so that it does not interfere with physiological recording. The deik will respond to the pneumatic pulses generated by trilling with the tongue up to 30 per second and the vibrations of the voice at c. 200 show clearly in such a tracing.

The pneumodeik is compact, and six of these units may be placed parallel on a drum 15 cm wide. They can be calibrated so that tracings from different subjects and at different times may be compared. This is important in phonetics, for example, where the actual air pressures and the actual extent of minute movements are significant.

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# SPECIAL ARTICLES

## CORRELATION OF THE FISH LAKE VALLEY AND CEDAR MOUNTAIN BEDS IN THE ESMERALDA FORMATION OF NEVADA

THE relations of the Fish Lake Valley and Cedar Mountain faunas have, in the past, been somewhat confused. Merriam (1916) compared the Cedar Mountain fauna with that of the Barstow and Santa Fé Miocene; furthermore, he called attention to Buwalda's (1914) work on the geology of the region in which the Tertiary sediments of Stewart and Ione Valleys were traced stratigraphically into the Esmeralda formation. Aside from the mammalian evidence, remains of plants and animals have thrown little conclusive evidence on the age of the Esmeralda formation. Lucas (1900) considered the fish as presumably of Pliocene rather than Miocene age, whereas Berry (1927) identified the plants as "most certainly Upper Miocene."

The results of a University of California expedition to Cedar Mountain in 1925 yielded sufficient material for a much better identification of the mammalian fauna. The available evidence seems to justify the assumption that both Miocene and Pliocene epochs are represented. While the fossil material is not as complete nor the fauna as extensive as might be desired for correlation purposes, certain distinctions are apparent.

Evidence for the existence of two faunas in the Cedar Mountain Tertiary deposits is most clearly shown by the horse teeth. There are also certain differences in the preservation of the material from these two faunal assemblages. The *Merychippus* teeth from U. C. Loc. No. 2027 and especially the associated bony elements are heavily water worn, harder and more silicified than the softer and lighter colored specimens from the lacustrine deposits discussed by Buwalda (1914). *Merychippus, Pliohippus* and *Hipparion* teeth are present from localities in Stewart Valley, but in no instance has *Merychippus* been found in association with *Pliohippus* or *Hipparion*. The teeth of *Pliohippus* and *Hipparion* represent advanced types; therefore it is difficult to conceive of their being contemporaneous with *Merychippus*. The Miocene anchitherine horse *Hypohippus* near *osborni* from U. C. Loc. 2027 is smaller and distinct from the larger *H. nevadensis* from the lacustrine beds.

The Carnivora from the Middle Miocene locality are more primitive than most Pliocene genera. *Tephrocyon* near *kelloggi,* although represented by fragmentary material, is characteristically different from the customary Pliocene aelurodons.

Among the Artiodactyla, *Procamelus gracilis*[1] is found in the Fish Lake Valley beds and in the lacustrine deposits at Cedar Mountain. The identity of this material from both beds is one of the best indications of their contemporaneity.

The fossil beavers from Loc. 2027 are more primitive than *Eucastor tortus* from Fish Lake Valley and compare favorably with remains from the Santa Fé and Coalinga Miocene deposits. A description and discussion of these species will be made in a paper on the fossil Castoridae.

There is one species which is reported both in the Fish Lake Valley Pliocene and the Cedar Mountain Miocene fauna. Hall (1929) referred a series of edentulous lower jaws from locality 2027 to *Meterix latidens,* a Fish Lake Valley species. It is questionable whether the lower jaws from Cedar Mountain belong to *M. latidens,* since no teeth are present to afford characters for comparison. When teeth are found from the Cedar Mountain Miocene deposits they will probably represent a new species.

The Miocene deposit, U. C. Loc. No. 2027, in the Cedar Mountain beds may be described as a lense of rewashed materials. The fossil mammal remains were found in a small area of brown sandstone lying in the fourth gully south of where the old road branches, one branch going to Stewart Spring (see Buwalda's map opposite p. 338, 1914).

The Fish Lake Valley fauna is predominantly Lower Pliocene and equivalent to the Upper Snake Creek and Valentine of Nebraska, also, the Little White River of South Dakota. The species do not compare closely with those from Thousand Creek or Rattlesnake. There are, possibly, some relations with

[1] The species *Procamelus cortatus* described by Stirton (1929) is probably conspecific with *P. gracilis* Leidy.

the Ricardo, but these are not clear. A comparison of the Fish Lake Valley and late Cedar Mountain fauna is unsatisfactory because of the lack of material from Cedar Mountain; however, identifiable specimens which are closely related and found in both localities appear to represent the same species. From the available evidence these faunas are the same or very closely related.

