

**KANSAS GEOLOGICAL SURVEY
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FLINT HILLS PROFILES

by

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It is probable that using profiles is one of the best ways of representing the Flint Hills, the most prominent group of the generally east-facing escarpments that lie in the area of outcrops of Paleozoic rocks in Kansas. The escarpments give the name "Scarped Plains" to the larger area.

We have made a series of east-west profiles showing the groups of lower Permian and Upper Pennsylvanian rocks that are in the Flint Hills escarpments and farther east. Bases of some of the thicker limestones are shown.

(Show slides of profiles)

The profiles were drawn with vertical scales 10 times that of the horizontal. They represent topography and stratigraphy along east-west lines (1) in northern Wabaunsee County and extending into the vicinity of Junction City; (2) in Butler County in the vicinity of Piedmont and Beaumont; and (3) in Chautauqua and Cowley Counties, only a few miles north of the Kansas-Oklahoma line.

Primarily the profiles are presented to show topography, which being more rugged than that to the west or to the east is the chief reason for designating a geographic area as a physiographic unit, the Flint Hills.

It is obvious that an area defined as a physiographic unit requires geographic boundaries.

(Slide showing maps from Kollmorgen and Simonett)

Boundaries as shown in Kollmorgen and Simonett's figure 3 shows boundaries that have been proposed. This outlines on the west the westernmost outcrops of the Fort Riley Limestone, which is approximately 100 feet below the top of the Chase Group which is shown on the profiles. On the east the boundary is placed at the outcrop of the thin Americus Limestone lowermost unit of the Council Grove Group, shown on the profiles.

The southern boundary, in Oklahoma, is placed at Arkansas River, where in general facies changes in the rocks are responsible for less rugged topography southward.

In Nebraska relatively thick glacial drift partly masks the influence of bedrock on the topography. The Flint Hills should be regarded as extending an undetermined distance north of the Kansas-Nebraska border.

Kollmorgen and Simonett's figure 3 shows the Flint Hills Upland as defined by Schoewe. He designated the Flint Hills as an area about 20 miles wide and occupying the eastern margin of the Uplands area. We are suggesting that inasmuch as the rocks are the chief factor that influence physiography that rocks are suitable factors in determining a physiographic unit.

Concerning specifically the Flint Hills, the presence of flint is a characteristic of rocks.

The other two maps, also from Kollmorgen and Simonett are based on soil associations as outlined by Bidwell and the one (at the right) is a "Big Pastures" map, purely a land-use map.

The profiles and interpretations of rocks in nearby areas tell a long, long story. Only major events should be mentioned here; *omitting* many details of very long periods of geologic history we are ignorant.

(With one profile on screen)

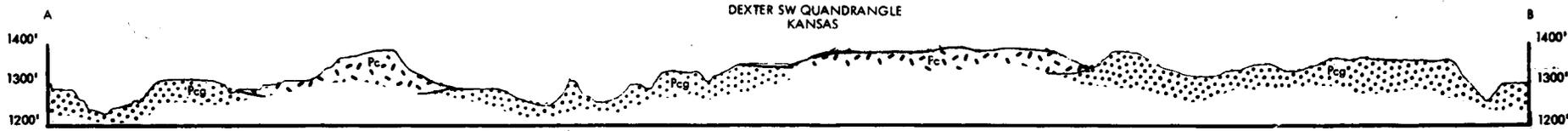
Note the westward tilting of bedrock and the eastward slope of the Kansas surface as a whole.

There is evidence that the rocks acquired their westward inclination not later than the close of Paleozoic time; I believe it was earlier.

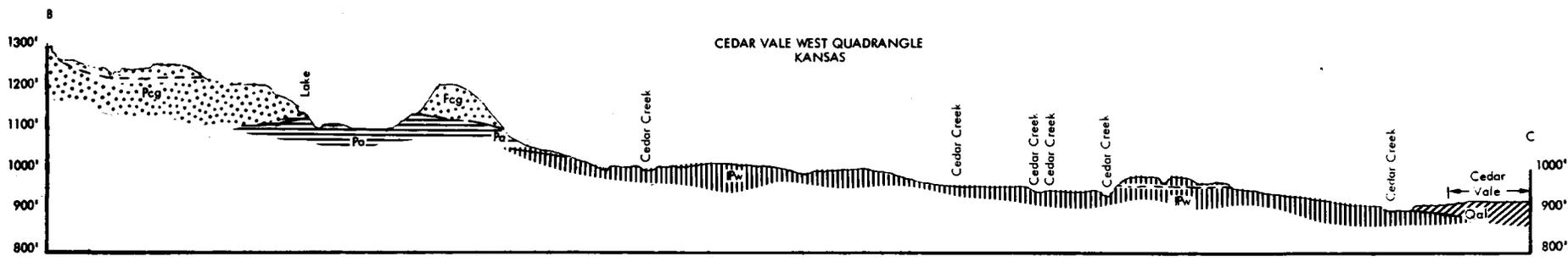
Their westward dip is a result of an uplift in the Ozark country. Evidently it was accompanied by erosion that beveled the beds and removed much material. But note that the surface sloped westward. Material was carried westward and became part of younger rocks.

