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2001

Generalized Block Diagram of the Pine Mountain Karst

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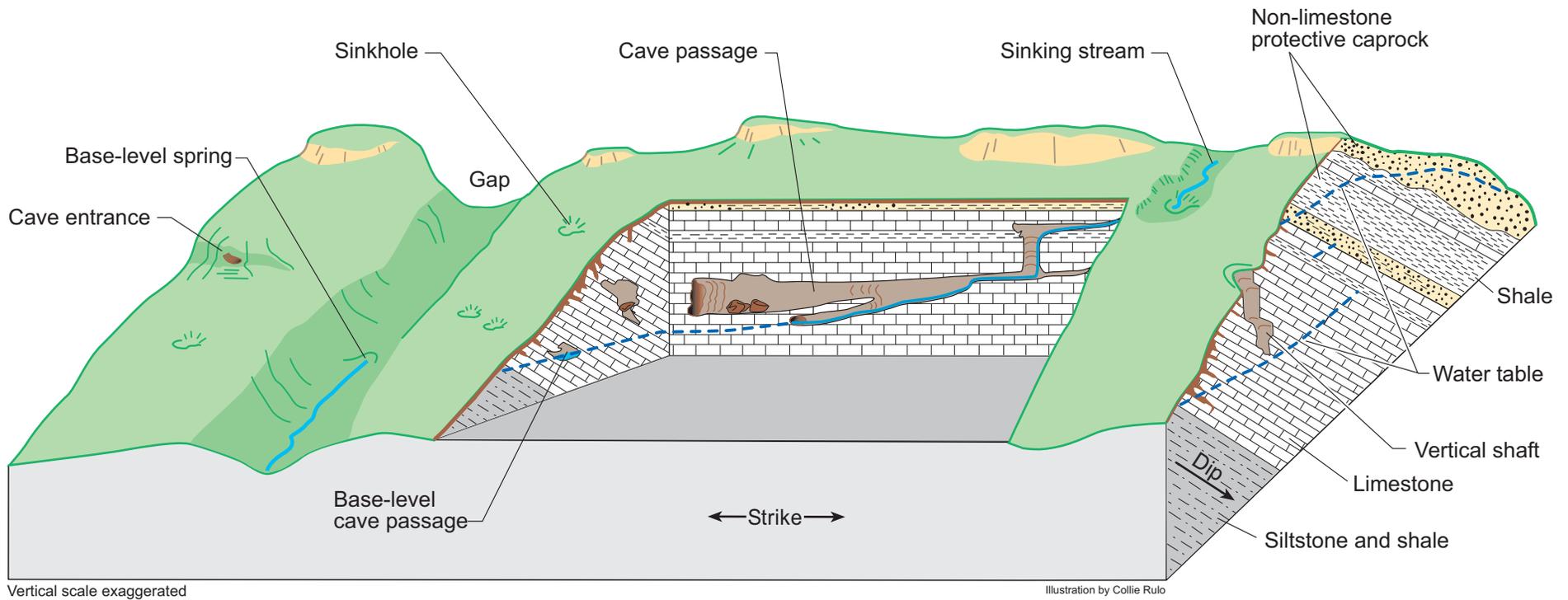
Currens, James C., "Generalized Block Diagram of the Pine Mountain Karst" (2001). *Kentucky Geological Survey Map and Chart*. 18.

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Generalized Block Diagram of the Pine Mountain Karst

James C. Currens



Pine Mountain karst:

Karst occurs where limestone or other soluble bedrock is near the earth's surface, and fractures in the rock become enlarged when the rock dissolves. Sinkholes and sinking streams are two surface features that indicate karst development. In karst areas most rainfall sinks underground, resulting in fewer streams flowing on the surface than in non-karst settings. Instead of flowing on the surface, the water flows underground through caves to eventually discharge at a base-level spring along a major stream or at the top of an impermeable strata. The development of karst features is influenced by the type of soluble rock and how it has been broken or folded by geologic forces. There are four major karst regions in Kentucky: the Inner Bluegrass, Western Pennyroyal, Eastern Pennyroyal, and Pine Mountain. This diagram depicts the Pine Mountain karst in southeastern Kentucky.

Pine Mountain is the eroded western edge of a vast sheet of rock that was pushed northwest by continental collision along a thrust fault, between 200 and 280 million years ago. The caves and other karst features developed long after the faulting ended, but their

development was controlled by the southeastern dip of the rocks along the Pine Mountain Fault. As the overlying rocks were removed by erosion, the limestone was exposed along a narrow, very long strip along the length of the fault. The limestone is bounded by shales and sandstones. The extent of karst development is limited by the area of exposed limestone and by structure restricting ground-water circulation. Many springs are located at major gaps, such as Hurricane and Payne Gaps, but some are in small hollows on the northwest slope of the mountain. Cave passages are aligned along the strike (length) of the mountain and drain toward the gaps. The sloping cross-sectional shape of cave passages is also influenced by the structure. Sinkholes are small and scattered because they are filled by debris that moves downslope and because runoff infiltration is rapid and widely distributed along the numerous joints and bedding planes. Less soluble layers in the bedrock influence the location and development of vertical shafts and cave passages. Very few water wells are drilled into the Pine Mountain karst aquifer because the steep topography along the northwest face of the mountain discourages building, but some springs are used as water sources.