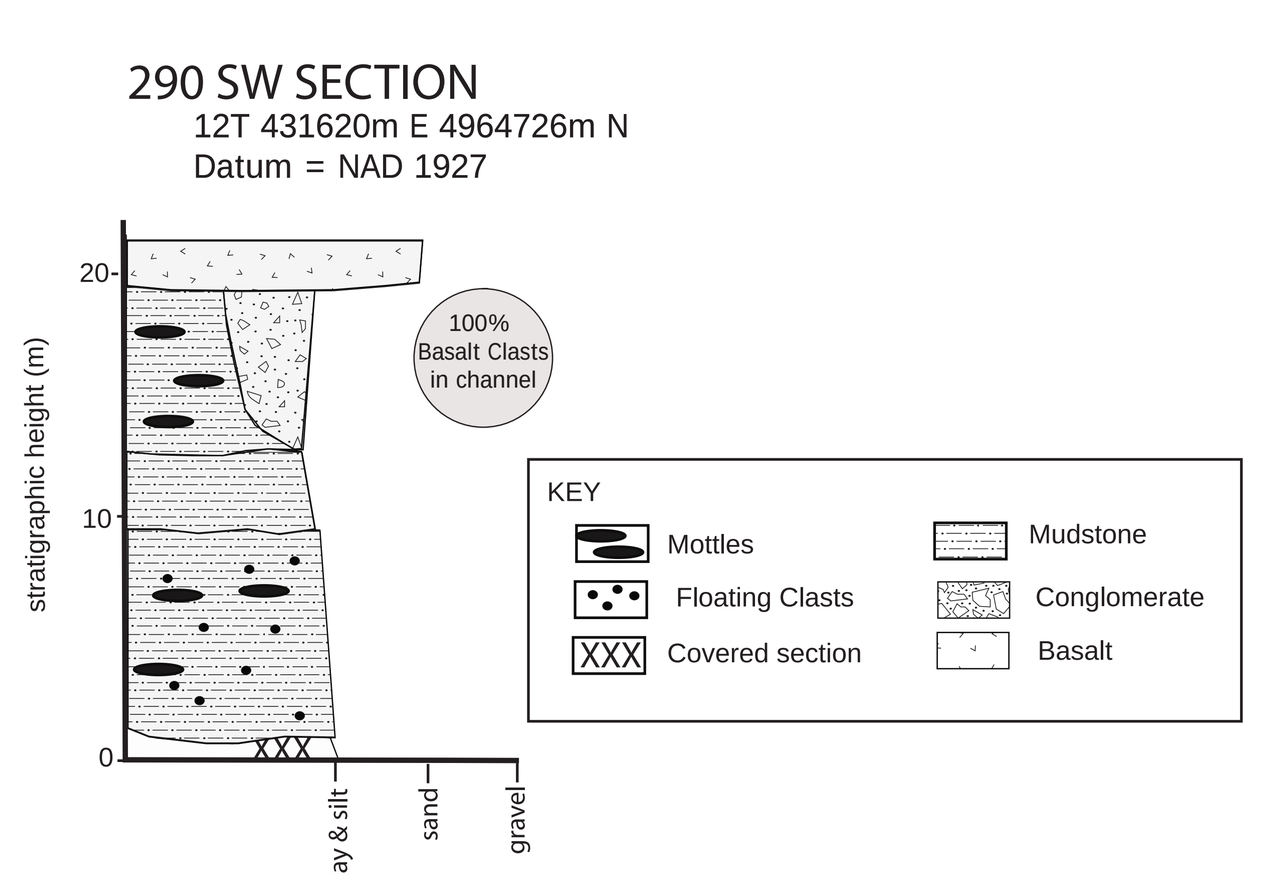
A tapiroid - probably *Colodon*, from the Black Butte SE section, the uppermost fossiliferous mudstone (from the MCZ collections, Harvard University).

Protoreodon from the Black Butte SE section, uppermost fossilifeous mudstone (MCZ collections, Harvard University).

