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PRELIMINARY DESCRIPTIONS OF PRE-QUATERNARY SAMPLES, R/V LEE, MARCH 1976, OFFSHORE SOUTHERN CALIFORNIA

By

J.G. VEDDER, R.E. ARNAL, DAVID BUKRY, AND J.A. BARRON

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This report is preliminary and has not been edited or reviewed for conformity with U.S. Geological Survey standards.

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During March, 1976, the U.S. Geological Survey Research Vessel S.P. LEE was used for geophysical work and sampling to support the Survey's resource and environmental studies on the California Continental Borderland. Samples of pre-Quaternary rocks were taken primarily by means of dart cores, although chain-bag dredges, gravity cores, Van Veen grabs and box cores yielded additional bedrock samples. Navigation was done by the LORAC system supplemented by Miniranger.

The accompanying Table is intended to be a supplement to similar tables published in Vedder and others (1974) and Vedder and others (1976). Most of the described samples are from the San Nicolas Island platform, southern Patton Ridge, and the vicinity of Nidever Bank. Others are from the northern San Clemente Ridge, northwestern slope of Santa Cruz Basin, and Coronado Bank. In some instances, recorded depths may not match bathymetric contours on published maps because of imprecise navigation on pre-1940 surveys.

Rock descriptions are based chiefly on examination of bulk samples under low-magnification binocular microscope supplemented by thin-section study of selected samples. Rock colors are coded after Goddard and others (1948) and apply to dried samples unless otherwise noted. Splits for paleontologic study were taken from the bottom of the cores in most cases.

R. E. Arnal identified the benthic and planktic foraminifers; David Bukry, the coccoliths and silicoflagellates; and J. A. Barron, the diatoms. Stage and age correlations follow the usage of Kleinpell (1938), Mallory (1959), Bukry (1973), and Barron (1976). Double hyphens in the age/stage column of the Table signify unfossiliferous samples or those devoid of age-diagnostic species. Florence Wong examined and described the thin-sections.

in the last column of the table

For reference and retrieval purposes, all sample numbers are prefixed by the designation LEE 2-76-SC; samples from which thin sections were made are designated by a second number prefixed by T.

REFERENCES CITED

Barron, J. A., 1976, Middle Miocene-lower Pliocene marine diatom and silicoflagellate correlations in the California area in Fritsche, A. E., Ter Best, Harry, Jr., and Wornardt, W. W., Jr., eds., The Neogene symposium, Pacific Section, Soc. Econ. Paleontologists and Mineralogists, April, 1976, p. 117-124.

Bukry, J. D., 1973, Low-latitude coccolith biostratigraphic zonation: Deep Sea Drilling Project, Initial Repts., v. 15, p. 685-703.

Goddard, E. N. chairman, and others, 1948, Rock-color chart: Washington D. C., Natl. Research Council (repub. by Geol. Soc. America, 1951), 6 p.

Kleinpell, R. M., 1938, Miocene stratigraphy of California: Tulsa, Okla., Am. Assoc. Petroleum Geologists, 450 p.

Mallory, V. S., 1959, Lower Tertiary biostratigraphy of California coast ranges: Tulsa, Okla., Am. Assoc. Petroleum Geologists, 416 p.

Vedder, J. G., Beyer, L. A., Junger, Arne, Moore, G. W., Roberts, A. E., Taylor, J. C., and Wagner, H. C., 1974, Preliminary report on the geology of the continental borderland of southern California: U. S. Geol. Survey Misc. Field Studies Maps MF-624, 34 p., 9 sheets.

Vedder, J. G., Taylor, J. C., Arnal, R. E., and Bukry, David, 1976, Maps showing location of selected pre-Quaternary rock samples from the California continental borderland: U. S. Geol. Survey Misc. Field Studies Maps MF-737, 3 sheets.