Some of the Permian strata of western and central Kansas probably is material that had been Pennsylvanian and Permian rocks in eastern Kansas. Certainly Mesozoic rocks farther west are made of material that was a part of Paleozoic rocks in eastern Kansas. It should be noted that in the Flint Hills country escarpments cut in Permian beds then faced westward.

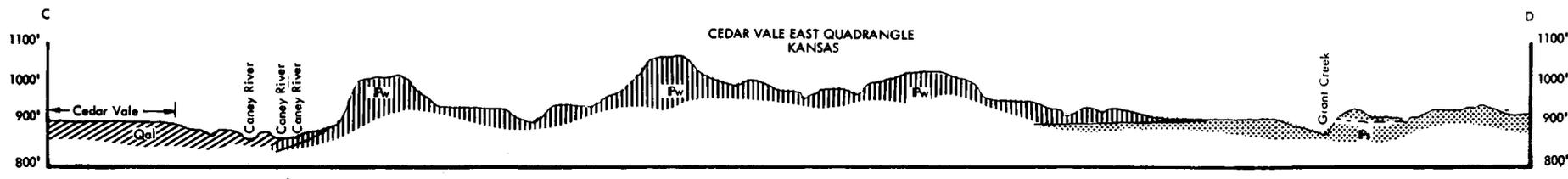
Probably Cretaceous sediments completely blanketed Kansas. But when sometime in Cenozoic time Mesozoic and "Tertiary" sediments no longer covered Paleozoic rocks in eastern Kansas and the country had acquired an eastern slope. The Rocky Mountains had been born. Later the High Plains had been built and already were being destroyed while east-facing escarpments were being carved in eastern Kansas. The Flint Hills were being carved chiefly by running water.



0 1/2 1 MILE
section 2 miles north of T. 34 S.



0 1/2 1 MILE
section 2 miles north of T. 34 S.

