

Fauna and Stratigraphic
Relations of the Tejon Eocene
at the Type Locality in
Kern County,
California

BY

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INTRODUCTION

In 1854 a portion of the Pacific Railroad Survey expedition under Lieutenant R. S. Williamson camped in what is now Kern County, California, in the vicinity of old Fort Tejon. The geologist of the party, W. P. Blake, made numerous excursions in the region during which some paleontologic specimens were collected. In "Cañada de las Uvas", now known as Grapevine Creek, he picked up a float boulder containing fossils and this soon passed into the hands of T. A. Conrad. Several species new to science were detected in the small collection and the age of the formation from which it came was definitely determined as Eocene. Thus was initiated the long series of studies on California paleontology which have followed.

The strata from which the boulder came were located by subsequent workers and were given the name "Tejon." The Group has been found to be a distinct portion of the Eocene Series, demarked both above and below by profound unconformities. For this reason and because of its historical importance the "Tejon" has become the basis of a voluminous literature on west American Eocene.

A large and well preserved fauna has been found in the Group and many species have been first described from there. But a great many others have been listed as occurring in the strata without proper discrimination or through errors of various kinds. No thorough systematic study of the fauna has heretofore been completed, yet a knowledge of the Tejon is essential before studies on other portions of western Eocene can well be attempted. In order to meet this need the senior author in 1913 and 1914 had large collections of fossils made at this and other horizons of possible equivalent age from Seattle, Washington, to San Diego, California. It was then proposed to make a thorough study of the fauna of the Tejon Group at its Type Locality and use this as a basis for correlation elsewhere. Other tasks interfered and the work has been delayed until this time.

In the preparation of the report we have enjoyed the advantages of having very large collections with which to

work. By far the most important is that of the California Academy of Sciences. The University of California also possesses a large collection from the region and this was generously placed at our disposal by Professor Bruce L. Clark. Another large collection of beautifully preserved Tejon material was made by Mr. G. C. Gester. This became the property of the Southern Pacific Company and has recently been deposited in the California Academy of Sciences through the office of Professor E. T. Dumble.

We wish to express our greatest appreciation for the assistance rendered by those above mentioned; also to Mr. Marcus A. Hanna of the University of Washington for the loan of valuable comparative material from San Diego.

MARINE EOCENE DEPOSITS OF CALIFORNIA

Distribution: The marine Eocene deposits of California are known to extend throughout the coast region from below the Mexican border northward for nearly 600 miles to their most northern occurrence in the valley of Clear Lake, Lake County. South of the Tehachapi Mountains in southern California they are extensive and well developed, making up either the whole or considerable parts of several important ranges, such as the Santa Ynez, San Cayetano, Santa Susana and other Coast Ranges, and over wide areas are covered by later Tertiary formations.

North of the Tehachapi Mountains in central California, where these deposits are chiefly of interest in this paper, they not only have a great development, but it is here perhaps that they appear in their most complete and most legible sequence, and where, therefore, they are most advantageously studied. They are found on both borders of the central valley at intervals, and doubtless pass beneath it where they are covered by later sediments. Along the flanks of the Sierra Nevada Mountains from Butte County southward they have been found at several points, as at Table Mountain, Marysville Buttes, Ione, and on the Merced River, and also farther south in the region of the Tehachapi Mountains. On the opposite side of the valley they extend along the Mount Diablo Range as far south as

65. *Conus ægilops* Anderson & Hanna, new species

Plate 13, figures 5, 6

Shell of medium size, spire high, turrated, general form biconical; sides of body whorl almost straight, marked by faint revolving striæ above, but with stronger raised threads near the base; angle of whorls having a distinct beaded ridge, bordered below by an impressed groove at the top of body whorl; nodes or beads 24 or more in number on a complete whorl; shoulder concave above, slope rising in a collar on the preceding whorl; lines of growth almost straight, but curving gently forward. The raised beaded cord on the angle of the last whorl gives the shell somewhat the form and appearance of an acorn of the large oaks (*Quercus lobata*), growing at the type locality of the species; hence the name. The length of the largest specimen found is 32 mm.; diameter, 13 mm.; height of spire, when complete, about equal to diameter.