TABLE

N lat Lambert X	W long Lambert Y	Uncorrected depth (meters)	Description	Age/Stage	Sample designation
32°34.2' 1654530	117°22.3' 148730	145	Siltstone, clayey, micaceous, diatomaceous; 5Y4/1; massive	Middle or late Miocene silicoflagellates; North Pacific Diatom 15-16b	12
32°35.8' 1654780	117°22.3' 158190	260	Siltstone, clayey, micaceous, calcareous, pumiceous (?); 5Y4/1 to 5Y6/1; indistinctly laminated to mottled; low density	Late Miocene silicoflagellates; upper Mohnian foraminifers; North Pacific Diatom Zone 13-14	31
32°38.7' 1636550	117°25.9' 176150	163	Siltstone, clayey, and claystone, silty; micaceous, diatomaceous, pumiceous (?), 5Y4/1 to 5Y6/1; mottled; low density	North Pacific Diatom Zone 15-16a	41
32°40.9' 1626650	117°27.8' 189430	309	Sandstone, silty, micaceous, very fine to fine grained, semiconsolidated	North Pacific Diatom Zone 17-18	46
32°41.6' 1625170	117°28.1' 193930	344	Siltstone, clayey, micaceous, pumiceous (?); 5Y5/1 to 5Y6/1; indistinctly laminated; low density	Middle or late Miocene coccoliths; Mohnian foraminifers	47
32°42.1' 1621100	117°29.0' 196890	418	Claystone, silty, micaceous, pumiceous (?); N2; massive; low density	--	48
32°50.4' 1672370	117°19.1' 246660	58	Siltstone, clayey, micaceous; N6; well defined parting; hard	Campanian or Maestrichtian coccoliths (mixed with Quaternary)	66

33°18.5' 894890	119°52.1' 434450	345	Claystone, silty, micaceous, calcareous; 5Y6/1 to 5Y4/1; laminated; minute clay-filled fractures; low density	Late middle or late Miocene coccoliths; upper Mohnian foraminifers	70
33°17.6' 891570	119°52.7' 429210	152	Claystone, silty, micaceous, pumiceous (?); 5Y6/1; massive, low density	Late middle or late Miocene coccoliths and silicoflagellates; upper Mohnian and/or Delmontian foraminifers	71
33°17.1' 889470	119°53.1' 426050	310	Claystone, silty, micaceous, calcareous; 5Y4/1; massive; low density	Late middle or late Miocene coccoliths; upper Mohnian foraminifers	72
33°15.5' 890050	119°52.9' 416470	340	Diabase (?), amygdaloidal; 5Y4/1; subophitic texture; fresh, hard; possibly a rafted erratic	--	76
33°14.7' 890760	119°52.7' 411640	300	Siltsone, clayey, micaceous; N6; fractured; moderately hard	Albian to Campanian coccoliths (mixed with Quaternary)	77
33°14.1' 891500	119°52.6' 407740	279	Siltstone, micaceous, calcareous; N4 to N6; mottled in part; fractured fragments; moderately hard	--	78
33°13.3' 892270	119°52.4' 402900	265	Siltstone, clayey, micaceous; N4 to N7; massive (?); fractured fragments; hard, relatively dense	--	79
33°12.8' 894930	119°51.8' 399960	332	Siltstone, clayey, micaceous; N4 to N6; fractured and sheared; hard, relatively dense	Trace of Cenozoic coccoliths	80

33°16.2' 963710	119°38.5' 418530	47	Mudstone, micaceous, calcareous; N4 to N7; massive; fragments, hard	Early Eocene coccoliths	88
33°16.3' 963770	119°38.4' 418650	47	Sandstone, silty, micaceous, very fine grained, calcareous; 5Y6/1; thin-bedded; hard; probably fragments eroded from nearby outcrop	Paleogene (?) coccoliths	89
33°18.0' 955933	119°40.0' 427578	60	Sandstone, feldspathic, micaceous medium to coarse grained, contains pink volcanic rock fragments; 5Y7/1; massive; moderately hard; 10x7x3 cm fragment	--	91
33°18.5' 946470	119°41.9' 432560	90	Siltstone, clayey, micaceous; 5Y4/1 to 5Y6/1; hard; slabby fragments mixed with Quaternary sediment	Early Eocene coccoliths; Ulatisian foraminifers	92
33°20.5' 930060	119°45.2' 445370	102	Siltstone, micaceous; 5GY7/1; thin bedded; hard; numerous slabby fragments	Early Eocene coccoliths; Eocene foraminifers	95
33°22.9' 928550	119°45.7' 460010	108	Siltstone and very fine-grained sandstone, micaceous; 5Y6/1; indistinctly laminated; hard, slabby fragments mixed with Quaternary sediment	Early or middle Eocene coccoliths; Ulatisian foraminifers	96
33°24.7' 920740	119°47.1' 471460	111	Siltstone, sandy, micaceous; 5GY6/1; hard; subangular fragments embedded in unconsolidated shelly sand	--	98