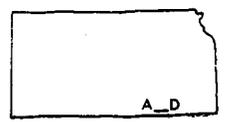


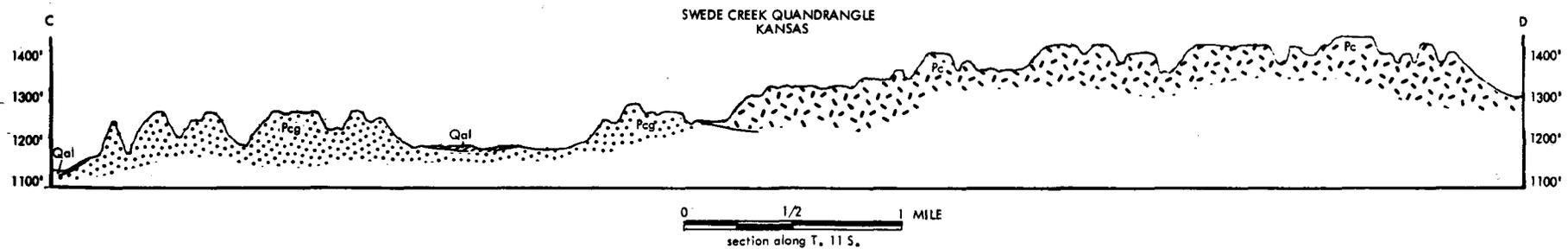
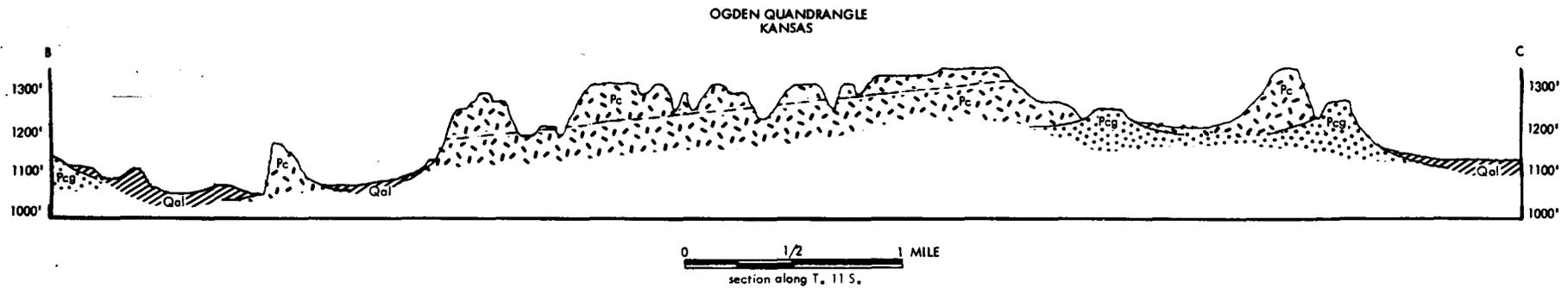
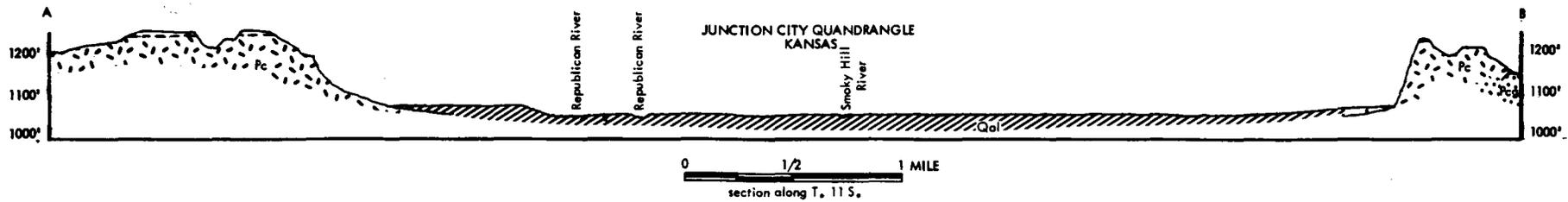
0 1/2 1 MILE
section 2 miles north of T. 34 S.

EXPLANATION

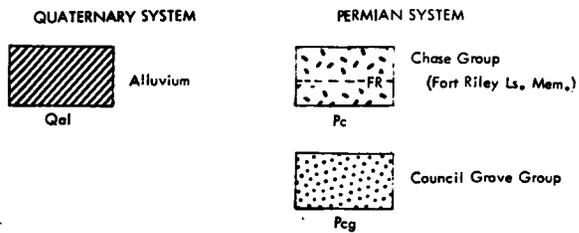
QUATERNARY SYSTEM	PERMIAN SYSTEM	PENNSYLVANIAN SYSTEM
Alluvium Qal	Chase Group Pc	Wabausee Group (Zeandale Ls.) Pw
	Council Grove Group (Neva Ls., Mam.) Pcg	Shawnee Group (Deer Creek Ls.) Ps
	Admire Group Pa	