Type: No. 809, Mus. Calif. Acad. Sci.; collected by Bruce G. Martin at Loc. 245, (C. A. S. Coll.), Grapevine Creek, Kern County, California. Cast of paratype, No. 810, Mus. Calif. Acad. Sci., from Loc. 452 (U. C. Coll.) in Grapevine Canyon; Type Tejon Eocene.

This species has a general similarity to *C. cowlitzensis* Weaver and it is possible that Dickerson may have had one of the specimens here described when he reported that form from the type locality of the Tejon Group.

66. *Conus californianus* (Conrad)

Plate 8, figure 5

Volutatithes californiana CONRAD, House Doc. 129, Proj. Vol. 3, 33 Cong. 1st Sess. 1855, p. 11, App. to Rep. of W. P. Blake.—CONRAD, Pac. R. R. Repts. Vol. 5, 1857, p. 322, pl. 2, fig. 9, locality Cañada de las Uvas, California.—CARPENTER, Rept. Brit. Ass. Ad. Sci. 1864, p. 589; also Smith. Misc. Coll. 252, 1872, p. 75.

(?) *Conus remondii* GABB, (in part,) Geol. Surv. Calif. Pal. Vol. 1, p. 122, Type Tejon records, but not pl. 20, fig. 79, from Cochran's, east of Mount Diablo, etc., and not *C. remondii* GABB, Pal. Vol. 2, 1869, p. 225. *C. californiana* (CONRAD) DICKERSON, Calif. Acad. Sci. Proc. 4th Ser., Vol. 5, 1915, p. 43, Type Tejon record, and p. 74, pl. 11, fig. 6.—DICKERSON,

Univ. Calif. Publ. Geol. Vol. 9, 1916, pp. 421, 438, 449, Type Tejon records.

Volutilithes californiana CONRAD, Amer. Journ. Conch. Vol. 1, 1865, p. 23.—
DICKERSON, Univ. Calif. Publ. Geol. Vol. 9, 1916, p. 368.

Conrad's description of this species was from a specimen found at Grapevine Canyon by W. P. Blake; his figure is defective, and his description incomplete, but still the species can be recognized among the forms obtained at the type locality. Gabb's criticism of the specific name employed by Conrad is not well founded, since he misquoted it, (as *Volutilithes californica*); as Conrad wrote it it seems to be entirely permissible. Furthermore the specimen figured and described by Gabb for Conrad's species was from Cochran's, east of Mount Diablo, and represents a distinct form, related to, but not identical with Conrad's type. The names are, therefore, not synonymous, and both may be used for their respective species. A small form, quite similar to Gabb's species, occurs in the Tejon Group at the type locality, but it is easily distinguishable from Conrad's; it may be identical with *C. remondii* Gabb. It is still doubtful whether this species should be included in the list of valid species from the Type Tejon locality.

Dickerson recognized the distinctness of Gabb's species, as well as the validity of the name used by Conrad, since he has listed both from this locality.

67. [*Conus cowlitzensis* Weaver]

Conus cowlitzensis WEAVER, Wash. Geol. Surv. Bull. 15, 1912, p. 54, pl. 2, fig. 20, Cowlitz Group, Vader, Washington.

Not *C. cowlitzensis* WEAVER, DICKERSON, Calif. Acad. Sci. Proc. 4th Ser., Vol. 5, 1915, pp. 43, 49, 51, Type Tejon records, and not pl. 11, fig. 8, "cotype No. 352."—Not *C. cowlitzensis* WEAVER, DICKERSON, Univ. Calif. Publ. Geol. Vol. 9, pp. 421, 449, Type Tejon records.

