

shale and overlying formations to the base of the Hertha limestone. The Englevale sandstone, therefore, can not be correlated with the Warrensburg and Moberly sandstones from the information available. Several other channel sandstones have been noted⁶ in the Pennsylvanian, but they are all considerably higher in the section than the Englevale sandstone.

Future work with channel sandstones for the purpose of differentiating the channels of different ages and grouping those of the same age is essential in the formation of a regional pattern. As an alternative for the conception of single channels of great depth, the possibility of compound channels that are made up of younger channels superimposed over older ones should be investigated during field and office studies.

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DEEP-WELL RECORD OF FOSSIL MAMMAL REMAINS IN CALIFORNIA

INTRODUCTION

The writer not only aims to discuss the subject matter indicated by the title, but takes the occasion also to direct attention to a type of material met with in geological explorations for petroleum and important to the vertebrate paleontologist as well as to the practical field geologist. Remains of fossil mammals are commonly encountered in land-laid deposits of Tertiary or Pleistocene age where their presence may be looked upon as a source of some information concerning the conditions under which the sediments have accumulated. The mammals themselves, because of their complex structural characters and relatively restricted vertical range in geologic time, become excellent markers and age determinators. Moreover, a surprising amount of information concerning these forms may be drawn on occasion from scattered or fragmentary remains.

Some fossil land mammals are found in continental deposits that are intercalated in marine beds or in strata laid down under marine conditions, as for example in the Pacific Coast Marine Province of California or in the Coastal Province of the southern United States. In such instances broad regional correlations of considerable impor-

⁶ Henry Hinds and F. C. Greene, "Leavenworth-Smithville, Missouri-Kansas," *U. S. Geol. Survey Atlas Folio 206* (1917), pp. 6, 10.

R. C. Moore, M. K. Elias, and N. D. Newell, "Pennsylvanian and 'Permian' Rocks of Kansas," *Kansas Geol. Survey* (1934). A graphic composite section.