33°26.4' 896320	119°52.1' 482350	382	Siltstone, clayey, micaceous, calcareous; 5Y6/1; massive	Early Miocene coccoliths; lower Saucesian or Zemorrian foraminifers	105
33°27.9' 912220	119°49.0' 490900	130	Claystone, silty, micaceous, calcareous; 5Y6/1; massive (?)	Early Miocene coccoliths; lower Saucesian or Zemorrian, possibly lower Zemorrian foraminifers	106
33°29.5' 938310	119°44.0' 499690	133	Siltstone, clayey, calcareous; 5Y2/1 to 5Y4/1; abundant fragments embedded in Quaternary sediment; indistinctly laminated; low density	Early or middle Miocene coccoliths; Luisian foraminifers	109
33°25.6' 944600	119°42.6' 475760	111	Siltstone, dolomitic (?), sugary texture; 10YR7/4 to 10Y6/2; large subround to subangular fragments; hard	--	118
33°23.7' 960150	119°39.7' 464050	108	Claystone, silty, 5Y6/1 to 5Y2/1; large angular fragments, cherty and dolomitic	--	122
33°23.1' 1132830	119°5.5' 455470	155	Siltstone, clayey, micaceous, pumiceous (?) in part; 5Y5/1; massive; low density	Middle or late Miocene diatoms and silicoflagellates	135
33°22.6' 1131190	119°5.8' 452230	235	Siltstone, clayey, claystone, silty; diatomaceous; 5Y8/1; indistinctly laminated; low density	Middle Miocene diatoms, silicoflagellates	136
33°21.8' 1131350	119°5.7' 447230	480	Mudstone, micaceous, glauconitic; N2 to 5Y3/1, massive (?), hard	--	138

33°09.8' 1177930	118°56.2' 372520	968	"Marlstone", sugary texture (very fine grained); 5Y5/2; massive	--	144
33°10.4' 33°09.8' 1183200(?) 1181610	118°55.0' 118°55.5' 376020(?) 373320	1200- 923	Barite and barite-encrusted claystone and glauconitic sand; Monterey-like siltstone and chert; olivine-pyroxene salt, porphyritic amygdaloidal	Probable Saucesian and Luisian? or Mohnian? foraminifers in siltstone	148 (dredge) T638 (basalt)
33°15.4' 1227520	118°46.7' 405760	961	Claystone, silty, micaceous, diatomaceous, 5Y5/1; massive; low density	Late Miocene coccoliths; upper Mohnian or Delmontian foraminifers	161
33°15.6' 1231400	118°45.9' 407040	1148	Siltstone, clayey micaceous, calcareous; 5Y4/1 to 5Y6/1	--	162
33°16.2' 1243180	118°43.7' 410770	913	Siltstone, clayey, micaceous, calcareous, 5Y4/1; massive, fractured	Late late Miocene or early Pliocene coccoliths; probable Repettian foraminifers	164
33°11.0' 1252670	118°41.6' 378580	925	Tuff, glassy, very fine grained; N7; and siltstone, clayey; 5Y5/1; indistinctly laminated	Middle or late Miocene diatoms and silicoflagellates	166
33°10.2' 1247970	118°42.5' 374180	720	Siltstone, pumiceous, micaceous, 5Y8/1; fragments in Quaternary mud	Redeposited upper Mohnian foraminifers	167
33° 09.8' 1244190	118°43.1' 371610	675	Tuff and pumiceous siltstone; micaceous, 5Y6/1 to 5Y8/1; abundant fragments mixed with Quaternary mud	--	168
33°08.4' 1228510	118°46.2' 363160	720	Siltstone, clayey, and claystone, silty, calcareous, micaceous; 5Y6/1 to 5Y4/1; low density	Late Miocene coccoliths; upper Mohnian or Delmontian foraminifers	170