The species described by Weaver under this name is abundant in the Cowlitz Group near Vader, Washington, where the senior author and Mr. Martin obtained a number of good specimens at Loc. 182 (C. A. S. Coll.). Dickerson figured a specimen from there as *C. cowlitzensis*, but his "cotype No. 352" differs from Weaver's species in a number of important details; the apical angle of Weaver's figured

specimen is 60° , the number of nodes is 16 to 18, on the body whorl which contains 40 revolving lines below the angle; while the specimen figured by Dickerson has an apical angle of only 45° , only 12 nodes on the angle of the body whorl and the latter is quite smooth, or only faintly marked by a few spiral lines near the base. In other words it is evidently a distinct species, and does not represent Weaver's species, as Dickerson supposed. Moreover, his so-called "cotype" was merely a plesiotype. No specimen of Weaver's species has yet been recognized in any of the collections from the type locality of the Tejon Group studied by us, and no confirmation has been found of its occurring there.

68. *Conus hornii* Gabb

Conus hornii GABB, Geol. Surv. Calif. Pal. Vol. 1, 1864, p. 122, pl. 29, fig. 226, Alizos Creek, (Live Oak), near old Fort Tejon.—GABB, Calif. Acad. Nat. Sci. Proc. Vol. 3, 1867, p. 303.—GABB, Calif. Acad. Nat. Sci. Proc. Vol. 3, 1867, p. 303.—GABB, Geol. Surv. Calif. Pal. Vol. 2, 1869, p. 225, said to come from the Type Tejon Group.—HEILPRIN, Acad. Nat. Sci. Phila. Proc. Vol. 34, 1882, p. 198.—COOPER.—ARNOLD, U. S. Geol. Surv. Prof. Ppr. 47, 1906, p. 15.—DICKERSON, Calif. Acad. Sci. Proc. 4th Ser., Vol. 5, 1915, pp. 43, 98, pl. 11, figs. 9a, 9b, 9c; Type Tejon records.—DICKERSON, Univ. Calif. Publ. Geol. Vol. 9, 1916, pp. 421, 426, 427, 432, 438, 449, Type Tejon records.

This species was first described from the type locality of the Tejon Group, and has been found plentifully at Loc. 244 (C. A. S. Coll.), Live Oak Canyon, by Mr. Bruce G. Martin. Several good examples are in the collections of the California Academy of Sciences, three of which were figured by Dickerson. The complete absence of nodes or beads on the periphery and the slightly concave shoulder are the chief distinguishing features of the species.

69. *Conus submonilifer* Anderson & Hanna, new species

Plate 8, figure 6

Shell small, smooth, spire relatively high, biconical, with nine, heavy, impressed spiral lines on the lower half of the body whorl and finer ones extending to the periphery;

whorls eight, rising into a high spire with almost straight sides; periphery sharply angled the ridge being quite smooth, or only faintly crenulated on the body, but with more distinct crenulations on the younger whorls; shoulder slightly concave above the angle; lines of growth sinuous on the body whorl, bending obliquely forward below the angle; apical angle 68° ; basal angle 32° . Altitude of largest shell, 18 mm.; diameter, 13 mm.; spire one-third of the total length; altitude of type, 9.9 mm.; diameter, 5.2 mm.

Type: No. 812, Mus. Calif. Acad. Sci.; collected at Loc. 244, (C. A. S. Coll.), Live Oak Creek, Kern County, California, by Bruce G. Martin; Type Tejon Eocene.

This species appears to be related to the small form called *C. remondii* (?) herein, found with it at the type locality of the Tejon Group, but is distinguished from it by the absence of beads, or even crenulations on the more mature whorls, and fewer spiral lines on the same. Numerous specimens of both species were obtained at Live Oak Canyon by Mr. Martin and the writers.

The species is related to *C. hornii* but has a higher spire, traces of beads on the periphery, and for the same number of whorls is uniformly smaller.

70. ? *Conus remondii* Gabb

Plate 8, figure 7

Conus remondii, GABB, Geol. Surv. Calif. Pal. Vol. 1, 1864, p. 122, pl. 20, fig. 79; Cochran's, east of Mount Diablo, and other localities including Type Tejon.—GABB, Calif. Acad. Nat. Sci. Proc. Vol. III, 1867, p. 303.—GABB, Geol. Surv. Calif. Pal. Vol. 2, 1869, p. 225.—HEILPRIN, Acad. Nat. Sci. Phila. Proc. Vol. 34, 1882, p. 198.—COOPER, Calif. State Min. 7th Ann. Rep. 1888, p. 278.—ARNOLD, U. S. Geol. Surv. Prof. Ppr. 47, 1906, p. 15.

