

**EXPLANATION**

**Alluvium**  
Qal—Alluvial deposits of sand, silt, and gravel; covers the flat basin plain between hill and mountain groups.  
Qaf—Collected alluvial fans surrounding Tres Hermanas Mountains; similar deposits found into northeast, west, and southeast parts of mapped area; from Florida Mountains, Cedar Mountain Range, and Carrizillo Hills respectively; contains some younger stream alluvium, large areas covered by wind-blown sand.

**Basalt**  
Qtb—Basalt flows, scoria, and pumice, less than 100 feet thick; flow rock is grayish-black to black, olivine-rich basalt; most flows are aphanitic, but a few are aphyric containing phenocrysts of olivine and labradorite imbedded in finely textured groundmass; alteration of olivine to iddingsite is common.  
Qtd—Basalt dikes

**Gila(?) Conglomerate**  
Qcg—Poorly sorted and bedded, weakly cemented conglomerate, conglomeric sandstone, mudstone, and siltstone; best exposure is in railroad cut 6 miles west of Columbus; contains considerable micritic conglomerate south of northeast trending ridge of Cretaceous sediments; total thickness not known, but may be immense.

**UNCONFORMITY**  
Tf1

**Rhyolite and latite**  
Tr—Flows, breccias, and tuffs of light-gray to reddish-brown rhyolite and latite; thickness probably exceeds 500 feet in southern part of area; pyroclastics dominant in northeast; rhyolite and latite dikes (not shown) cut older parts of sequence; small andesite exposure in extreme northeast may be a thin flow within this sequence.

**UNCONFORMITY**  
Tm1d

**Monzonite, rhyolite, and latite dikes**  
Tm—Closely related in age and composition to quartz monzonite intrusion; most dikes are porphyritic; only principal dikes are shown.

**Xenoliths**  
Tx—Highly silicified and silicified xenoliths of Paleozoic and Cretaceous sedimentary rocks within quartz monzonite.

**Quartz monzonite**  
Tm—Buff-colored, medium- to fine-grained, equigranular to slightly porphyritic quartz monzonite; composed essentially of oligoclase, plagioclase feldspar, and some hornblende; typical analysis of typical specimens: SiO<sub>2</sub> 66.7%, Al<sub>2</sub>O<sub>3</sub> 15.12%, CaO 4.41%, MgO 4.15%, K<sub>2</sub>O 4.77%, MnO 0.57%, Fe<sub>2</sub>O<sub>3</sub> 1.63%, FeO 1.36%, TiO<sub>2</sub> 0.10%, H<sub>2</sub>O 0.44%, H<sub>2</sub>O+ 0.04%, H<sub>2</sub>O- 0.07%, H<sub>2</sub>O 0.25%, H. B. Wilks, analyst.

**Andesite**  
Ta—Flows, breccias, agglomerates, and tuffs of grayish-purple andesite; thickness may exceed 1000 feet; andesine and hornblende are major constituents; purplish color is due to finely disseminated hornblende.  
Tad—Intrusive andesite of essentially the same composition as extrusive andesite; typically porphyritic containing large hornblende phenocrysts.

**Older latite**  
Tl—Breccias, welded tuffs, and subordinate porphyritic flows of gray to yellowish-tan latite; rocks are considerably altered; chlorite is common.

**UNCONFORMITY**  
Kc1

**Upper limestones**  
Kc—Sparsely fossiliferous, light-to dark-gray, thin-to thick-bedded limestones, more than 100 feet thick; upper 240 feet contains nodular chert that increases in amount upward.

**Limestone conglomerate**  
Kcl—Limestone and limestone-chert conglomerate; about 430 feet thick; pebbles, cobbles, and the few boulders are subangular to well rounded and consist of argillaceous limestone with some fragments of chert, dolomite, and sandstone; matrix is fine, very fine, to coarse-grained quartz, calcite, and sandstone; matrix is light gray, tan, or, cross-laminated sandstone; lenses of reddish argillaceous sandstone and siltstone in upper part.

**Massive limestone**  
Kb—Gray, coarsely crystalline limestone about 395 feet thick; some cherty and siliceous beds; near top are scattered lenses of limestone-pabble conglomerate.

**Basal clastic rocks**  
Kb1—About 375 feet of chert conglomerate, arkosic to quartzaceous sandstone, pale-red siltstone, and gray siliceous limestone; base covered by alluvium; set off from rest of section by a fault.

**UNCONFORMITY ?**  
Ph

**Hueco Formation**  
Ph—More than 525 feet thick; basal 10-15 feet is reddish-brown chert-pabble and chert-cobble conglomerate; then 85 feet of brown-weathering silicified microcrystalline chert-pabble limestone; overlain by about 70 feet of lower cross-laminated chert-pabble conglomerate and upper limestone-pabble conglomerates with interbeds of brown to olive, siliceous microparticulate limestones; the upper 325 feet is dark-gray, thin-bedded to massive limestones, oolitic in part; contains many gastropods, Schwageria, and much crinoidal debris; upper contact is a fault plane.

