

Revision of Stratigraphic Names For Some Eocene Formations In Santa Barbara and Ventura Counties, California

By J. G. VEDDER

CONTRIBUTIONS TO STRATIGRAPHY

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REVISION OF STRATIGRAPHIC NAMES FOR SOME EOCENE FORMATIONS IN SANTA BARBARA AND VENTURA COUNTIES, CALIFORNIA

By J. G. VEDDER

ABSTRACT

Rock units of Eocene age in the southeastern San Rafael Mountains and eastern Santa Ynez Mountains have had a relatively consistent set of names for at least 20 years. In upward stratigraphic order, these units are the Sierra Blanca Limestone, Juncal Formation, Matilija Sandstone, Cozy Dell Shale, and Coldwater Sandstone. The last three originally were assigned subformational rank, but their recognition as formations is deemed valid on the basis of firmly established use of this higher rank designation and on the basis of their distribution as regionally mappable units. Although the precise age and correlation of each remains in doubt, new paleontologic evidence from the upper Mono Creek-Pine Mountain area suggests that together these formations represent much of early, all of middle, and part of late Eocene time.

INTRODUCTION

The stratigraphic nomenclature for rocks of Eocene age in the southeastern San Rafael Mountains, eastern Santa Ynez Mountains, and Pine Mountain area requires slight modification to conform to present knowledge of the distribution, succession, and ages of these strata. Recent detailed reconnaissance mapping along the Big Pine fault between Big Pine Mountain and San Guillermo Mountain (Vedder and others, 1971) also has demonstrated the need for formalization of names for early Tertiary rock units in that area and has provided new paleontologic information that is helpful in correlating these units with previously named units nearby. Dickinson (1969) also has recognized the need for standardized terminology for the rock units in the Sespe Creek-Pine

Mountain region despite the fact that precise regional correlations remain in dispute.

The commonly used names Sierra Blanca Limestone (Nelson, 1925); Juncal Formation (Page and others, 1951); Matilija Sandstone and Cozy Dell Shale (Kerr and Schenck, 1928), and Coldwater Sandstone (Kew, 1924) are proposed for adoption herein as names of formation rank. All these names have persisted for at least 20 years in numerous published and unpublished sources on the geology of the Santa Barbara-Ventura district (fig. 1), and their formal adoption is long overdue. With the exception of the Sierra Blanca Limestone, which occurs as discontinuous lenses, each unit is mappable throughout much of the region. Although similar rock units underlie much of the Sierra Madre Mountains and southeastern La Panza Range to the northwest (Vedder and others, 1967; Vedder and Brown, 1968), it seems premature to assign any of the above names to them until they are mapped in detail and their stratigraphic succession and correlation are more precisely known. Chipping (1969), however, has appended informal new names to aid in his description of lithogenetic sequences in that area.

The former designation of the Matilija Sandstone, Cozy Dell Shale, and Coldwater Sandstone as subunits within the Tejon Formation is now considered by most geologists to be inappropriate because the Tejon type area is nearly 40 miles to the northeast and is on the opposite side of the San Andreas fault, along which there has been many miles of post-Eocene right-lateral slip. The name Topatopa Formation (Eldridge, in Eldridge and Arnold, 1907, p. 5-7) probably should remain suppressed (Wilmarth, 1938, p. 2166), as it has had inconsistent usage both stratigraphically and chronologically (fig. 1).

The new paleontologic information concerning rock units in the upper Mono Creek-Pine Mountain area is based on identification and correlation of microfossil assemblages by R. L. Pierce and on provisional age assignments based on identification of mollusk assemblages by the author.

SIERRA BLANCA LIMESTONE

The name Sierra Blanca Limestone was proposed by Nelson (1925, p. 352) for a lenticular body of distinctive white algal limestone that is prominently exposed along the south side of the San Rafael Mountains between East Fork Santa Cruz Creek and Alamar Canyon (figs. 2, 3). A type locality was designated by Keenan (1932, p. 65); the representative outcrop was a 225-foot