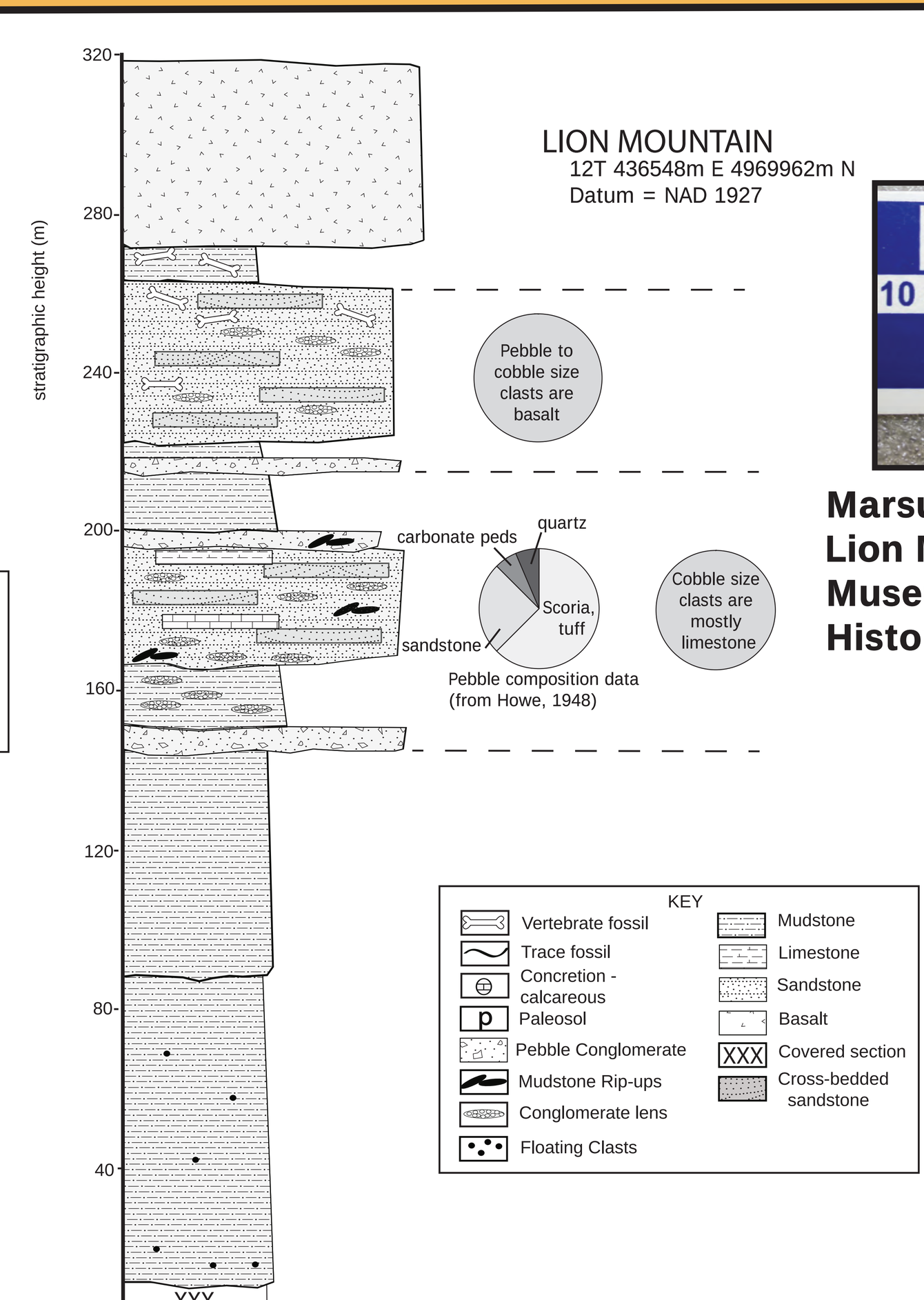
Stratigraphic sections were measured and described from several areas in the south-central Gravelly Range. Five sections have age control based upon contained vertebrate fossils,volcanic rocks, or a combination of both. These stratigraphic sections are shown in this poster along with some of their contained vertebrate fossils and lithologies.