Not *Volutatithes caniforniana* CONRAD, Pac. R. R. Repts. Vol. 5, 1857, p. 322.

Not *Conus californianus* (CONRAD) GABB, Pal. Vol. 1, p. 122, Type Tejon records.—DICKERSON, Calif. Acad. Sci. Proc. 4th Ser., Vol. 5, pp. 43, 49, 51, Type Tejon records, but not p. 74, pl. 11, fig. 7, Cowlitz Group, Washington.—DICKERSON, Univ. Calif. Publ. Geol. Vol. 9, 1916, pp. 421, 432, 438, 449, Type Tejon records.

As stated by Gabb, Remond obtained a specimen of *Conus* from Cochran's, east of Mount Diablo, which was taken

for the species found by Blake at Grapevine Creek, and named by Conrad *Volutatithes* (Typ. err.) *californiana*. Gabb confused this name with *C. californicus* Hinds, objected to its use, and sought to replace it with the name *C. remondii*. Conrad's name appears to be valid, notwithstanding its resemblance to that used by Hinds for a recent species, and since Gabb actually used *C. remondii* for a distinct, even though related species, both names may be retained, but used for their respective species only.

Dickerson figured a specimen (pl. 11, fig. 7.), from Loc. 183 (C. A. S. Coll.), near Vader, Washington, as *C. remondii* Gabb, but which, from a direct comparison with Gabb's figure, and with Tejon material appears to be a questionable determination. A form similar to Gabb's, but smaller, occurs in the Tejon Group of the type locality. The number of nodes varies in the series we have and they do not have the axially flattened appearance of the figure of *C. remondii*. We have been unable to secure any authentic specimens of the latter from Cochran's to check the work of Gabb and until this is done it would seem premature to separate the Tejon form specifically. The identification is made, however, with the belief that eventually the separation will have to be made.

71. [*Conus weaveri* Dickerson]

Conus weaveri DICKERSON, Calif. Acad. Sci., Proc. 4th Ser. Vol. 5, 1915, p. 74, pl. 11, fig. 10, Cowlitz Group, Vader, Washington, Loc. 182 (C. A. S. Coll.); not pp. 43, 49, 51, Type Tejon records.—Not *C. weaveri* DICKERSON, Univ. Calif. Publ. Geol. Vol. 9, 1916, pp. 421, 429, Type Tejon records.

This species was described from a single specimen obtained from the Cowlitz Group by the senior author and Mr. Martin at Loc. 182 (C. A. S. Coll.), near Vader, Washington. Dickerson's record of the species from the type locality of the Tejon Group, is apparently based upon a single worn and fragmentary specimen, Loc. 244 (C. A. S. Coll.), which shows none of the diagnostic characters of his *C. weaveri*. On the other hand it bears a closer resemblance to *C. hornii* Gabb, a common form in the type local-

ity of the Tejon Group. We do not regard the evidence as sufficient to warrant including this species as a member of that fauna.

72. *Cowlitzia canalifera* (Gabb)