Eldridge and Arnold (1907)	Kew (1924)	Nelson (1925)	Kerr and Schendk (1928)	Reed and Hollister (1936)	Page, Marks, and Walker (1951)
Santa Clara Valley area	North of Santa Clara River	Southeastern San Rafael Mountains	Matilija Creek area	Ojai district	Mountains northeast of Santa Barbara
Sespe Formation	Sespe Formation		Sespe Formation		Sespe Formation
	Tejon Formation	Undifferentiated Eocene (Meganos and Tejon Formations)	Tejon Formation	Coldwater Sandstone	"Coldwater Sandstone"
				Cozy Dell Shale	Cozy Dell Shale
				Matilija Sandstone	Matilija Sandstone
Topatopa Formation				Matilija Sandstone Member	Matilija Sandstone
		Sierra Blanca Limestone	Chico Formation	Unnamed member	Juncal Formation
					Sierra Blanca Limestone
				Middle or Lower Eocene	Pendola Shale
		Mono Shale		Cretaceous(?)	

Bailey, in Redwine and others (1952)	Merrill (1952, 1954)	Dibblee (1966)	Dickinson (1969)	Eschner (1969)	This report
Ojai district	Sespe Creek-Pine Mountain area	Central Santa Ynez Mountains	Mountains between Ventura and Cuyama	Fillmore area	Upper Mono Creek-Pine Mountain area
Sespe Formation	Sespe Formation	Sespe Formation	Sespe Formation	Sespe Formation	Sespe Formation
Coldwater Sandstone	"Coldwater" Sandstone (Formation)*	"Coldwater" Sandstone	Topatopa Group	Tejon Group	Coldwater Sandstone
Cozy Dell Shale	Cozy Dell Shale (Formation)*	Cozy Dell Shale			Cozy Dell Shale
Matilija Sandstone	Matilija Sandstone (Formation)*	Matilija Sandstone			Matilija Sandstone
Juncal Formation	Juncal Formation	Juncal Formation	Juncal Formation	Topatopa Formation	Juncal Formation
Camino Cielo Sandstone Member					
Sierra Blanca equivalent	Sierra Blanca Limestone	Sierra Blanca Limestone	Sierra Blanca Limestone		Sierra Blanca Limestone
Upper Cretaceous Shale	Upper Cretaceous strata	Jalama Formation			Unnamed Upper Cretaceous shale

*Terminology of 1954 report.

FIGURE 1.—Evolution of nomenclature for Eocene strata in parts of Santa Barbara and Ventura Counties. The Sierra Blanca Limestone, Juncal Formation, Matilija Sandstone, Cozy Dell Shale, and Coldwater Sandstone presumably represent much of Eocene time; however, the lower part of the nonmarine Sespe Formation in the type area of that formation is also late Eocene in age. Names that have been used for underlying strata are also shown.