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FAUNAL LISTS

| Cedar Mountain | | Fish Lake Valley |
|---|---|---|
| Middle Miocene | Lower Pliocene | Lower Pliocene |
| | BIRDS<br>*Nettion carolinense* (Gmelin)<br>*Marila collaris* (Donovan) near *Querquedula cyanoptera* (Vieillot)? | BIRDS<br>*Branta esmeralda* Burt |
| MAMMALS<br>*Meterix* cf. *latidens* Hall<br>*Bassariscus parvus* Hall | MAMMALS | MAMMALS<br>*Meterix latidens* Hall<br>*Metechinus nevadensis* Matthew<br>*Mystipterus vespertilio* Hall |
| *Tephrocyon* near *kelloggi* Merriam | ?Aelurodon | *Aelurodon haydeni* (Leidy)<br>*Hypolagus* cf. *vetus* L. Kellogg<br>*Sylvilagus*? |
| New genus (Castoridae)<br>*Mylagaulus* sp. | | *Eucastor tortus* Leidy<br>*Mylagaulus* sp.<br>*Entoptychus*? |
| *Meniscomys* | | *Diprionomys magnus* L. Kellogg<br>*Diprionomys parvus* L. Kellogg<br>*Diprionomys quartus* Hall<br>*Diprionomys tertius* Hall<br>*Macrognathomys nanus* Hall<br>*Peromyscus dentalis* Hall |
| *Hypohippus* near *osborni* Gidley | *Hypohippus nevadensis* | *Hypohippus* near *nevadensis* Merriam |
| *Merychippus* cf. *isonensus* (Cope) | *Pliohippus* cf. *leidyanus* Osborn | *Pliohippus* cf. *leidyanus* Osborn |
| | *Hipparion* cf. *occidentalis* Leidy | *Hipparion* cf. *occidentalis* Leidy |
| | | *Prosthennops* cf. *crassigenis* Gidley |
| | *Procamelus gracilis* Leidy | *Procamelus gracilis* Leidy<br>*Procamelus* cf. *robustus* Leidy<br>*Alticamelus* cf. *priscus* Matthew |

## SEED TRANSMISSION OF COTTON WILT[1]

MANY Fusaria which cause diseases of plants have been assumed to be disseminated inside the seeds. With cotton wilt, caused by *Fusarium vasinfectum*, the possibility of the disease being carried by the seed has been questioned. Gilbert[2] stated that "tests covering a period of four years to determine whether wilt is carried by the seed have given negative results." Later, Fahmy,[3] Neal[4] and Dastur[5] planted seed from wilt-infected cotton plants with negative results, and also failed to isolate Fusarium in culturing such seeds. The only previous evidence indicating seed transmission of cotton wilt was obtained by Elliott.[6] He obtained wilt in plants grown from seeds from infected plants and showed also that Fusarium spores placed on the exterior of cotton seed remained viable for at least 5 months.

### PLANTING SEED FROM WILT-INFECTED PLANTS

During the fall of 1929, a quantity of seed of the variety "Half and Half" was selected from a field in Brazos County, from plants known to be infected with Fusarium wilt as proved by isolations from the roots and stems. These seed were stored in the laboratory at room temperature and in 1930 divided in two lots. The seed of one lot were planted in a series of 40 cylinders, each 18 inches in diameter and 24 inches deep. These were sunk in the ground, closed at the bottoms by tight galvanized iron plates and filled with sifted Norfolk fine sandy loam soil material from an elevated, uncleared wooded section in Brazos County, known to have been uncultivated for at least 50 years. Untreated seed from the wilt-infected cotton plants were planted in wilt-free soil in 20 cylinders and seed delinted with sulphuric acid and then surface sterilized with 1:1000 mercuric chloride solution were planted in 20 more cylinders. Plants in 2

[1] Published with the approval of the director as Contribution No. 209, Technical Series, of the Texas Agricultural Experiment Station.

[2] W. W. Gilbert, "Cotton Wilt and Root Knot," U. S. Dept. of Agr., *Farmers' Bull.*, 625, 1914.

[3] Tewfik Fahmy, "The Fusarium Disease of Cotton (Wilt) and Its Control," Ministry of Agr., Egypt. Tech. and Sci. Series, *Bull.* 74, 1927.

[4] D. C. Neal, "Cotton Diseases in Mississippi and Their Control," *Miss. Agr. Exp. Sta. Bull.*, 248, 1928.

[5] J. F. Dastur, "Cotton Wilt," Memoirs of the Dept. of Agr. in India, Botanical Section, 17: 29–73, 1929.

[6] J. A. Elliott, "Cotton Wilt, a Seed-borne Disease," *Journ. of Agr. Res.*, 23: 387–393, 1923.