INDEX MAP

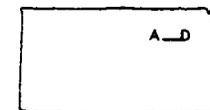


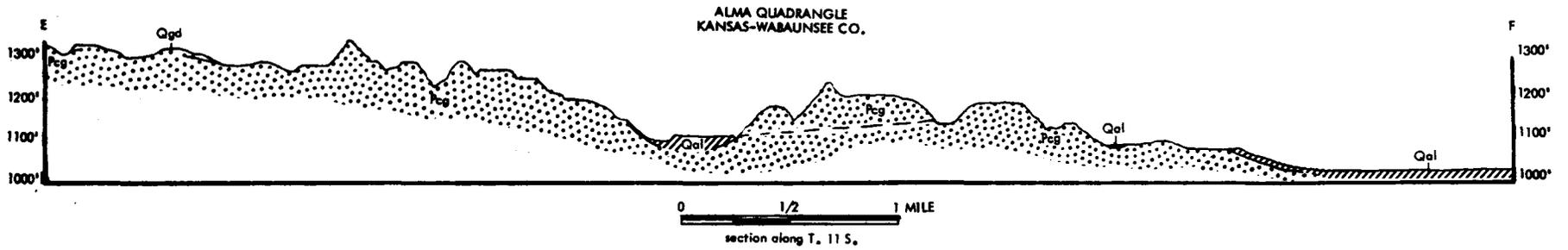
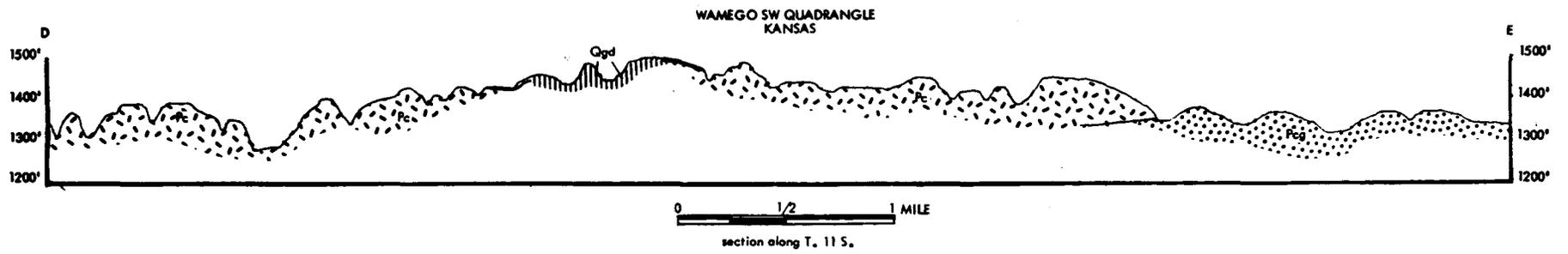