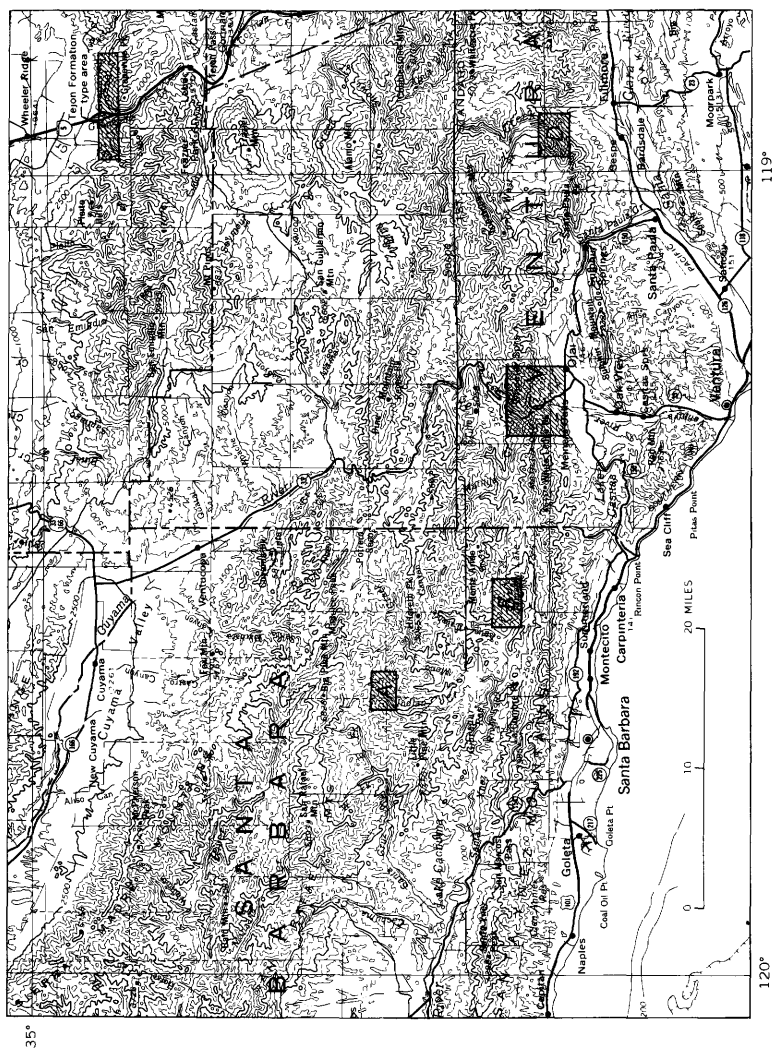


FIGURE 2.—Location of the type area of the Tejon Formation and of the sketch maps shown in figure 3.

section in Indian Creek. The type locality is here considered the type section (fig. 3). The recognition of widely scattered lenses by both Keenan (1932) and Woodring (1930, 1931) extended the known distribution of the unit. Walker (1950) provided a detailed description of the formation in the type area, and Dibblee (1950, 1966) mapped it throughout southern Santa Barbara County. Page, Marks, and Walker (1951, p. 1745-1749) mapped it and described its stratigraphic relations in the vicinity of lower Mono Creek. Additional outcrops near the type area were identified as Sierra Blanca Limestone by recent work (Vedder and others, 1967). In Ventura County, Merrill (1954) mapped two narrow lenses of Sierra Blanca Limestone south of lower Matilija Creek; Bailey (in Redwine, 1952) noted the probable occurrence of the formation north of Ojai. The formation is everywhere unconformable on rocks of Late Cretaceous or older age within the area under discussion, but this unconformity may not persist into the northwestern Sierra Madre Mountains area; there similar algal limestone lenses seem to be conformable on strata of older Tertiary age (Vedder and Brown, 1968).

On the basis of foraminiferal assemblages, Mallory (1959, p. 35-36, 76) assigned the Sierra Blanca Limestone to his upper Penutian Stage, which probably correlates with part of the "Capay Stage" of early Eocene age as used by Weaver and others (1944) and Durham (1954).

JUNCAL FORMATION

Page, Marks, and Walker (1951, p. 1749) proposed the name Juncal Formation for an interbedded sandstone and shale unit in the southeastern San Rafael Mountains and eastern Santa Ynez Mountains. Their type section is about 6 miles due south of Hildreth Peak, about a mile east of Agua Caliente Creek, and about 2 miles northeast of the Santa Ynez River (figs. 2, 3). The same workers correlate the Juncal Formation with Nelson's (1925, p. 354) "undifferentiated Eocene" in the upper Mono Creek area. Mapping has shown that at places where the Sierra Blanca Limestone is absent, the Juncal Formation unconformably overlies Upper Cretaceous strata. Strata similar to those of the type Juncal form thick successions in the Pine Mountain region and near Rancho Nuevo Creek; these units have been assigned to the Juncal by Merrill (1954), Crowell (1964, p. 9, fig. 3), and Dickinson (1969, p. 13). Bailey (in Redwine, 1952) described the stratigraphy of the formation north of Ojai. A thick sequence of Eocene rocks in the Sierra Madre Range (Vedder and others, 1967; Vedder

