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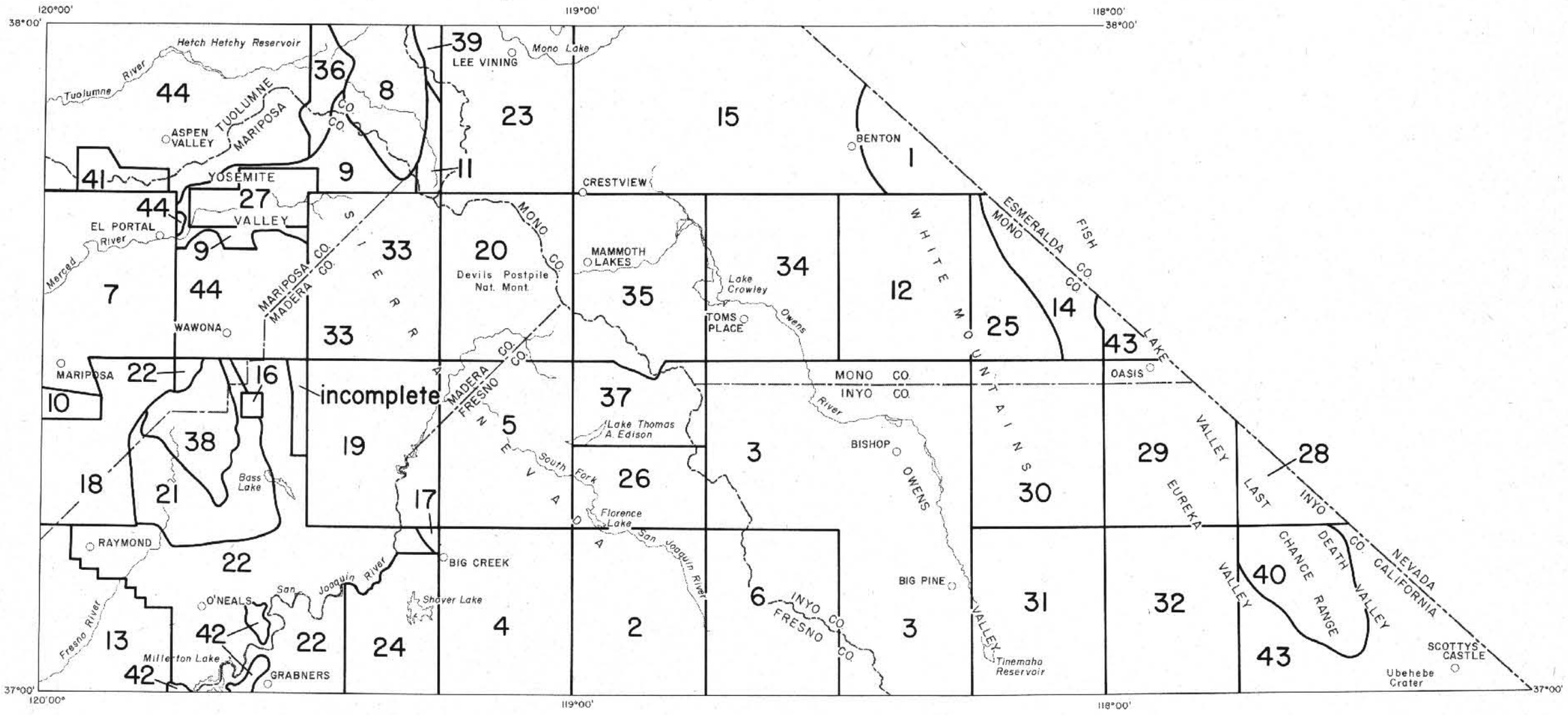
EXPLANATORY DATA
MARIPOSA SHEET
GEOLOGIC MAP OF CALIFORNIA

OLAF P. JENKINS EDITION

Compiled by Rudolph G. Strand 1967

Third printing, 1978

INDEX TO GEOLOGIC MAPPING
USED IN THE COMPILATION OF THE MARIPOSA SHEET



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STRATIGRAPHIC NOMENCLATURE—Continued