33°07.6' 1223320	118°47.2' 358910	799	Claystone, silty, micaceous, calcareous; 5Y6/1, N4; mottled in part, lenticular color bands	Late middle or late Miocene coccoliths; upper Mohnian or Delmontian foraminifers	171
32°56.1' 1232710	118°45.1' 288810	1185	Mudstone, calcareous, sandy; 5GY6/1; massive; rock fragments	--	174
32°55.5' 1224360	118°46.7' 285380	1279	Foraminiferal claystone, micaceous, 5Y5/1; massive; sand, fine to medium quartzose, contains abundant shallow-water shell fragments and volcanic rock detritus	Redeposited Paleocene and Eocene coccoliths in Quaternary sediment	176
32°52.4' 1233990	118°44.7' 266320	1142	Mudstone, foraminiferal, glauconitic, quartzose; 5Y5/1; massive; contains sand-size grains of volcanic rock detritus	Quaternary with redeposited Luisian (?) foraminifers	179
33°10.9' 1071260	119°17.2' 383150	766	Vitric tuff, 5Y8/1, and claystone, silty, ashy, diatomaceous, 5Y6/1; laminated, low density	Early or middle Miocene diatoms and silicoflagellates	185
33°13.4' 1069270	119°17.6' 397800	73	Claystone, silty, pumiceous; 10YR4/2 and 10YR8/2; laminated in part; low density	Early Miocene coccoliths; Relizian foraminifers	190
33°13.8' 1072660	119°17.0' 400520	100	Siltstone, clayey, tuffaceous, diatomaceous; N7 to 5Y8/1; laminated; low density	Early or middle Miocene diatoms and silicoflagellates	192

33°14.3' 1074720	119°16.6' 402950	110	Claystone, silty, micaceous, tuffaceous, diatomaceous; 5Y6/1; indistinctly laminated; low density	Early Miocene coccoliths, silicoflagellates, diatoms; redeposited Eocene coccoliths; upper Relizian or Luisian foraminifers	194
33°14.6' 1077400	119°16.1' 405150	157	Claystone, silty, tuffaceous (?); 5Y6/1 and 5Y8/1; laminated, 10° dip, low density	Early or middle Miocene coccoliths and silicoflagellates; Relizian foraminifers	195
33°15.1' 1079880	119°15.6' 408240	270	Claystone, silty, micaceous; 5Y4/1 to 5Y6/1; mottled in part; massive, low density	Middle or late Miocene coccoliths; probable lower Mohnian foraminifers	196
33°15.6' 1082850	119°15.0' 410810	425	Claystone, silty, and siltstone, clayey, micaceous, calcareous; 5Y6/1 and 5Y4/1; mottled in part, laminated; dip approx. 5°; low density	Late (?) Miocene coccoliths; upper Mohnian or Delmontian foraminifers	197
33°17.4' 1031520	119°25.2' 423180	73	Siltstone, sandy, highly micaceous, tuffaceous (?); N7; massive; low density	--	205
33°18.9' 1039720	119°23.6' 431990	420	Claystone, silty, diatomaceous; N9 and 5Y6/1; laminated, low density; numerous fragments	Early Miocene silicoflagellates; North Pacific diatom zone 23a	212
33°22.9' 1013270	119°29.0' 457390	412	Claystone, silty, micaceous, calcareous; 5Y4/1; massive (?); low density	Late middle or late Miocene coccoliths; upper Mohnian foraminifers	213
33°21.2' 989340	119 199°33.6' 447880	105	Siltstone, sandy, dolomitic (?); sugary texture; 5Y7/2; contains sporadic phosphorite pellets; hard; fragmented	--	217