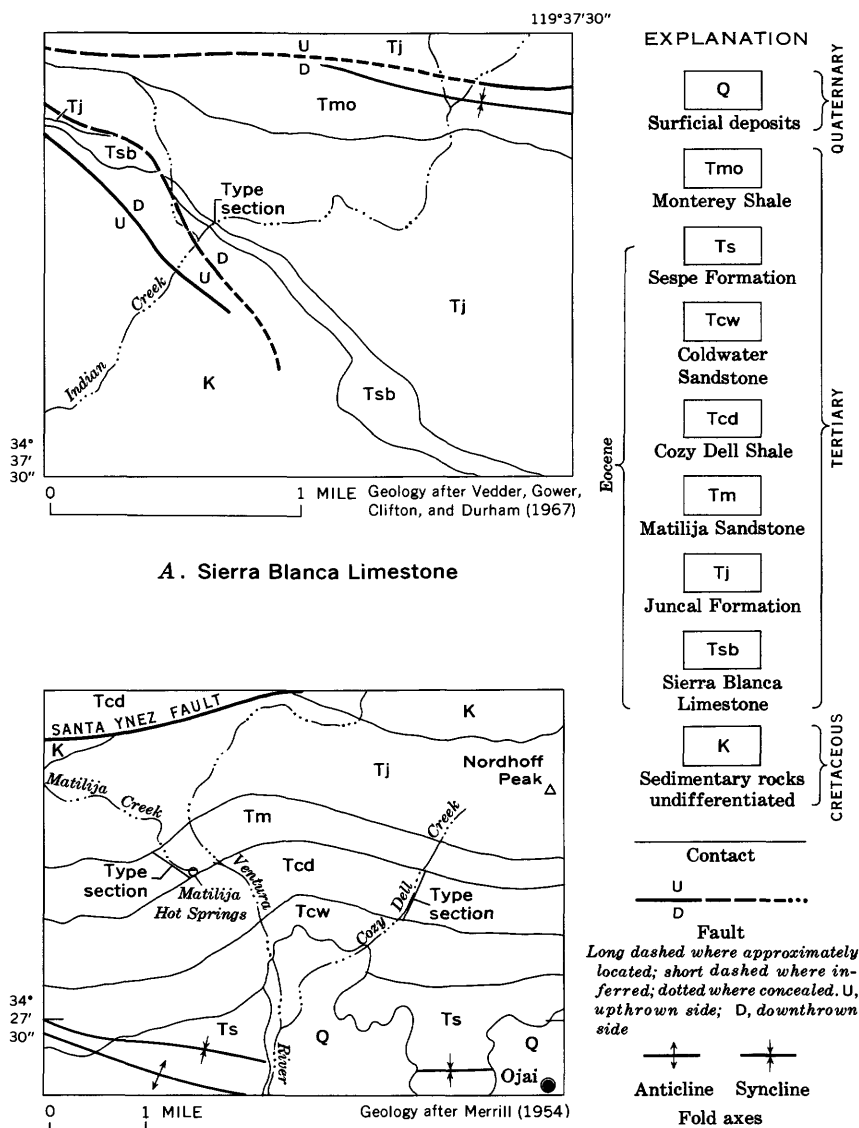
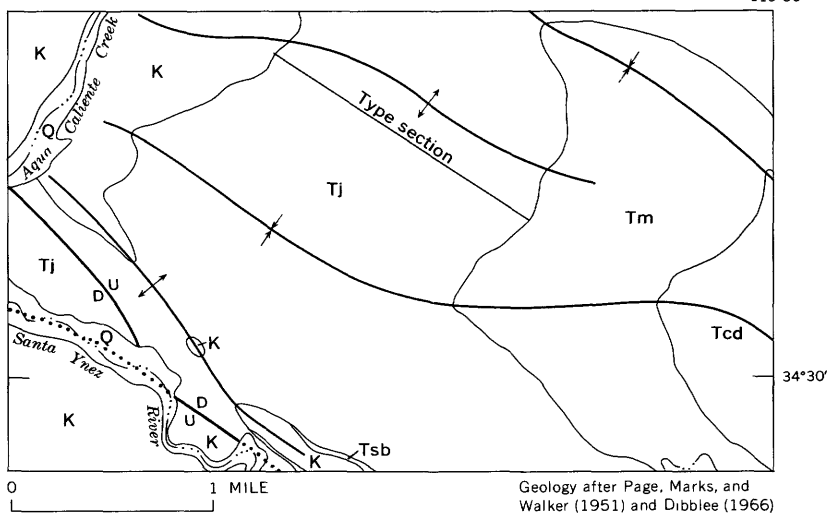
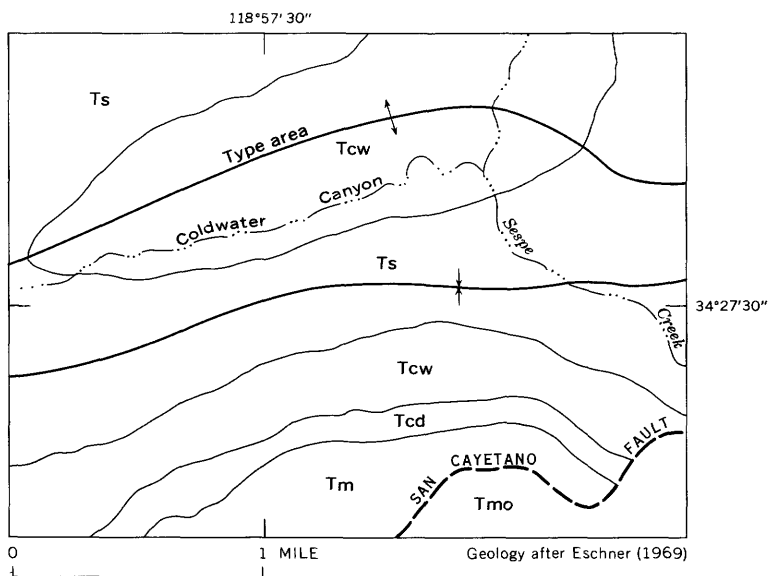