Plate 9, figures 6, 9, 13

- Rostellaria (Rimella) canalifera* GABB, Geol. Surv. Calif. Pal. Vol. 1, 1864, pp. 123, 226, pl. 29, fig. 228; Martinez and near Fort Tejon.
- Rimella canalifera* GABB, Calif. Acad. Nat. Sci. Proc. Vol. 3, 1868, p. 303.—GABB, Amer. Journ. Conch. Vol. 5, 1868, p. 142.—GABB, Geol. Surv. Calif. Pal. Vol. 2, 1869, p. 225.—HEILPRIN, Acad. Nat. Sci. Phila. Proc. Vol. 34, 1882, p. 197.—COOPER, Calif. State Min. 7th Ann. Rept. 1888, p. 291.—STANTON, U. S. Geol. Surv. 17th Ann. Rept. 1897, p. 1027.—ARNOLD, U. S. Geol. Surv. Prof. Ppr. 47, 1906, p. 15.
- ? *Rimella macilentia* WHITE, STANTON, U. S. Geol. Surv. 17th Ann. Rept. 1897, p. 1027, not of White.
- Rimella simplex* GABB, DICKERSON, Calif. Acad. Sci. Proc. 4th ser. Vol. 5, 1915, pp. 44, 50, 51, Type Tejon records.—DICKERSON, Univ. Calif. Publ. Geol. Vol. 9, 1916, pp. 421, 427, 439, 452, Type Tejon records.—Not *R. simplex* of Gabb.
- Cowlitzia canalifera* (GABB), CLARK & PALMER, Univ. Calif. Publ. Geol. Vol. 14, 1923, p. 284, pl. 51, figs. 15-20.

In Gabb's description of this species the first locality mentioned was Martinez, but he added, "and near Fort Tejon". Our collections from the type section of the Tejon Group contain numerous specimens that agree so well with the original figure and description that we are disposed to believe that the type came from the Tejon locality. This surmise is borne out by the fact that we have found no mention of the species occurring at Martinez by any of the later writers who have studied this section, where it should have been found if the type had really come from there. To Gabb's meager description we add the following supplementary notes:

Shell with about seven whorls, regularly rounded, and with suture well impressed between them; upper two and a half whorls smooth, the rest strongly sculptured but with gradual transition; posterior canal extending up the spire to the lowest nuclear whorl where it bends to the right around the spire; last whorl sculptured with nine axial ribs,

PLATE 8.

Fig. 1. *Acteon quercus*, new species; type No. 319 (C. A. S. Type Coll.) from Loc. 244, Type Tejon Group; enlarged to 2.3. This specimen was figured by Dickerson (Calif. Acad. Sci. Proc. 4th ser. Vol. V, pl. 11, fig. 5) as *Acteon*. n. sp. and presumably was subsequently referred to his *A. moodyi* from north of Coalinga. See p. 141.

Fig. 2. *Architectonica hornii* Gabb; plesiotype No. 801 (C. A. S. Type Coll.) from Loc. 244, Type Tejon Group; enlarged to 2.3; p. 123.

Fig. 3. *Cancellaria paucivaricata* (Gabb); plesiotype No. 804 (C. A. S. Type Coll.) from Loc. 244, Type Tejon Group; enlarged to 2.3; p. 81.

Fig. 4. *Cancellaria paucivaricata* (Gabb); plesiotype No. 805 (C. A. S. Type Coll.) from Loc. 244, Type Tejon Group; enlarged to 2.3; p. 81.

Fig. 5. *Conus californianus* (Conrad); plesiotype No. 811 (C. A. S. Type Coll.) from Loc. 245, Type Tejon Group; enlarged to 2.3; p. 97.

Fig. 6. *Conus submonilifer*, new species; type No. 812 (C. A. S. Type Coll.) from Loc. 244, Type Tejon Group; enlarged to 2.3; p. 99.

Fig. 7. *Conus remondii* ? Gabb; plesiotype No. 813 (C. A. S. Type Coll.) from Loc. 244, Type Tejon Group; enlarged to 2.3; p. 100.

Fig. 8. *Exilia fausta*, new species; type No. 820 (C. A. S. Type Coll.) from Loc. 245, Type Tejon Group; enlarged to 2.3; p. 59.

Fig. 9. *Exilia fausta*, new species; paratype No. 821 (C. A. S. Type Coll.) from Loc. 245, Type Tejon Group; enlarged to 2.3; p. 59.

Fig. 10. *Gemmula encinalis*, new species; type No. 825 (C. A. S. Type Coll.) from Loc. 245, Type Tejon Group; enlarged to 2.3; p. 93.

Fig. 11. *Gemmula abacta*, new species; paratype No. 963 (C. A. S. Type Coll.) from Loc. 245, Type Tejon Group; enlarged to 2.3; p. 92.