AGE	STATE MAP SYMBOL	STATE MAP UNIT State Map Units listed here are not necessarily in stratigraphic sequence; the sequence used has been standardized for all sheets of the Geologic Map of California	STRATIGRAPHIC UNITS AND CHARACTERISTIC LITHOLOGIES Formally named formations grouped in sequence (separated by semicolons) are listed from youngest to oldest.
PALEOZOIC — CAMBRIAN	€	**CAMBRIAN MARINE SEDIMENTARY AND METASEDIMENTARY ROCKS**	In the White Mountains: Tamarack Canyon Dolomite—*thin-bedded, fine-grained, gray dolomite having black chert nodules in basal part*; Lead Gulch Formation—*limestone, siltstone, shale, and chert*; Emigrant Formation—*thin-bedded gray cherty limestone, gray shale, yellow-buff silty limestone, and massive oolitic limestone*; Bonanza King Formation—*laminated to thick-bedded, gray and buff, fine-grained dolomite and limestone*; Monola Formation—*thin-bedded to massive, fine-grained, gray to blue-gray limestone, gray siltstone, silty gray shale, shaly siltstone, and buff limy siltstone*; Mule Spring Limestone—*thin- to medium-bedded, blue-gray limestone*; Saline Valley Formation—*thin-bedded, brown siltstone, fine-grained quartzite, silty shale, gray to brown shaly siltstone, and thin-bedded gray limestone*; Harkless Formation—*gray-green to brown platy silty shale, thin beds of fine-grained quartzite, thin pisolitic limestone beds at base of unit, and a tongue of fine- to medium-grained brown vitreous quartzite*; Poleta Formation—*gray-green shale, mottled blue-gray limestone, quartzite, gray limestone in upper unit, and massive- to thick-bedded gray-blue limestone in lower unit*; Campito Formation—Montenegro Member—*gray shale and interbedded fine-grained quartzitic siltstone and sandstone*, Andrews Mountain Member—*massively bedded, cross-stratified, gray to black, fine-grained quartzitic sandstone and interbedded gray siltstone and shale.* (The middle of Andrews Mountain Member contains lowest *Olenellid* fauna below which the strata are considered to be Precambrian by C. A. Nelson, 1966.) In the southern part of Last Chance Range: Nopah Formation—*light-gray to creamy-buff dolomite*; Bonanza King Formation (distinctively striped); Carrara Formation—*gray limestone, greenish-gray phyllite; siltstone, and yellowish-brown silty limestone*; Zabriskie Quartzite—*grayish-purple to dark-gray, fine- to medium-grained vitreous quartzite, conspicuously cross-stratified near the base*; Wood Canyon Formation—*very fine-grained quartzite, greenish-gray and gray siltstone, and yellowish-brown and gray limestone.* In the northern part of Last Chance Range: Nopah Formation; Bonanza King Formation; Mule Spring Limestone; Saline Valley Formation; Harkless Formation; Poleta Formation; and Campito Formation.
PRECAMBRIAN	€?	**CAMBRIAN-PRECAMBRIAN MARINE SEDIMENTARY AND METASEDIMENTARY ROCKS**	Deep Spring Formation—*massive blue dolomite, quartzite, and limestone*; Reed Dolomite—*massive white dolomite* (these units are considered to be Precambrian by Stewart, 1965). Gray limestone, olive-gray siltstone and yellowish-gray quartzite in northern Last Chance Range (considered to be equivalent to the Reed Dolomite).
	lp€	**LATER PRECAMBRIAN SEDIMENTARY AND METAMORPHIC ROCKS—Algonkian on some maps**	Wyman Formation—*thin-bedded, brown to dark-gray argillite, fine-grained, brown quartzitic sandstone, gray-brown siltstone, and a tongue of lenticular, gray-blue, oolitic limestone.*

NOTES

[1] These deposits were shown as Tertiary by Nelson (1966), but are now considered to be Pleistocene because of their stratigraphic relationship to a radiometrically dated basalt flow, C. A. Nelson personal communication, 1966. See also: G. B. Cleveland, 1958, Poverty Hills diatomaceous earth deposit, Inyo County, California: California Jour. Mines and Geol. v. 54, no. 3, p. 308.

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[9] Listed in alphabetical order, not in intrusive sequence. For details concerning the distribution of the plutons see: Bateman, Paul C., *et al*, 1965, The Sierra Nevada batholith, a synthesis of recent work across the central part: U. S. Geol. Survey Prof. Paper 414-D, p. D1–D46.