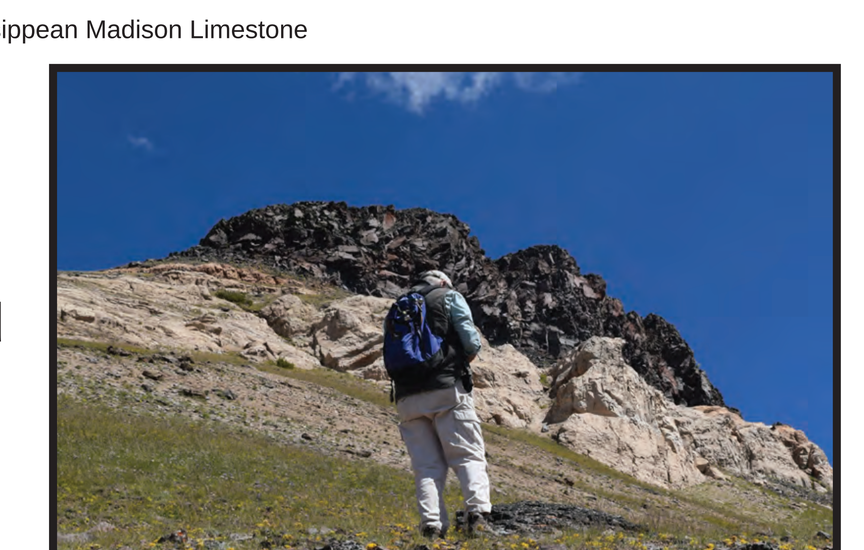
Stratigraphic section correlation of those Tertiary Gravelly Range stratigraphic sections with age control.