33°21.3' 989020	119°33.7' 448510	105	"Marlstone", silty micaceous, dolomitic (?); 5Y5/1; massive (?)	--	218
33°20.8' 1000710	119°31.4' 444710	104	Siltstone, clayey, micaceous; 5Y6/1; indistinctly laminated; moderately hard	--	219
33°18.1' 1047750	119°22.0' 427410	501	Siltstone, clayey, diatomaceous; micaceous, tuffaceous; 5Y6/1 to 5Y8/1; laminated; very low density; 10° dip	Early or middle Miocene coccoliths, silicoflagellates; North Pacific diatom Zone 23a	225
33°15.2' 1055770	119°20.3 409270	59	Siltstone, clayey, tuffaceous, calcareous; 5Y7/2; laminated; hard	Early or middle Miocene coccoliths; Mohnian-Delmontian forams.	226
33°12.3' 988710	119°33.4' 394570	428	Claystone, silty, micaceous, calcareous; 5Y4/1 to 5Y6/1; indistinctly laminated; low density	Early Miocene coccoliths; probable upper Luisian foraminifers	236
33°09.2' 955060	119°39.9' 375800	478	Claystone, silty, micaceous; N5 to 5Y6/1; laminated in part; very low density	Late (?) Miocene coccoliths; upper Mohnian foraminifers	244
33°02.7' 954670	119°39.7' 336950	667	Claystone, silty, micaceous, calcareous; 5Y2/1; massive; low density	Late (?) Miocene coccoliths; probable upper Mohnian foraminifers	248
33°07.4' 914160	119°47.8 366740	1129	Sand, glauconitic, fine to very coarse grained, silty; 5Y4/1; contains grains of prehnite, sericite schist, serpentine, albitized basalt, quartzite, and chloritized rocks	Late late Miocene coccoliths; Repettian foraminifers from middle of 24-cm core	249 T644

33°07.4' 909810	119°48.7' 366600	600	Subwacke, feldspathic, medium to very coarse grained; rock fragments include chert, granitic rock, mica-quartz schist, epidote-zoisite granulite; recrystallized sandstone and mudstone; altered clay matrix	--	250 (dredge) T637 A and B
33°08.3' 899140	119°50.8' 372260	630	Chloritized argillite, phyllite (?), chert, hard clayey siltstone, albitized basalt and gabbro; angular and subround fragments embedded in mudstone matrix apparently derived from same materials	--	256 T643
33°11.3' 891740	119°52.4' 391220	518	Claystone, silty, calcareous, tuffaceous (?); 5Y6/1 to 5Y8/1; indistinctly laminated; low density	Late Miocene coccoliths; upper Mohnian or Delmontian foraminifers	270
33°11.8' 889530	119°52.8' 394120	540	Claystone, silty, micaceous, calcareous; 5Y4/1 and 5Y6/1; laminated, 5° dip; low density	Late Miocene coccoliths; upper Mohnian foraminifers	271
32°58.9' 32°59.7' 865040 865660	119°57.1' 119°57.0' 316350 321370	?-590	Diabase, amygdaloidal, chloritized, spilitic; coarse texture; plagioclase albitized; altered to incipient greenstone	--	280 (dredge) T639A T639B
32°44.7' 32°43.9' 876200 874700	119°54.3' 119°54.6' 230390 225800	518- 475(?)	Phosphorite nodules, dolomitic siltstone and claystone, calcareous fine-to-medium-grained lithic arenite; clasts in sandstone include quartzite, amphibolite, diorite	Siltstone and claystone contain early or middle Miocene coccoliths; sandstone contains middle Miocene (probable Luisian) foraminifers	281 (dredge) T640A T640B

