

THE RECENT AND FOSSIL MOLLUSKS OF THE GENUS ALABINA FROM THE WEST COAST OF AMERICA.

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The first record that we find for *Alabina* on the west coast of America was made by Dr. P. P. Carpenter in the Report for the British Association for the Advancement of Science for 1863, published in 1864. Here he writes (page 612) that *Mesalia tenuisculpta*, n. s., occurs in shoal water at San Diego, and on page 655 of the same report he adds, "*Mesalia tenuisculpta*, n. s. Very small, slender, whorls rounded, lip waved, shoal water San Diego, Cp." (Cooper). This description is further supplemented by him in 1866 in the Proceedings of the California Academy of Natural Sciences, volume 3, page 216, where he gives a detailed description of the species and queries its position in the genus *Mesalia* by placing a question mark before it.

In the last paper (page 219) Doctor Carpenter also described *Styliferina turrita*, which is now referred to *Alabina*.

In 1894 Mr. Henry Hemphill published a description of *Eulimella occidentalis* in the fourth volume of *Zoe* (page 395). A fourth species was described by Doctor Dall and myself in the *Nautilus*, volume 15 (pages 58 and 59), in 1901 under the name of *Bittium (Elachista) californicum*.

Since the last was described a very large number of shell dredgings made by the U. S. Bureau of Fisheries steamer *Albatross* have been examined, which have yielded quite a number of additional species. Considerable work has also been done on the Tertiary faunas of the west coast, and these too have returned some interesting new forms, all of which are here described and figured.^a

^a In the preparation of the present diagnoses the following terminology is used:

"Axial sculpture," the markings which extend from the summit of the whorls toward the umbilicus.

The axial sculpture may be—

"Vertical," when the markings are in general parallelism with the axis of the shell.

"Protractive," when the markings slant forward from the preceding suture.

"Retractive," when the markings slant backward from the suture.

"Spiral sculpture," the markings following the directions of the coils of the whorls.

KEY TO THE GENUS ALABINA.

- Shell without sculpture.....*turrita*.
 Shell sculptured.
 Shell without axial sculpture (except lines of growth).
 Shell with a single spiral cord between the sutures.....*occidentalis*.
 Shell with five low, spiral cords between the sutures.....*barbarensis*.
 Shell with axial sculpture.
 Axial ribs strong.
 Spiral sculpture consisting of broad cords.
 Shell large; adult more than 6 mm. long.....*hamlini*.
 Shell small; adult less than 4 mm. long.....*phanea*.
 Spiral sculpture not consisting of broad cords.
 Spiral sculpture consisting of slender cords.
 Shell slender, conic.....*diomedea*.
 Shell stout, broadly conic.....*ignati*.
 Spiral sculpture consisting of incised lines.....*californica*.
 Axial ribs slender or obsolete.
 Axial ribs broad, but feebly developed.
 Spiral sculpture absent.....*io*.
 Spiral sculpture present.....*t. phalacra*.
 Axial ribs slender.
 Adult shell less than 5.5 mm. long.....*monicensis*.
 Adult shell more than 7 mm. long.
 Spiral sculpture obsolete between the sutures.....*tenuisculpta*.
 Spiral sculpture strong between the sutures.....*t. diegensis*.

ALABINA TURRITA Carpenter.

Plate 62, fig. 4.

Styliferina turrita CARPENTER, Proc. Cal. Acad. Nat. Sci., vol. 3, 1866, p. 219.

Shell small, elongate-conic, white. Nuclear whorls minute, apparently not differentiated from the remaining turns. Post-nuclear whorls strongly flattened, somewhat overhanging, separated by a deeply channeled suture, apparently without sculpture. Periphery and base of the last whorl well rounded. Aperture ovate, posterior angle acute, outer lip thin; columella short, moderately strong, slightly reflected.

Doctor Carpenter's type (Cat. no. 15566, U.S.N.M.), which has furnished this description and figure, has 8 whorls and measures: Length 1.7 mm., diameter 0.6 mm. It was collected by Doctor Cooper at San Pedro, California.

ALABINA OCCIDENTALIS Hemphill.

Plate 62, fig. 2.

Eulimella occidentalis HEMPHILL, Zoe, vol. 4, 1894, p. 395.

Shell elongate-conic, subdiaphanous. Nuclear whorls $1\frac{1}{2}$, small, well rounded, smooth. Post-nuclear whorls with a very strong, concavely sloping shoulder, which extends from the appressed summit over the posterior third of the whorls terminating there in a well

rounded keel. The shoulder is smooth, excepting fine lines of growth; the portion between the suture and the shoulder is well rounded, marked with lines of growth and 9 to 11 equal and equally spaced incised spiral lines. Sutures strongly constricted; periphery of the last whorl well rounded. Base moderately long, somewhat inflated, well rounded, narrowly umbilicated, marked by slender lines of growth and numerous fine spiral striations. Aperture very broadly ovate; posterior angle obtuse; outer lip thin, columella slender, slightly oblique, revolute.

The specimen described and figured (Cat. no. 127551, U.S.N.M.) is one of six which come from the Mud Flats, near San Diego, California. It has 9 whorls and measures: Length 3.1 mm., diameter 1 mm.

ALABINA BARBARENSIS, new species.

Plate 61, fig. 3.