FIGURE 3.—Type areas of Eocene formations discussed. (See figure 2 for location of sketch maps.)

119°30'

**B. Juncal Formation****D. Coldwater Sandstone****FIGURE 3.—Continued**

and Brown, 1968, p. 244–245; Chipping, 1969) is in part correlative with the Juncal Formation but differs in lithologic details and stratal succession.

Foraminiferal assemblages reported by Page, Marks, and Walker (1951, p. 1754) from the lower part of the formation in the type area suggest assignment to the upper Penutian Stage or lower Ulatisian Stage; most of the megafossil species reported by the same workers from the basal sandstone are too long ranging for precise age determination, but the assemblage suggests an early or middle Eocene age. Recently collected foraminiferal assemblages from the lower part of the formation along upper Mono Creek and near Rancho Nuevo Creek range from Penutian or older to lower Ulatisian. A few new mollusk assemblages from shaly zones in the lower Tinta Creek area are provisionally assigned an age that ranges from early to middle Eocene ("Capay and Domengine Stages" as used by Weaver and others, 1944, and Durham, 1954). Presumably the Juncal Formation includes strata of both early and middle Eocene age.

MATILIJA SANDSTONE

The Matilija Sandstone was named by Kerr and Schenck (1928, p. 1090), who selected a type section in the canyon at Matilija Springs about 4 miles northwest of Ojai and about 10 miles due south of Reyes Peak. They assigned the unit to the Tejon Formation and extended the name eastward to exposures on Santa Paula Ridge and Topatopa Mountain. Although these workers stated that the unit apparently is conformable on strata of Cretaceous age, later paleontologic data has demonstrated that the underlying rocks are Eocene in age and that they are equivalent to the type Juncal Formation (Page and others, 1951, p. 1757; Bailey, in Redwine, 1952). The name Matilija Sandstone has been used throughout the Santa Ynez Mountains (Kelley, 1943; Dibblee, 1950, 1966; Page and others, 1951, p. 1756–1758); both Merrill (1952, 1954) and Dickinson (1969, p. 14–16) applied it to similar strata in the Pine Mountain region. Dickinson, however, noted that precise correlation of sandstone units between different structural blocks may prove difficult, particularly across the Santa Ynez fault.

Mallory (1959, p. 95) implied that, on the basis of unpublished work in the type area by R. C. Blaisdell, the Matilija Formation ranges from the upper Ulatisian Stage to the lower Narizian Stage. The biostratigraphic relations, however, seem to be more complex. One new microfossil locality from the middle part of the formation