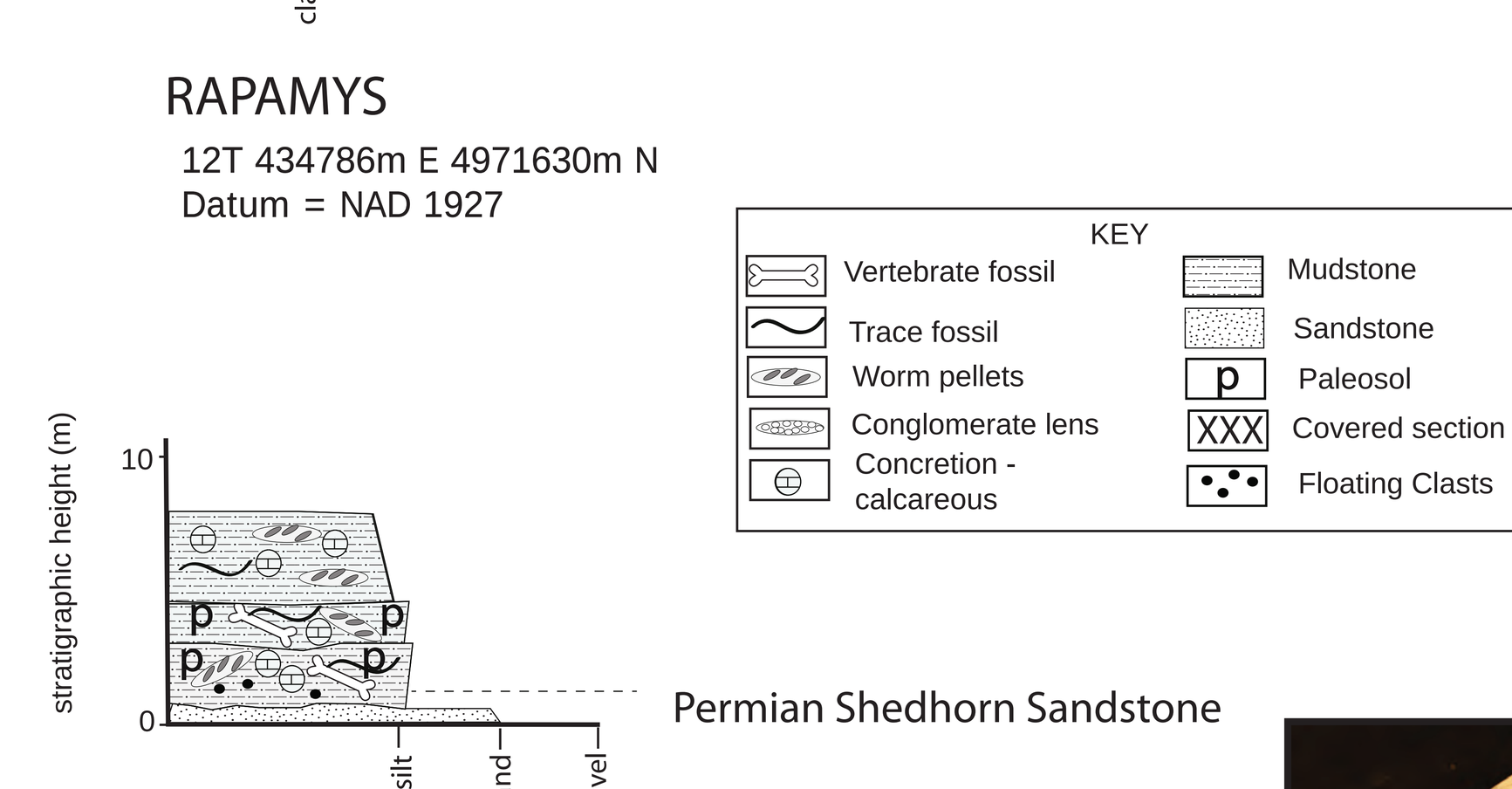
Channel with basaltic clasts cut into mottled mudstone strata at the 290 SW stratigraphic section.



Marsupial jaw from Lion Mountain (American Museum of Natural History collections).



Uppermost fossiliferous mudstone strata capped by basalt at the Lion Mountain stratigraphic section.