Fig. 12. *Mitra murietta*, new species; type No. 834 (C. A. S. Type Coll.) from Loc. 245, Type Tejon Group; enlarged to 2.3; p. 76.

Fig. 13. *Mitra murietta*, new species; paratype No. 835 (C. A. S. Type Coll.) from Loc. 245, Type Tejon Group; enlarged to 2.3; p. 76.

Fig. 14. *Molopophorus striata* Gabb; plesiotype No. 836 (C. A. S. Type Coll.) from Loc. 244, Type Tejon Group; enlarged to 2.3; p. 74.

Fig. 15. *Niso pistilliformis*, new species; type No. 841 (C. A. S. Type Coll.) from Loc. 244, Type Tejon Group; enlarged to 2.3; page 128.

Fig. 16. *Phos blakianus*, new species; type No. 844 (C. A. S. Type Coll.) from Loc. 711, Type Tejon Group; enlarged to 2.3; p. 73.

Fig. 17. *Pyramidella mucronis*, new species; type No. 850 (C. A. S. Type Coll.) from Loc. 244, Type Tejon Group; enlarged to 2.3; p. 134.

Fig. 18. *Terebra californica* Gabb; plesiotype No. 871 (C. A. S. Type Coll.) from Loc. 711, Type Tejon Group; enlarged to 2.3; p. 82.

Fig. 19. *Olivella mathewsonii* Gabb; plesiotype No. 843 (C. A. S. Type Coll.) from Loc. 244, Type Tejon Group; enlarged to 2.3; p. 80.