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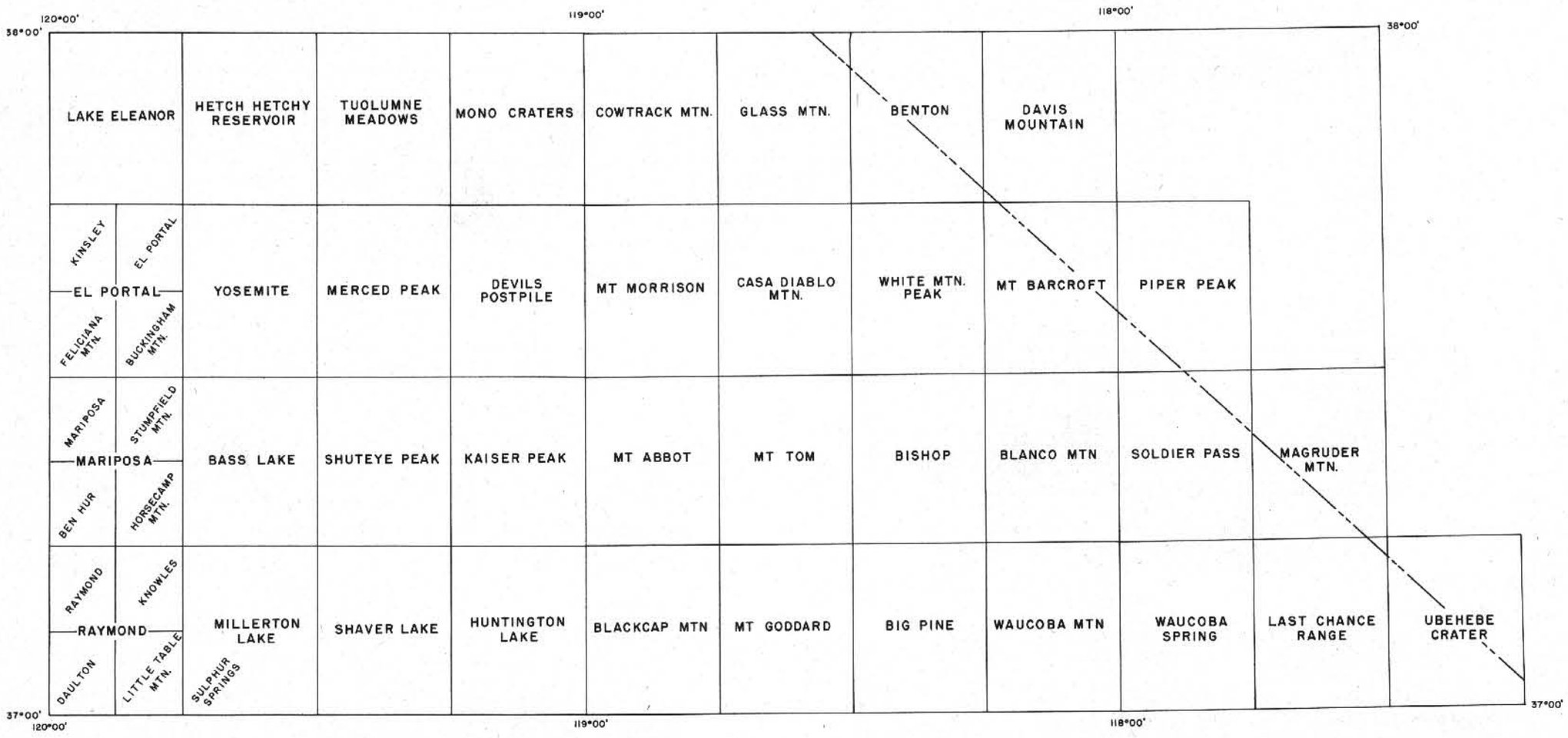
TOPOGRAPHIC QUADRANGLES
WITHIN THE MARIPOSA SHEET