(Con't)			(?), argillite, and chlorite-epidote bearing metamorphic rocks		
32°46.9' 835260	120°02.4' 244840	586	Siltstone, clayey calcareous; 5Y5/1 and 5Y6/1, mottled; low density	Middle Miocene coccoliths, diatoms, silicoflagellates; Luisian foraminifers	293
32°49.2' 32°47.4' 851780 844950	119°59.3' 120°00.5' 258340 247290	1125 964	Siltstone, dolomitic, slabby, laminated in part; 5Y5/1 to 5Y8/1; hard; leached foraminifers	--	296 (dredge)
32°52.7' 826320	120°04.4' 280540	720	Claystone, silty, calcareous; N5 to N7; laminated to massive; low density	Late Miocene coccoliths; upper Mohnian foraminifers	301
32°54.9' 816230	120°06.5' 294050	728	Claystone, silty, micaceous, calcareous, pumiceous (?); N3 to 5Y5/1; mottled, low density	Late Miocene coccoliths; upper Mohnian foraminifers	304
32°57.7' 32°55.9' 837400 828630(?)	120°02.5' 120°84.4' 310240 301070(?)	1100(?) -700(?)	Claystone, silty, calcareous; 5Y4/1 and 5Y6/1, mottled, low density	Luisian foraminifers	308 (dredge)
32°48.1' 32°48.1' 748540 763770	120°19.4' 120°16.4' 255530 254540	3054- 1000±	Basalt porphyry, partly altered; glassy matrix; An_{45-78}; subangular to subround fragments; constitutes about 75% of haul, remainder are sedimentary rocks	--	311 (dredge) T641A T641B
32°58.0' 763740	120°16.9' 314770	697	Claystone, silty, calcareous; 5Y4/1; massive (?); low density	Late Miocene coccoliths; upper Mohnian foraminifers	315

32°58.6 769690	120°15.8' 318270	661	Claystone, silty, calcareous; 5Y4/1 to 5Y6/1; mottled; burrowed, deformed; low density	Middle Miocene coccoliths (oldest); upper Mohnian foraminifers	316
32°59.2' 773760	120°15.0' 322070	702	Claystone, silty, calcareous; 5Y2/1 to 5Y6/1; mottled, contains phosphorite (?) blebs	Late Miocene coccoliths; upper Mohnian foraminifers	317
33°01.7' 798260	120°10.3' 335800	542	Claystone, silty, calcareous; 5Y3/1 to 5Y6/1; mottled in part, indistinct laminae dip 20°; low density	Middle Miocene coccoliths; upper Relizian or Luisian (probable Luisian) foraminifers	321
32°59.4' 778340	120°14.1' 322850	717	Claystone, silty, calcareous; 5Y4/1 and 5Y6/1; massive (?), contains thin phosphatic (?) lenses; low density	Late Miocene coccoliths; upper Mohnian foraminifers	334
33° 04.5' 807460	120° 08.6 352940	450	Mudstone, micaceous, calcareous; 5Y5/1; massive (?); contains subround to angular grains of quartz, feldspar, chert, quartzite, diorite (?), volcanic rocks, quartz sericite schist, albite-epidote rock, as much as 2 mm in diam.	Early Miocene coccoliths and silicoflagellates; Luisian foraminifers	346 T646
33° 05.3' 805220	120° 09.1' 357410	499	Claystone, silty, micaceous, calcareous; 5Y4/1 to 5Y6/1; mottled in part; massive; low density	Early Miocene coccoliths; upper Relizian or Luisian foraminifers	347
33° 05.8' 807060	120° 08.8' 360530	633	Claystone, silty, micaceous, calcareous, tuffaceous (?); 5Y4/1 and 5Y6/1, indistinctly laminated, low density	Early Miocene coccoliths; upper Luisian or lower Mohnian foraminifers	348

33° 06.0' 808840	120° 08.4' 361900	872	Siltstone, sandy, highly micaceous, calcareous seams; N6; massive, low density	--	349
33°32.2' 899620	119°51.7' 517430	346	Claystone, silty, micaceous, calcareous; N7; low density; numerous fragments embedded in glauconitic phosphatic mud	Late Miocene coccoliths; upper Mohnian or Delmontian foraminifers	353
33°42.5' 934450	119°45.3' 578590	873	Claystone, silty, micaceous, calcareous; N3 to 5Y4/1; fragments embedded in glauconitic foraminiferal mud	Probable Luisian foraminifers (mixed with Quaternary)	368
33°53.7' 914750	119°49.6' 647570	818	Siltstone, clayey, micaceous, calcareous; 5Y4/1 and 5Y6/1; mottled; massive (?); low density	Late Miocene coccoliths and silicoflagellates; Mohnian foraminifers	371