EXPLANATION



INDEX MAP



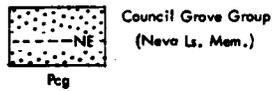


EXPLANATION

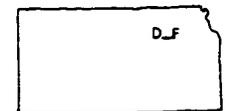
QUATERNARY SYSTEM



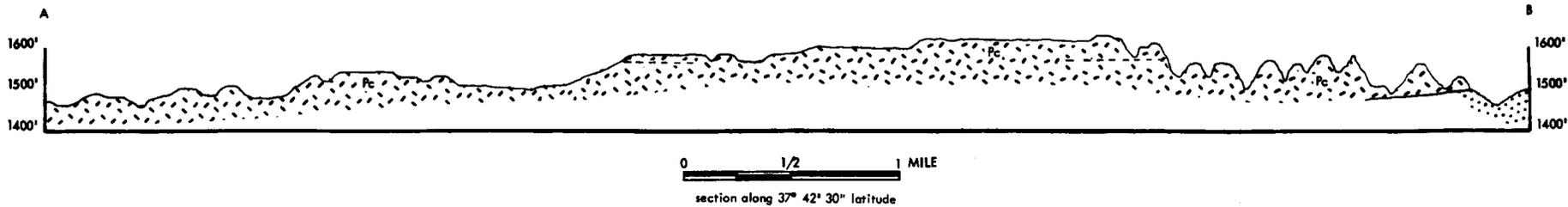
PERMIAN SYSTEM



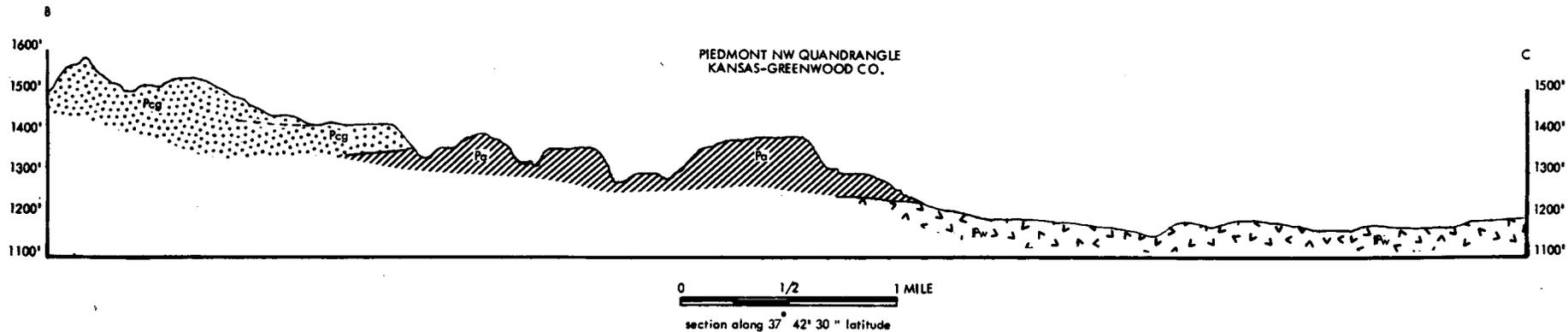
INDEX MAP



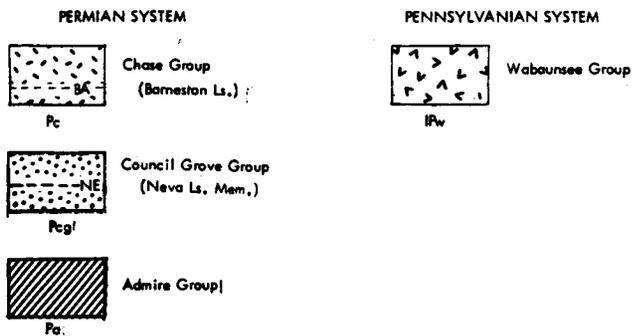
BEAUMONT QUADRANGLE
KANSAS



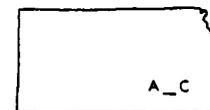
PIEDMONT NW QUADRANGLE
KANSAS-GREENWOOD CO.



EXPLANATION



INDEX MAP



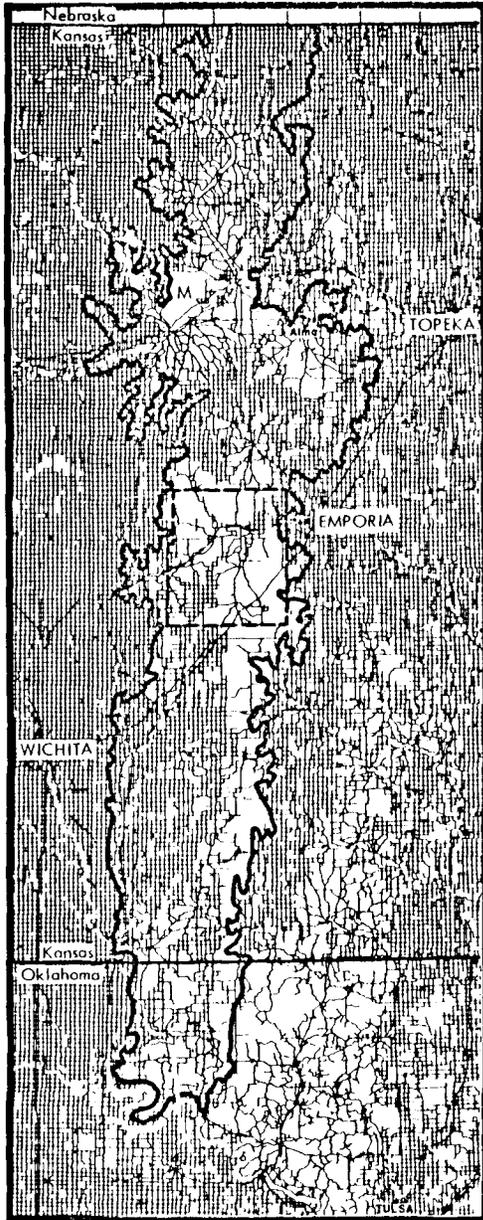


FIG. 2. The Flint Hills of Kansas-Oklahoma, as outlined by J. M. Jewett of the Kansas Geological Survey, and location of Chase County (near-rectangular form west of Emporia). Mr. Jewett established the eastern border of the Flint Hills at the base of the Foraker Flint-bearing limestone formation, and the western boundary approximately at the western boundary of the outcrops of the Fort Riley limestone. The outline is drawn over a road grid pattern to suggest that the term Flint Hills, as used by geologists, is by no means coterminous with big pasture country. Crop farming is prominent where section line roads prevail. In the northern part of the area shown as Flint Hills, glacial drift and loess mantle much of the area and intensive farming is the rule. The open, big pasture area shown in Oklahoma, lying for the most part outside the designated Flint Hills area, is about half limestone hill country and half sandstone hill country, or part of the Osage Hills. Northward in Kansas, the big pasture country east of the designated Flint Hills is likewise part limestone hills on the western side and part sandstone hills on the eastern side, and is also referred to as Chautauqua Hills.