AVAILABLE FROM THE U.S. GEOLOGICAL SURVEY
FEDERAL CENTER, DENVER, COLORADO 80225
1967



STRATIGRAPHIC NOMENCLATURE—Continued

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MESOZOIC — CRETACEOUS	gr	**MESOZOIC GRANITIC ROCKS**	In the Sierra Nevada: Bridalveil Granite[9], Cathedral Peak Granite, El Capitan Granite, Half Dome Quartz Monzonite, Inconsolable Granodiorite, Johnson Granite Porphyry, Lamarck Granodiorite, Leaning Tower Quartz Monzonite, Mount Clark Granite, Mount Givens Granodiorite, Pohono Granodiorite, Round Valley Peak Granodiorite, Sentinel Granodiorite, Taft Granite, Tinemaha Granodiorite, Tungsten Hills Quartz Monzonite, and Wheeler Crest Quartz Monzonite. In the White Mountains: Barcroft Granodiorite, Boundary Peak Granite, Cabin Granodiorite, Cottonwood Adamellite, Leidy Adamellite, McAfee Adamellite, Pellisier Granite, and Sage Hen Adamellite. Other unnamed plutons ranging in composition from alaskite to diorite.
	bi	**MESOZOIC BASIC INTRUSIVE ROCKS**	Undifferentiated quartz diorite, diorite, and gabbro in the Sierra Nevada. Metamorphosed basic igneous rocks in the Raymond quadrangle (includes some metabasalt as well as metagabbro). Hornblende norite, olivine-hornblende norite, and hornblende gabbro in the area west of Yosemite National Park.
	ub	**MESOZOIC ULTRABASIC INTRUSIVE ROCKS**	Pyroxenite in the Raymond quadrangle. Soapstone and talc rock in Kinsley quadrangle. Serpentine elsewhere.
MESOZOIC — JURASSIC	Ju	**UPPER JURASSIC MARINE SEDIMENTARY AND METASEDIMENTARY ROCKS**	Mariposa Formation—*black slate and phyllite, dark-gray or gray-green sheared sandstone, tuffaceous sandstone, and basal conglomerate.*
	Jml	**MIDDLE AND/OR LOWER JURASSIC MARINE SEDIMENTARY AND METASEDIMENTARY ROCKS**	In Mono Craters quadrangle: Jurassic marble, calc-silicate hornfels, and metaconglomerate. In Mt. Morrison quadrangle: metatuffaceous sandstone and siltstone, calc-hornfels, marble, thin beds of slate, and metavolcanic rocks (may be as old as Triassic). In Devils Postpile quadrangle: Lower Jurassic thin-bedded tuffaceous sandstone and siltstone, commonly calcareous.
	JRv	**JURASSIC AND/OR TRIASSIC METAVOLCANIC ROCKS**	In Mariposa and El Portal quadrangles: aphanitic rhyolite member of Mariposa Formation; Penon Blanco Volcanics—*massive green metamorphosed metatuff breccia, local andesitic and basaltic lava, and interbedded black slate and phyllite.* In the Tioga Pass area: unnamed Triassic meta-andesite flow and metarhyodacite pyroclastic rocks, Jurassic metarhyolite, metadacite, meta-andesite, metatuff and metarhyodacite, and Carboniferous(?) metadacite and meta-andesite. In the Raymond quadrangle: metamorphosed sodic dacite, sodic rhyolite, potassic rhyolite, andesite, basalt, and diabase. In Devils Postpile quadrangle: Early Jurassic and possibly Triassic or Permian crystal lithic metatuff, meta-andesite, metabasalt, metadacite, and some Jurassic metasedimentary rocks. In the Merced Peak quadrangle: Jurassic(?) amphibolite hornfels, schist and gneiss derived from tuff, bedded tuff and flows (in part this unit has been intruded by dikes which now constitute 25–50 percent of the rock). In the Mt. Morrison quadrangle: metamorphosed tuffs, flows, and hypabyssal intrusive rocks which range in composition from andesite to rhyolite. In the Blackcap Mtn. and Mt. Goddard quadrangles: flow-banded metarhyolite, metarhyolite to metadacite tuff, meta-andesite, metabasalt, and some lenses of metasedimentary rocks. In the Mt. Tom quadrangle: metarhyolite tuff, quartz latite sills, dikes, and flows(?), meta-andesite, and some metasedimentary rocks. Mafic metavolcanic rocks south of Bishop. Andesitic, dacitic, and rhyolitic metatuffs in Kaiser Peak quadrangle. Jurassic metamorphosed tuffs, flows, lapilli-tuff, graywacke, and shale, and calc-silicate hornfels in Mono Craters quadrangle.
MESOZOIC — UNDIVIDED	m	**PRE-CRETACEOUS METAMORPHIC ROCKS UNDIFFERENTIATED**	Triassic(?) and Jurassic gneiss and felsic gneiss in the Mt. Goddard quadrangle. Predominantly metavolcanic rocks in the Mt. Abbot quadrangle. Quartz-mica schists, slate, and greenstone in the Bass Lake area. Metamorphic rocks including some migmatite in the Millerton Lake area. Quartzite, interbeds of pelitic and calc-silicate hornfels, marble, brucite marble, quartzofeldspathic hornfels, meta-andesite, metadacite, metarhyolite, and metabasalt in the May Lake area of Yosemite National Park. Dolomitic limestone, argillite, schist, sandstone, quartzite, conglomerate, and metavolcanic rocks in the northern White Mtns. (adjoining units to the east in Esmeralda County, Nevada, range in age from Precambrian to Ordovician, Albers and Stewart, 1965[10]).