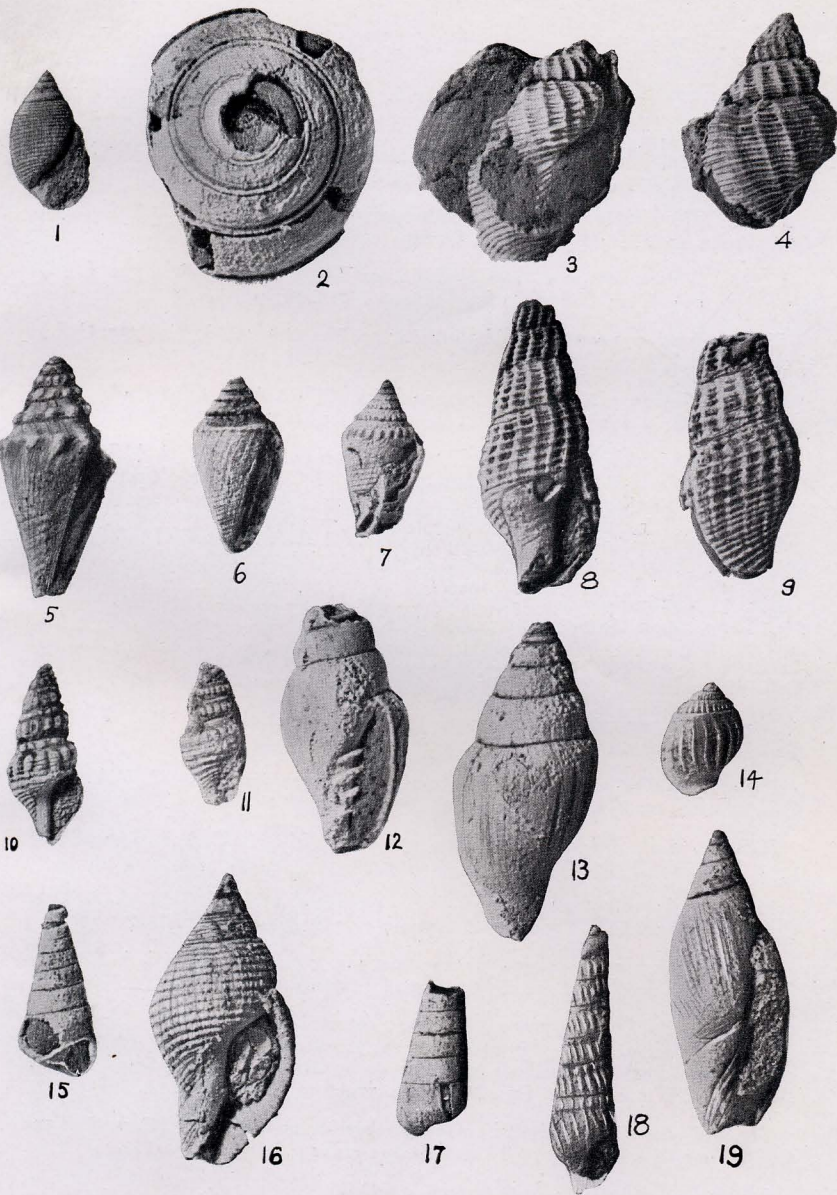


PLATE 13.

Fig. 1. *Clavilithes californicus* (Conrad); plesiotype No. 802 (C. A. S. Type Coll.) from Loc. 244, Type Tejon Group; enlarged to 1.76; p. 63.

Fig. 2. *Clavilithes californicus* (Conrad); plesiotype No. 803 (C. A. S. Type Coll.) from Loc. 244, Type Tejon Group; enlarged to 1.74; p. 63.

Fig. 3. *Bursa hornii* (Gabb); plesiotype No. 807 (C. A. S. Type Coll.) from Loc. 244, Type Tejon Group; enlarged to 1.76; p. 54.

Fig. 4. *Bursa hornii* (Gabb); plesiotype No. 808 (C. A. S. Type Coll.) from Loc. 244, Type Tejon Group; enlarged to 1.76; p. 54.

Fig. 5. *Conus ægilops*, new species; type No. 809 (C. A. S. Type Coll.) from Loc. 245, Type Tejon Group; enlarged to 1.76; p. 97.

Fig. 6. *Conus ægilops*, new species; paratype in University of California Collection; cast of same No. 810 (C. A. S. Type Coll.) from Loc. 452 (U. C. Coll.), Type Tejon Group; enlarged to 1.76; p. 97.

Fig. 7. *Crepidula pileum* (Gabb); plesiotype No. 814 (C. A. S. Type Coll.) from Loc. 244, Type Tejon Group; enlarged to 1.76; p. 122.

Fig. 8. *Bursa hornii* (Gabb); plesiotype No. 806 (C. A. S. Type Coll.) from Loc. 244, Type Tejon Group; enlarged to 1.76; p. 54.

Fig. 9. *Cypræa kerniana*, new species; type No. 816 (C. A. S. Type Coll.) from Loc. 245, Type Tejon Group; enlarged to 1.76; p. 104.

Fig. 10. *Cypræa kerniana*, new species; paratype No. 818 (C. A. S. Type Coll.) from Loc. 245, Type Tejon Group; enlarged to 1.76; p. 104.

Fig. 11. *Cypræa kerniana*, new species; paratype No. 817 (C. A. S. Type Coll.) from Loc. 245, Type Tejon Group; enlarged to 1.76; p. 104.

Fig. 12. *Gyrineum kewi* (Dickerson); plesiotype No. 828 (C. A. S. Type Coll.) from Loc. 245, Type Tejon Group; enlarged to 1.76; p. 56.

Fig. 13. *Gyrineum uvasalis*, new species; paratype No. 830 (C. A. S. Type Coll.) from Loc. 245, Type Tejon Group; enlarged to 1.76; p. 57.

Fig. 14. *Latirus sinuatus* (Gabb); plesiotype No. 831 (C. A. S. Type Coll.) from Loc. 244, Type Tejon Group; enlarged to 1.76; p. 64.

Fig. 15. *Latirus sinuatus* (Gabb); plesiotype No. 832 (C. A. S. Type Coll.) from Loc. 244, Type Tejon Group; enlarged to 1.76; p. 64.

Fig. 16. *Murex beali*, new species; type No. 837 (C. A. S. Type Coll.) from Loc. 244, Type Tejon Group; enlarged to 1.76; p. 50.

Fig. 17. *Dentalium stentor*, new species; type No. 819 (C. A. S. Type Coll.) from Loc. 792, Type Tejon Group; enlarged to 1.76; p. 145.