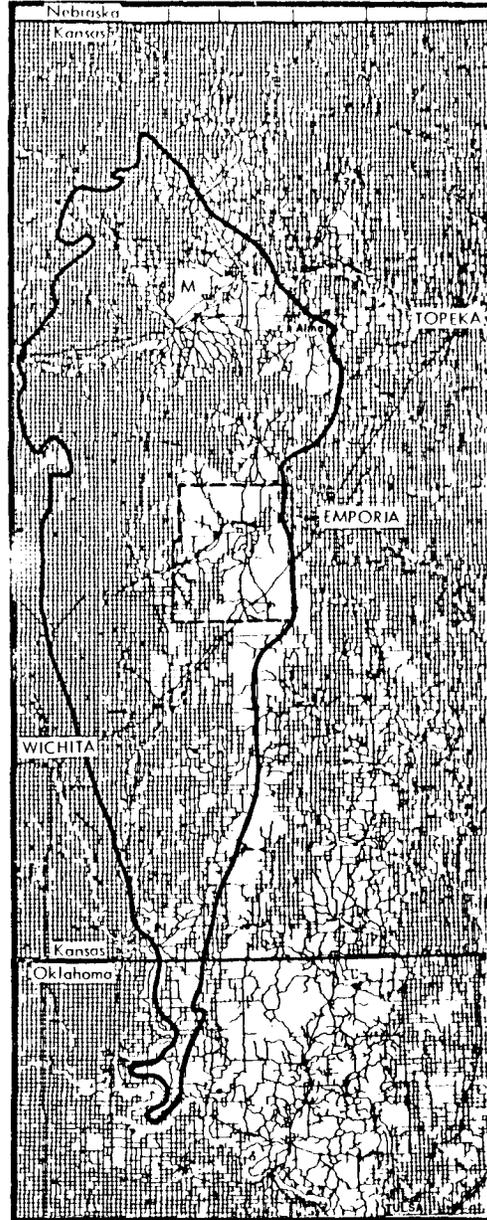


FIG. 3. The Flint Hills Uplands in Kansas part of figure as delineated by W. H. Schoewe in "The Geography of Kansas," Part II, "Physical Geography," in *Transactions, Kansas Academy of Science*, Vol. 52, No. 3 (Sept., 1949), p. 276. Extension into Oklahoma based on geology map of that state. Dash line shows border of Chase County.

The Flint Hills Upland outline for Kansas is based on the "outcrop of flint-bearing Permian strata" (p. 286). Schoewe also distinguishes between Flint Hills Uplands (area shown) and Flint Hills. The latter, he reports, are "about 20 miles wide and extend from the Nebraska to the Oklahoma border." In the above figure, these hills approximate the eastern border of the Flint Hills Uplands, but as suggested by background road pattern, much big pasture country lies eastward and even northward of the designated area. The largely uninterrupted road pattern in the western part of the Uplands correctly suggests small field crop farming. This figure and Fig. 2 present only two of a series of varying border outlines of the Flint Hills prepared by professional geologists.