	ls	**LIMESTONE AND/OR DOLOMITE**	Marble and calc-silicate rocks in the Sierra Nevada west of Bishop. Metamorphosed calcareous rocks, marble, tactite, and various calc-silicate hornfelses in the Shaver Lake quadrangle.
	ms	**PRE-CRETACEOUS METASEDIMENTARY ROCKS**	Quartzite, quartz-mica schist, calc-silicate hornfels and tactite in Shuteye Peak quadrangle, and in Merced Peak quadrangle where these units are believed to be Permian or Triassic. Quartzite, schist, and hornfels in Sugar Pine area. Carboniferous marble, calc-silicate rock, metachert, phyllite, slate, and quartz hornfels, Triassic calc-silicate hornfels, metaconglomerate, and metasandstone, Jurassic metasandstone, calc-silicate hornfels, phyllite, slate, quartz hornfels, and quartz-mica schist in the Tioga Pass area. Metagraywacke, metagrit, metaconglomerate, and marble in White Mtn. Peak quadrangle (probably Permian, Triassic or Jurassic). Elsewhere small outcrops of quartzite, hornfels, and silicated marble.
	mv	**PRE-CRETACEOUS METAVOLCANIC ROCKS**	Permian or Triassic biotite schist and amphibolite probably derived from volcanic rocks, in the Merced Peak quadrangle. Meta-andesite in southeastern part of Yosemite 30-minute quadrangle. Metatuff and metavolcanic breccia in White Mtn. Peak quadrangle (probably Permian, Triassic or Jurassic). Diabase and volcanic breccia in the northwestern part of the Last Chance Range.
	gr-m	**PRE-CENOZOIC GRANITIC AND METAMORPHIC ROCKS**	Plutonic and metamorphic rocks partly concealed under float of porphyritic dikes and sills in Casa Diablo quadrangle. Granitic dike swarms in metamorphic host rock in Millerton Lake quadrangle. Marginal intrusive breccia consisting of fragments of adjacent metamorphic rock in alaskite in Mt. Goddard quadrangle. Schistose to gneissose aluminous and quartzofeldspathic migmatites, basic quartzofeldspathic and aluminous granulose to schistose migmatite, and gneissose quartzofeldspathic migmatite in Raymond quadrangle.
PALEOZOIC — PERMIAN	IP	**PALEOZOIC MARINE SEDIMENTARY AND METASEDIMENTARY ROCKS**	Briceburg Formation—*black phyllite and slate with minor chert, sheared metasandstone, and lenses of metavolcanic rocks and limestone* (shown as IP or Ju, considered to be late Paleozoic by some geologists and Upper Jurassic by others); Hite Cove Formation—*thin-bedded gray metachert, dark-colored phyllite and quartz-mica schist, minor sandstone and metaconglomerate, and shear zones of mylonite* (probably Permian and Carboniferous, possibly Triassic in part, includes rocks previously mapped as Calaveras Formation in Yosemite 30-minute quadrangle). Dolomite and quartzite in the northwestern extension of Grapevine Mountains. Tactite, calc-hornfels, quartz-sericite hornfels, graphite-andalusite hornfels, siliceous hornfels, quartz-mica phyllite, and biotite-quartz hornfels in Casa Diablo quadrangle (may be Precambrian, Rinehart and Ross, 1957). Quartzofeldspathic hornfels, calc-silicate hornfels, and carbonaceous marble in Mono Craters quadrangle. Micaceous quartzite, pelitic hornfels, siliceous calc-hornfels, metachert, marble, and schist in Bishop Creek area.
	Is	**LIMESTONE AND/OR DOLOMITE**	Fine-grained, gray, calcite marble and minor lenses of calc-hornfels and tactite in Casa Diablo quadrangle. Mississippian or Pennsylvanian limestone in northern Last Chance Range. Limestone of Hite Cove Formation in El Portal quadrangle.
	IPv	**PALEOZOIC METAVOLCANIC ROCKS**	Metavolcanic rocks of Hite Cove Formation in the El Portal quadrangle.
	Pm	**PERMIAN MARINE SEDIMENTARY AND METASEDIMENTARY ROCKS**	Bloody Mountain Formation—*medium- to dark-gray, massive, siliceous calc-hornfels, siliceous hornfels, and some limestone* (Permian age based upon fossil fauna reported by R. R. Curry, written communication, 1966). Quartzofeldspathic hornfels, calc-silicate hornfels, and metavolcanic rocks in Mono Craters quadrangle.
	Pmv	**PALEOZOIC METAVOLCANIC ROCKS**	Meta-andesite flows and breccia, felsic tuff and flows, and local graywacke and metasandstone lenses (Permian radiometric age date by Kistler, 1966).
PALEOZOIC — CARBONIFEROUS	C	**UNDIVIDED CARBONIFEROUS MARINE SEDIMENTARY AND METASEDIMENTARY ROCKS**	Mississippian and Pennsylvanian rocks undifferentiated in Last Chance Range.