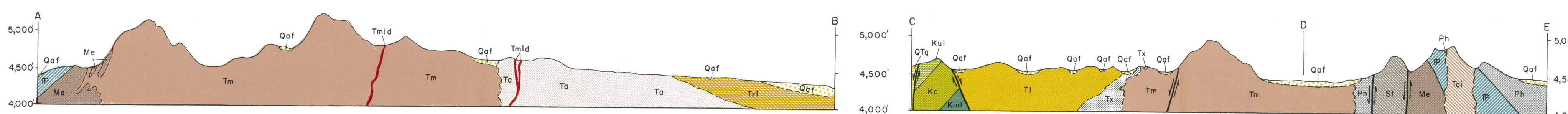
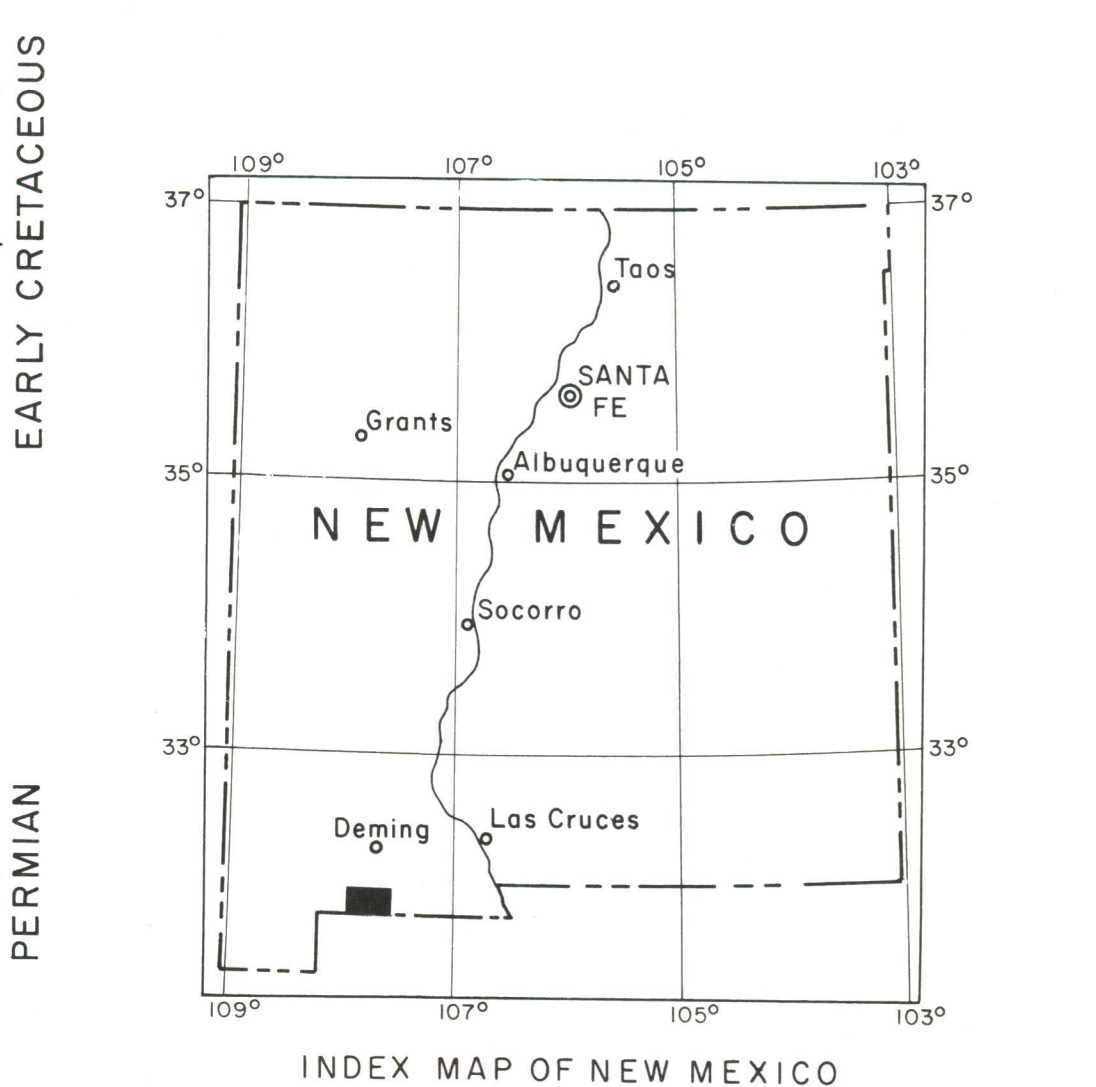
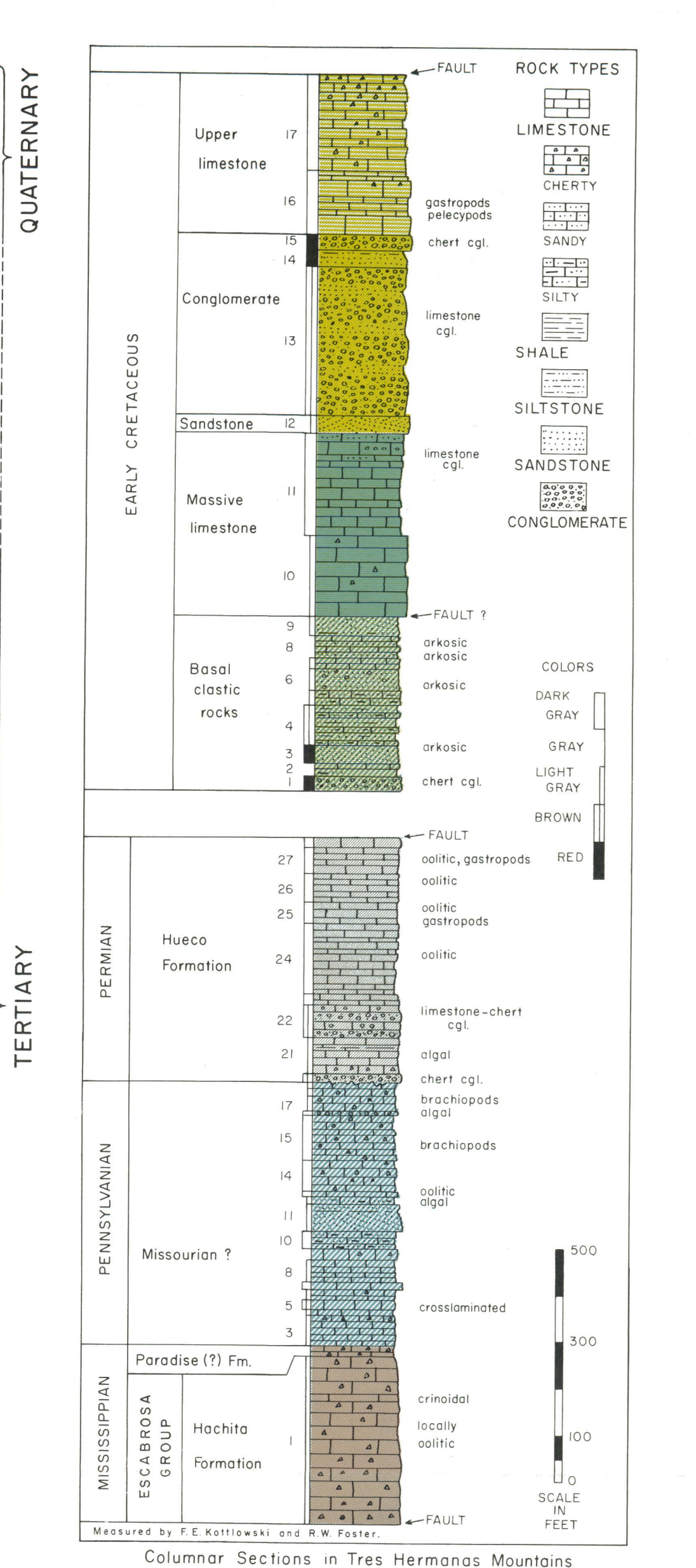
**UNCONFORMITY**  
P