northeast of Madulce Peak is assigned to the Narizian Stage, but stratigraphically higher strata contain Ulatisian faunas, suggesting that the guide species overlap and are longer ranging than previously supposed. Throughout the upper Mono Creek-Pine Mountain region, the Matilija Formation is underlain by strata that contain microfaunas diagnostic of the Ulatisian Stage and is overlain by strata that contain both Ulatisian and Narizian Stage microfauna. The apparent broad overlap of ranges and reversals in faunal successions indicate that the assemblages are facies controlled and that the stage names are in need of revision. Megafossils reported from the type area by Kerr and Schenck (1928, p. 1090) and by Bailey (in Redwine, 1952) suggest an age assignment of middle or late Eocene ("Domengine Stage" or "transition beds" and "Tejon Stage" in the usage of Weaver and others, 1944, and Durham, 1954). Mollusks from numerous localities in the fine-grained sandstone zones of the Matilija Formation north and east of Madulce Peak and north of Pine Mountain (Vedder and others, 1971) also suggest a middle or late Eocene age.

COZY DELL SHALE

The name Cozy Dell Shale was applied by Kerr and Schenck (1928, p. 1090) to a unit composed of interbedded shale and sandstone northwest of Ojai, and the type section designated is in a tributary to the Ventura River, Cozy Dell Creek canyon; there the formation lies conformably on the Matilija Sandstone. Although Kerr and Schenck did not give the geographic distribution of the unit, Kelley (1943), Dibblee (1950, 1966), and Page, Marks, and Walker (1951, p. 1758-1759) extended the usage of the name throughout the Santa Ynez Range and into the southeastern San Rafael Mountains. Bailey (in Redwine, 1952) provided a stratigraphic description in the type area. Similar strata in the Pine Mountain region were assigned to the Cozy Dell Shale by Merrill (1952, 1954) and by Dickinson (1969, p. 13-15); Dickinson discussed the facies relations with other units.

Mallory (1959, p. 78) implied that the formation throughout the Santa Ynez Range falls within his Narizian Stage, and the combined megafossil assemblages reported by all the above authors suggest a middle or late Eocene age (chiefly "transition beds" and "Tejon Stage" as used by Weaver and others, 1944, and Durham, 1954). Recently collected foraminiferal faunas from the Cozy Dell Shale in the upper Mono Creek area, from the vicinity of Potrero Seco, and from the north side of Pine Mountain include both Ulatisian (?) Stage and Narizian Stage indicators. That some

guide species are found in reverse stratigraphic order at places suggests that they are facies controlled and that their overlapping ranges destroy their value as guide fossils. Mollusks from these same areas and from exposures east of Madulce Peak (Vedder and others, 1971) suggest a middle or late Eocene age.

COLDWATER SANDSTONE

Although the name Coldwater is preoccupied in Michigan by a Mississippian formation composed of shale (Wilmarth, 1938, p. 485-486), the different lithologic designation, wide age discrepancy, geographic separation, and long local usage should justify its adoption as a formal name in the Eocene succession of Santa Barbara and Ventura Counties. Kew (1924, p. 26) used the name informally for a sandstone unit described by Watts (1897) in Coldwater Canyon about 5 miles northwest of Fillmore. Kerr and Schenck (1928, p. 1090) noted that the beds are traceable for more than 40 miles in the Santa Ynez Mountains. Kew stated (1924, p. 26-28) that the unit rests on older Eocene rocks with a gradational contact and that it forms the upper lithologic division of the Tejon Formation north of the Santa Clara River. In the type area, the Coldwater Sandstone is unconformably overlain by the Sespe Formation; elsewhere, the upper contact either is a local disconformity or is gradational. Taliaferro (1924, p. 789-802) referred the unit to member rank in the Tejon Formation. The Coldwater Sandstone was mapped and described as a formation by Page, Marks, and Walker (1951, p. 1759-1760) northeast of Santa Barbara and by Dibblee (1966, p. 32-34) in the eastern Santa Ynez Mountains. Dickinson and Lowe (1966, p. 2467-2469) and Dickinson (1969, p. 11-17) recognized the formation in the Pine Mountain region.

Kerr and Schenck (1928, p. 1091) and Bailey (in Redwine, 1952) reported late Eocene mollusks from the formation in the Ojai district ("Tejon Stage" as used by Weaver and others, 1944, and Durham, 1954). A siltstone zone in the lower part of the formation about 3 miles east of Hildreth Peak contains a foraminiferal assemblage that provisionally is assigned to the Narizian Stage (Vedder and others, 1971). Most geologists consider the Coldwater Sandstone to be late Eocene in age.

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