	CP	**PENNSYLVANIAN MARINE SEDIMENTARY AND METASEDIMENTARY ROCKS**	Keeler Canyon Formation—*thin-bedded, gray limestone, cherty limestone, and interbedded purple siltstone* in Waucoba Mtn. quadrangle (Permian in part); Rest Spring Shale—*dark-gray siltstone, shale and mudstone* (considered to be Mississippian to Pennsylvanian? in type area to south and in Last Chance Range, but considered to be Mississippian in Waucoba Mtn. quadrangle). In the Mt. Morrison area: Lake Dorothy Hornfels—*color-banded, thin-bedded, microgranular, siliceous calc-hornfels* (Pennsylvanian and/or Permian?); Mildred Lake Hornfels—*light- to dark-gray siliceous hornfels that weathers reddish-brown, some white to greenish-gray siliceous calc-hornfels layers* (Pennsylvania and/or Permian?); Mount Baldwin Marble—*medium-dark and bluish-gray fine-grained marble,* locally contains chert nodules; Bright Dot Formation—*gray to dark-gray siliceous hornfels and metachert* (Pennsylvanian age uncertain). Micaceous quartzite, pelitic hornfels, and marble in the Mt. Tom quadrangle. CP? in the Mono Craters quadrangle represents quartzofeldspathic hornfels, calc-silicate hornfels, marble, and quartzite.
	CM	**MISSISSIPPIAN MARINE SEDIMENTARY AND METASEDIMENTARY ROCKS**	Perdido Formation—*upper unit of thin-bedded gray shale, brown quartzite, and chert pebble conglomerate, lower unit of medium-bedded, dark-gray, fine-grained dolomite, thin- to medium-bedded black to brown chert, brown quartzite and basal limestone conglomerate* in Waucoba Mtn. quadrangle. Mississippian strata in Last Chance Range.
PALEOZOIC — SILURIAN DEVONIAN	D	**DEVONIAN MARINE SEDIMENTARY AND METASEDIMENTARY ROCKS**	Lost Burro Formation—*light-gray dolomite prominently striped with nearly black limestone and dolomite.*
	S	**SILURIAN MARINE SEDIMENTARY AND METASEDIMENTARY ROCKS**	Hidden Valley Dolomite—*gray dolomite, nodular cherty zone near base, silty and sandy zones near top* (in part Devonian; present in Waucoba Spring quadrangle). Sunday Canyon Formation—*platy, gray to buff, limy shale, minor gray limestone interbeds in basal portion, grading upward to thin-bedded blue-gray shaly limestone* (perhaps Devonian in part; present in Waucoba Mtn. quadrangle).
PALEOZOIC — ORDOVICIAN	O	**ORDOVICIAN MARINE SEDIMENTARY AND METASEDIMENTARY ROCKS**	In the Waucoba Spring quadrangle and in the Last Chance Range: Ely Springs Dolomite—*dolomite containing dark-brown and black nodular chert;* Eureka Quartzite—*vitreous quartzite, upper part massive and nearly white; lower part thinly-bedded, hematitic and limonitic;* Pogonip Limestone—*medium-gray limestone and dolomite which weathers to brownish or yellowish color.* In the Waucoba Mtn. quadrangle: Johnson Spring Formation—*medium-bedded, fine- to medium-grained, light-gray, vitreous quartzite beds, and buff, crystalline dolomite beds;* Barrel Spring Formation—*siltstone and shale which weather reddish-brown, and thin beds of gray-buff limestone and quartzite;* Badger Flat Limestone—*gray silty limestone and calcarenite and interbedded buff siltstone, black chert abundant near base;* Al Rose Formation—*brown-weathering siltstone, shale, and mudstone.* In the Convict Lake Block: Convict Lake Formation—*gray, siliceous hornfels and grayish-black to pale-orange thinly-laminated calc-hornfels, some slate, metachert, metasandstone, and marble;* Mount Aggie Formation—*interbedded, thin- to thick-bedded, dark-gray slate and bluish-gray marble* (questionable Ordovician); Buzztail Spring Formation—*interlayered, dark-colored, pelitic hornfels and slate, siliceous hornfels, metachert, calcareous quartz sandstone and marble* (questionable Ordovician). In the McGee Mtn. Block: Hilton Creek Marble—*light- to dark-bluish-gray, fine-grained marble containing silicated zones throughout* (questionable Ordovician); gray coarse-grained calcareous metasandstone, dark-gray, thinly laminated pelitic hornfels and slate, siliceous hornfels, metachert, marble, and siliceous calc-hornfels. O-S = Ordovician or Silurian(?) units: Mount Morrison Sandstone—*metamorphosed fine- to medium-grained calcareous quartz sandstone, some siliceous calc-hornfels* in Mt. Morrison quadrangle. Interbedded thick strata of dark-gray siliceous hornfels and quartzite, gray metamorphosed calcareous quartz sandstone, muscovite siliceous hornfels, and dark-gray metachert in Mt. Morrison quadrangle. Marble, calc-silicate hornfels, quartzite, andalusite hornfels, and quartzofeldspathic hornfels in Mono Craters quadrangle.