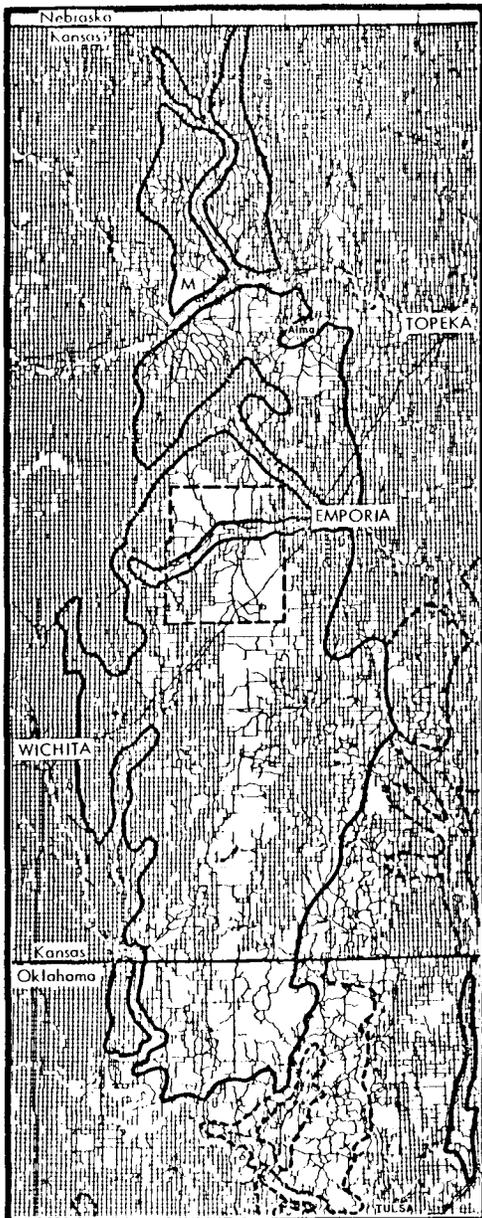


FIG. 4. Principal soil associations of the Flint Hills-Bluestem Pastures and the Oak-Hickory Sandstone pastures of Kansas and Oklahoma. Flint Hills in Kansas based on the Sogn, Summit, Florence, Idana Association (after Bidwell, 1956); in Oklahoma, on the Sogn, Summit Association (after Gray and Galloway, 1959). Oak-Hickory sandstone lands in Kansas based on the Darnell, Stephensville, Dennis, Boone Association (after Bidwell, 1956); in Oklahoma, on the Darnell-Stephensville Association (after Gray and Galloway, 1959). Note the discrepancy in fit in eastern part along Kansas-Oklahoma border. Again the sparse road pattern in background is more helpful in identifying big pasture country, which clearly extends southward and eastward of single physical factor delineation. Dash line shows location of Chase County. Sources: (1) O. W. Bidwell, *Major Soils of Kansas*, Contribution No. 551, Department of Agronomy Kansas Agricultural Experiment Station (Manhattan, 1956); (2) F. Gray and H. M. Galloway, *Soils of Oklahoma*, Miscellaneous Publication MP-56 (Stillwater: Oklahoma State University Experiment Station, 1959).

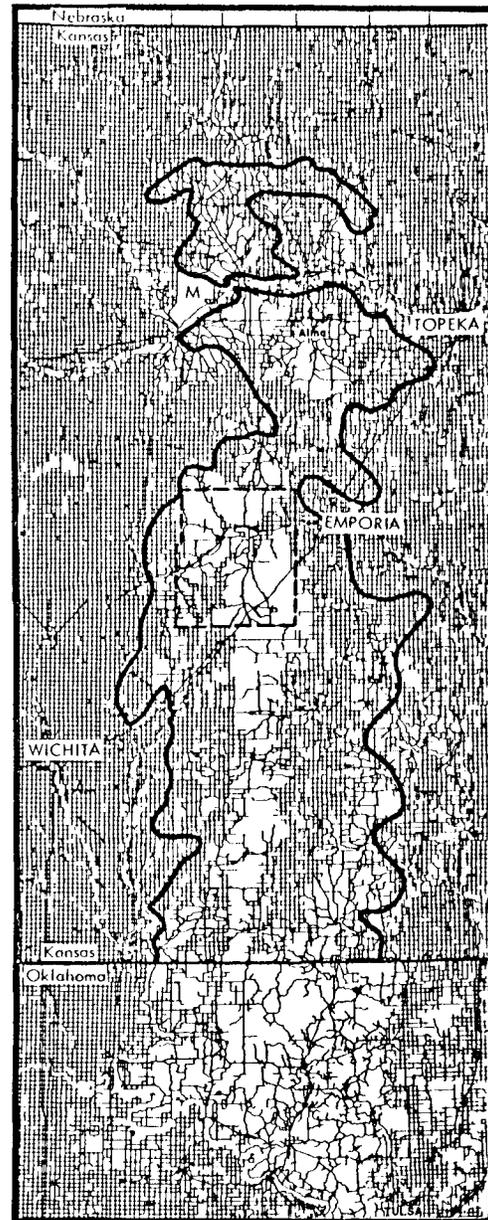


FIG. 5. "Major Pasture" area of Kansas as delineated by G. F. Jenks of the University of Kansas on map titled "The Geographic Pattern of Kansas Agriculture," p. 18, in *A Kansas Atlas*, (Topeka: Kansas Industrial Development Commission, 1952). Pasture area based on minor civil divisions, with approximating borders, reporting from 50 to 90 per cent of farmlands in grass in 1950 Kansas Statistical Rolls. As background road pattern suggests not all minor civil divisions in enclosed area are predominantly in grass; nor are all big pastures encompassed by borders shown. Open areas in Oklahoma give good approximation of big pastures in Osage Hills. Dash line shows location of Chase County.