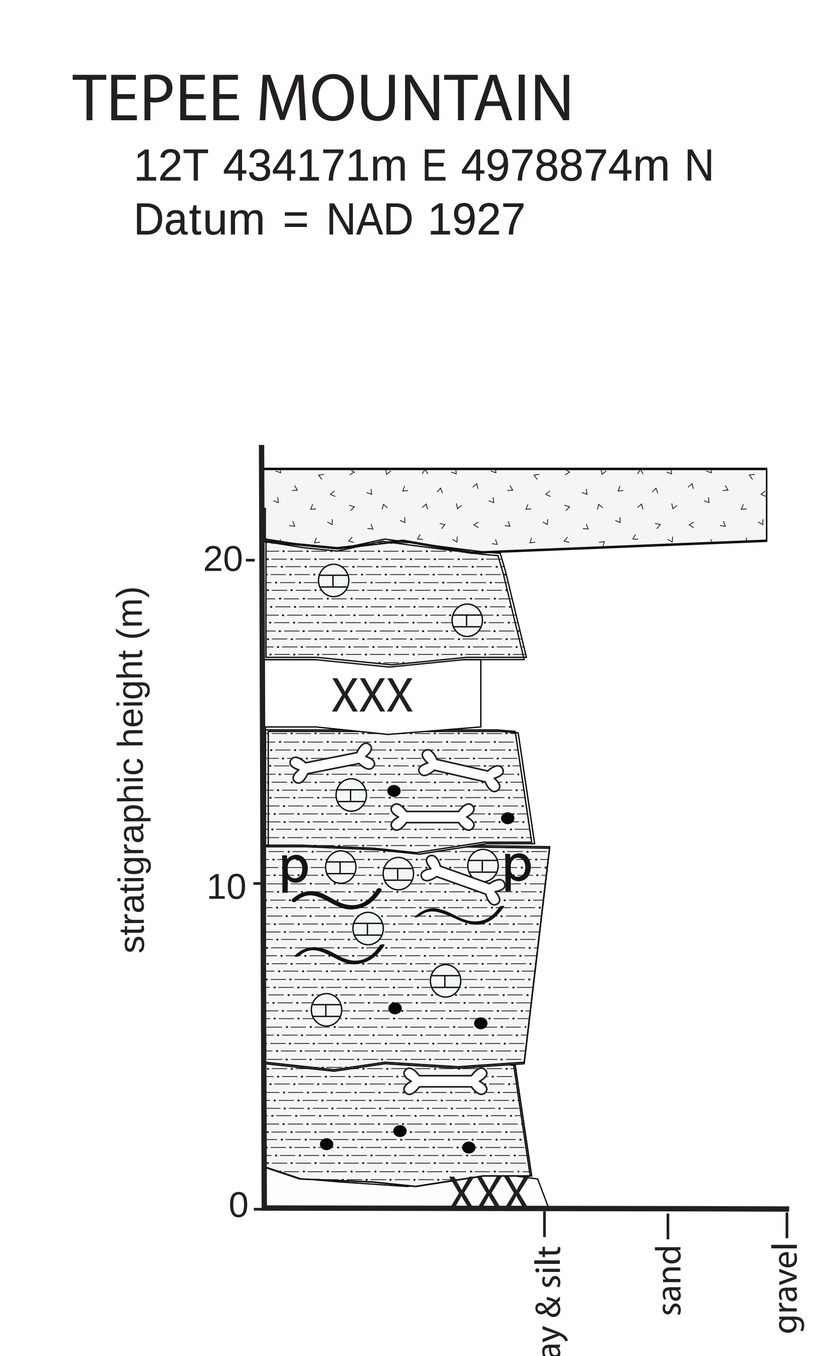
Partial *Rapamys* skull from Rapamys section.

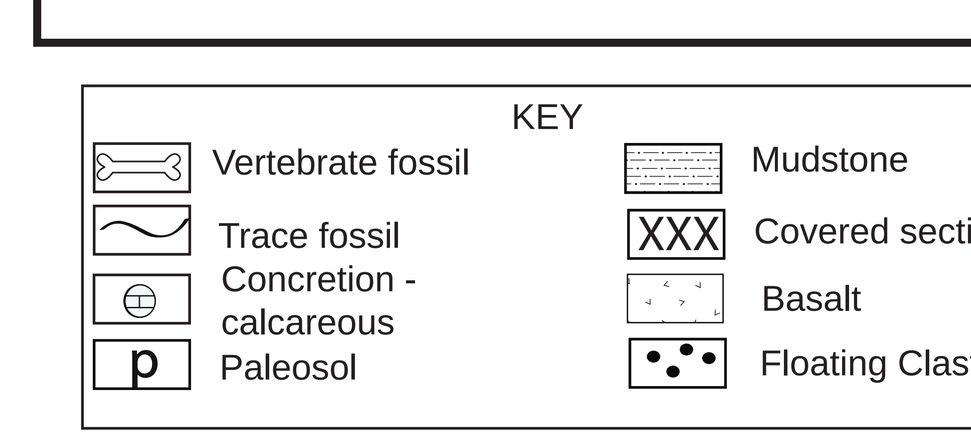
Prepared *Rapamys* skull from Rapamys section.

Pellets (?worm) in calcareous nodule at Rapamys section.

Lycophocyon - new species from the Rapamys section.

Rapamys section mudstone and calacreous nodules.





Ischyromys - from the Tepee Mountain section (in the American Museum of Natural History collections).

Megalagus - from the Tepee Mountain section (in the American Museum of Natural History collections).