STRATIGRAPHIC NOMENCLATURE—MARIPOSA SHEET

AGE	STATE MAP SYMBOL	STATE MAP UNIT State Map Units listed here are not necessarily in stratigraphic sequence; the sequence used has been standardized for all sheets of the Geologic Map of California	STRATIGRAPHIC UNITS AND CHARACTERISTIC LITHOLOGIES Formally named formations grouped in sequence (separated by semicolons) are listed from youngest to oldest.
CENOZOIC / QUATERNARY / Recent / Undivided	Qs	**RECENT DUNE SAND**	Large sand dune in southern Eureka Valley and eolian sand deposits along the southwest margin of Eureka Valley; stabilized dune sand in area four miles west of Bishop.
	Qal	**RECENT ALLUVIUM**	Alluvium and Recent alluvial fan deposits. Locally includes some pumice tuff-breccia in Mono Craters area, Recent moraines in Mt. Goddard area, lake beds in Merced Peak area, eolian sand veneer along southwest margin of Eureka Valley, residual decomposed granite in valleys within Millerton Lake quadrangle, and spring tufa deposits northeast of Ubehebe Crater. Also includes some of the glacial outwash, ground moraine, and talus deposits present over much of the area.
	Qf	**RECENT ALLUVIAL FAN DEPOSITS IN THE GREAT VALLEY**	Sediments deposited by the Fresno River.
		RECENT VOLCANIC ROCKS:	
	Qrv	**UNDIFFERENTIATED**	Pleistocene or Recent, dark-gray, glassy, olivine-bearing, quartz latite.
	Qrv^r	**RHYOLITIC**	Rhyolite domes in Devils Postpile quadrangle; rhyolite domes and obsidian flows of Mono Craters.
	Qrv^b	**BASALTIC**	Scoriaceous basalt flows of the Red Cones, Devils Postpile quadrangle.
	Qrv^p	**PYROCLASTIC**	Mantle of light-gray rhyolitic pumice tuff-breccia in the southeastern Mono Basin area (mapped only where known to be several tens of feet thick; possibly includes Pleistocene and Tertiary deposits). A veneer of cinder deposits which extends northward from the Ubehebe Crater area.
	Ql	**QUATERNARY LAKE DEPOSITS**	Deposits of ancestral Long Valley Lake—gray sandstone and conglomerate, light-gray clay beds, calcareous tufa, and yellowish to greenish-white diatomaceous earth. Diatomaceous earth interbedded in lacustrine silt, sand and pebble conglomerate (southwest corner Tinemaha Reservoir[1]). Lake beds of ancient Waucobi Lake—well-bedded light-gray to buff shaly siltstone, fine- to coarse-grained sandstone, in part tuffaceous. Recent playa silt and clay in Eureka and Deep Spring Valleys, lake beds along Mono Lake and in northern part of Death Valley. Glacial lake deposits in Yosemite Park.
	Qg	**QUATERNARY GLACIAL DEPOSITS**	The more prominent moraine and till deposits of Pleistocene Sierran glaciations (i.e. Tioga, Tenaya, Tahoe, Mono Basin, Sherwin, and McGee Glaciations of Blackwelder, 1931[2], Sharp and Birman, 1963[3], and Birman, 1964 ref. no. 37; till of pre-Sherwin (McGee?) glaciation recognized by Bateman and Moore, 1965.
	Qt	**QUATERNARY NONMARINE TERRACE DEPOSITS**	Gravels terraced to the level of ancestral Long Valley Lake; river terrace gravels west of Bishop.
	Qc	**PLEISTOCENE NONMARINE SEDIMENTARY DEPOSITS**	Friant Formation—*gravel, sand, clay, volcanic ash, pumice fragments, and interbedded continental stream and lake sediments* (may correlate with Modesto, Riverbank, and Turlock Lake Formations of Chesterman, Janda, and Wahrhaftig, 1965[4]). Older alluvium and megabreccia in Eureka Valley; some lake deposits of ancient Waucobi Lake (Bishop quadrangle); and older alluvium containing layers of reworked pumice (NW¼ White Mtn. Peak quadrangle).
		PLEISTOCENE VOLCANIC ROCKS:	
	Qpv^r	**RHYOLITIC**	Light-brownish-gray porphyritic quartz-latite of Mammoth Mountain; light- to medium-gray, structureless "younger" rhyolite in Mt. Morrison quadrangle; gray perlitic glass, pitchstone, obsidian, and pale-reddish-brown to light-brownish-gray flow-banded rhyolite in Glass Mtn. area (Pleistocene age per W. C. Putnam, 1962[5], and Pliocene(?) age by Rinehart and Ross, 1964); rhyodacite in southern Mt. Goddard quadrangle (may be late Tertiary in age); and light-gray rhyolite, pumiceous perlite, perlite, black brecciated obsidian, and gray perlitic vitrophyre, south of Big Pine.
	Qpv^a	**ANDESITIC**	Porphyritic plagioclase and olivine andesite (Devils Postpile quadrangle); scoriaceous andesite of Pumice Butte; and light- to dark-gray andesite of the Devils Postpile; andesite of Mono Craters; and andesite at northern end of Long Valley.
	Qpv^b	**BASALTIC**	Basalt flow rocks in eastern half of map area; in Bishop and Waucoba Spring quadrangles these flows may be late Tertiary.