**Pennsylvanian rocks**  
P—About 560 feet thick and probably of middle Pennsylvanian age; almost completely fossiliferous except for partings and thin lenses of shale and a 60-foot-thick sandstone, granular cross-laminated light-to dark-gray fossiliferous calcarenites are most typical along with light-brown-weathering siliceous microparticulate limestones; the sandstone is gray, fine grained to silty, cross-laminated, porous in part, and weathers to dark reddish brown.

**Escabrosa Limestone**  
Me—Light-gray, massive, crinoidal, and cherty limestone, more than 360 feet thick but only the uppermost part is exposed in the range; to the west the Escabrosa is as much as 1,000 feet thick. Quaternary to a silicified, light-to dark-gray fossiliferous calcarenites, 20 to 40 feet thick, that may be the Paradise Formation. The Devonian shales and argillaceous limestones that occur beneath the Escabrosa in neighboring ranges are not exposed.

**Fusselman Dolomite**  
Sf—Marbleized dolomites and limestones, several hundred feet thick, bounded above and below by faults; ten wavy massive dolomite is typical of the unit; some lenses of dark-gray calcarenites and sedimentary(?) breccias.

**Geology mapped in 1952-1955. Paleozoic Mesozoic sediments divided, and stratigraphic sections measured by F. E. Kottlowski 1960. Cartography by W. E. Arnold.**



**GEOLOGIC MAP AND SECTIONS OF TRES HERMANAS MOUNTAINS**

by Robert Balk  
Scale 1:48,000  
Statute Miles  
1962

Contact  
Fault  
Strike and dip of bed  
Mine or prospect