	Qpv^p	**PYROCLASTIC**	Bishop Tuff—*gray, salmon, pink, brown, and purple, agglutinated, rhyolitic tuff, contains a basal pumice layer, welded in part.* Pumice, perlitic glass, and obsidian northeast of Lake Crowley, probably derived from Glass Mountain, (shown as Pliocene(?) by Rinehart and Ross, 1964); rhyolitic tuff, tuffaceous sandstone, and conglomerate southeast of Mono Lake; cinder cones south of Big Pine, composed of grayish-red cinders, bombs, and angular blocks of olivine basalt; basaltic ash and cinders in Waucoba Mtn. quadrangle; lapilli tuff breccia to vitric tuff of rhyolite composition in Mt. Morrison quadrangle; pumice lapilli tuff in White Mtns.
	QP	**PLIOCENE-PLEISTOCENE NONMARINE SEDIMENTARY DEPOSITS**	"Old" alluvial deposits in Death Valley and on west flank of Last Chance Range; quartzite boulder fanglomerate in Soldier Pass quadrangle.
	✳	**QUATERNARY AND/OR PLIOCENE CINDER CONES**	Basaltic and andesitic cinder cones.
	Pc	**UNDIVIDED PLIOCENE NONMARINE SEDIMENTARY ROCKS**	Esmeralda Formation—*buff, friable, arkosic sandstone, green siltstone, white tuff, and gray to green sandstone* (late Miocene to Pliocene); tuffaceous sandstone, sandstone and conglomerate in Soldier Pass quadrangle; Pliocene(?) alluvium on upland surfaces of Sierra Nevada (Mt. Morrison quadrangle); and Pliocene(?) boulders, cobbles, and coarse sand in Blanco Mtn. quadrangle.
		PLIOCENE VOLCANIC ROCKS:	
	Pv^r	**RHYOLITIC**	Light-gray to purplish-gray, glassy to aphanitic, quartz latite of Two Teats dated at 3.0 ± 0.1 m.y. (Plio-Pleistocene) by Dalrymple, 1964[6], similar rocks nearby reported as 2.72 ± 0.2 m.y. by R. R. Curry, 1966[7], quartz-latite flow remnant northwest of Convict Lake.
	Pv^a	**ANDESITIC**	Dark-gray, hornblende andesite of Bald Mtn.; Pliocene or Pleistocene medium-gray, aphanitic andesite at northeast corner of Devils Postpile quadrangle; andesite of Deadman Pass in Devils Postpile quadrangle; latite and biotite-augite latite in the northern part of the Yosemite 30-minute quadrangle.
	Pv^b	**BASALTIC**	Gray to black olivine basalt in Casa Diablo quadrangle dated at 3.2 ± 0.1 m.y. (Plio-Pleistocene) by Dalrymple, 1963[8]; gray olivine basalt and some andesite in Merced Peak quadrangle (Pliocene and Pleistocene); olivine basalt in Mt. Abbot quadrangle dated at 3.6 ± 0.1 m.y. (Pliocene) by Dalyrmple, 1963[8]; trachybasalt, some trachyandesite and olivine latite in Kaiser Peak quadrangle; olivine basalt in Deep Spring Valley dated at 10.8 ± 1.0 m.y. (early Pliocene) by Dalrymple, 1963[8]; basalt of Esmeralda Formation in Sylvania Mountains; Pliocene(?) basalt and andesite in Shuteye Peak quadrangle; trachybasalt in the Huntington Lake quadrangle, and basalt in the Millerton Lake area dated at 9.5 ± 0.3 m.y. by Dalrymple, 1963[8]; basalt in Saline and Last Chance Ranges, and in northwestern extension of Grapevine Mtns., possibly Pleistocene.
	Pv^p	**PYROCLASTIC**	Andesitic tuffs and breccia in Yosemite 30-minute quadrangle; buff, pink and gray vitric rhyolitic tuff in the Blanco Mtn. quadrangle; buff and gray rhyolitic tuff in Soldier Pass and Mt. Barcroft quadrangles.
TERTIARY / Oligocene	ϕc	**OLIGOCENE NONMARINE SEDIMENTARY ROCKS**	Titus Canyon Formation(?)—*boulder conglomerate in red silty clay matrix* (in northern Last Chance Range; identification is tentative).
Eocene	Ec	**EOCENE NONMARINE SEDIMENTARY ROCKS**	Ione Formation—*conglomerate, sandstone, and mudstone* (in western foothills of Sierra Nevada).
	Tc	**TERTIARY NONMARINE SEDIMENTARY ROCKS**	Indurated conglomerate in Mono Craters quadrangle. "Old" gravel deposits in Last Chance Range. Sedimentary deposits exposed in walls of Ubehebe Crater. Poorly consolidated conglomerate, sandstone, and tuff in Millerton Lake area (considered to correlate with Mehrten Formation upper Miocene to lower Pliocene by Trauger, unpublished ref. no. 42). Auriferous gravels at western edge of Yosemite 30-minute quadrangle.
		TERTIARY INTRUSIVE (HYPABYSSAL) ROCKS:	
	Ti	**UNDIFFERENTIATED**	Undifferentiated hypabyssal rocks of west-central Mono Craters quadrangle.
	Ti^r	**RHYOLITIC**	Rhyolitic plugs in vicinity of Scottys Castle.
	Ti^a	**ANDESITIC**	Intrusive andesite in White Mountains.
		TERTIARY VOLCANIC ROCKS:	
	Tv^r	**RHYOLITIC**	Rhyolite in Waucoba Spring quadrangle. Rhyolite in vicinity of Scottys Castle (may be correlative with Miocene(?) rhyolite mapped to southeast in Grapevine Mtns.). Post-Jurassic rhyodacite in Tioga Pass area.
	Tv^a	**ANDESITIC**	Andesitic flow remnants in the northern part of Bass Lake quadrangle. Post-Jurassic andesite in Tioga Pass area.
	Tv^p	**PYROCLASTIC**	Gray rhyolitic vitric crystal tuff in Benton Range. Andesitic crystal lithic tuff in southeastern Mono Craters quadrangle. Tuff and tuffaceous sediments in Saline and Last Chance Ranges and in northwestern extension of Grapevine Mountains (may correlate with Miocene(?) deposits to southeast, or with rhyolitic tuff in Deep Spring Valley which has been dated as 10.9 ± 0.2 m.y. (early Pliocene) by Dalrymple, 1963[8]).