Shell broadly conic, creamy yellow. (Nuclear whorls decollated.) Post-nuclear whorls flattened, appressed at the summit, marked by four slender, incised, spiral lines, which divide the space between the sutures into five equal, flat, cords; axial sculpture consisting of lines of growth only. Sutures strongly impressed. Periphery of the last whorl angulated. Base well rounded, marked by six spiral lines, which divide it into six cords, the posterior five of which are equal, the one about the umbilicus being wider than the rest. Aperture ovate, feebly channeled anteriorly. Posterior angle acute; outer lip thin at the edge; columella decidedly curved, oblique, strongly reflected over the reinforcing base; parietal wall covered with a thick callus.

The type (Cat. no. 203676, U.S.N.M.) and four specimens come from the Postpliocene of Santa Barbara, California. The type has 8 whorls and measures: Length 6.2 mm., diameter 2.8 mm.

ALABINA HAMLINI, new species.

Plate 61, fig. 2.

Shell elongate-conic, yellowish white. Greater part of the nuclear whorls decollated, the last turn only remaining, which is well rounded and smooth. The first two post-nuclear turns are strongly, slopingly shouldered, the remainder well rounded. All of them are marked between the sutures by four nodulose spiral cords, of which the third one below the summit is the largest, while the two posterior to it are of equal size, but smaller than the rest. The shoulder on the first two whorls extends from the third cord to the summit. In addition to the spiral cords, the whorls are marked by axial ribs, of which 14 occur upon the first and second, 16 upon the third, while upon the last they become somewhat irregular. The spaces inclosed

between the ribs and the spiral cords appear as squarish, well-impressed pits, while their intersections form low and well rounded nodules. Sutures strongly impressed; periphery of the last whorl marked by a shallow sulcus. Base well rounded, marked by a single low feeble cord immediately below the peripheral sulcus, which is almost as wide as the spiral cords between the sutures, and numerous lines of growth. Aperture ovate, slightly channeled anteriorly; posterior angle acute; outer lip thin at the edge; columella strong, decidedly curved and reflected over the reinforcing base; parietal wall covered with a thin callus.

The type and 19 specimens (Cat. no. 195216, U.S.N.M.) were collected in the Post-Pliocene deposits at Hallenbeck's Well, Los Angeles, California. The type has 6 post-nuclear whorls, and measures: Length 6.8 mm., diameter 2.5 mm.

Named for Mr. Homer Hamlin, the collector.

ALABINA PHANEA, new species.

Plate 62, fig. 6.

Shell elongate-conic, white excepting the nuclear whorls which are yellowish brown. Nuclear whorls small; the first one and one-half well rounded and smooth; the next two marked by two strong spiral keels, which divide the space between the sutures into three subequal parts. Post-nuclear whorls strongly, slopingly shouldered, ornamented with moderately strong, decidedly curved, axial ribs, of which 16 occur upon the first, 18 upon the second to fourth, 20 upon the fifth, 22 upon the sixth, and 18 upon the penultimate turn. In addition to these ribs, the whorls are marked by three broad, low, spiral cords, the weakest of which is at the summit, while the other two divide the space between the sutures into three equal portions. The intersections of the axial ribs and the spiral keels form strong tubercles which are truncated posteriorly and slope gently anteriorly. The two middle cords are much more strongly tuberculate than the one at the summit. The spaces inclosed between the axial ribs and the spiral cords are moderately impressed, squarish pits. Sutures strongly impressed. Periphery of the last whorl marked by a channel which is crossed by the continuations of the axial ribs that terminate at its anterior border. Base short, well rounded, ornamented with four rather broad, weak spiral cords. Aperture subquadrate, channeled anteriorly; posterior angle decidedly obtuse; outer lip thin, showing the external sculpture within; columella decidedly oblique, strongly revolute and somewhat twisted; parietal wall covered with a moderately thick callus.

The type and two specimens (Cat. no. 198924, U.S.N.M.) come from San Diego, California. The type has 8 post-nuclear whorls, and measures: Length 3.6 mm., diameter 1.1 mm.

ALABINA DIOMEDEÆ, new species.

Plate 62, fig. 1.

Shell elongate-conic, wax yellow. Nuclear whorls 3, small, decidedly rounded, smooth. Post-nuclear whorls well rounded with a slender sloping shoulder which extends from the summit to the middle of the whorls, where it is bounded by a strong, median spiral keel. There are two other keels upon the whorls between the sutures, one a little less strong and a little nearer the suture than the median, and another a little nearer the summit than the median; the latter being the weakest of the three. In addition to the spiral cords, the whorls are marked by numerous very fine, spiral striations and well rounded, slender, curved, axial riblets, of which 24 occur upon all but the last two turns, which have 26. In addition to the axial riblets there are numerous fine lines of growth. The intersections of the axial ribs and the spiral cords are slightly nodulose. The spaces inclosed between them are impressed rectangular pits. Periphery of the last whorl marked by a sulcus. Base moderately long, well rounded, marked by five spiral cords which are equally spaced, but grow successively weaker from the periphery to the umbilical area. Aperture broadly ovate, somewhat effuse anteriorly; posterior angle obtuse; outer lip thin, showing the external sculpture within; columella slender, decidedly curved, very slightly revolute; parietal wall glazed with a thin callus.

The type has 8 post-nuclear whorls, and measures: Length 4.7 mm., diameter 1.7 mm. It and 2,398 specimens were dredged at U. S. Bureau of Fisheries station 2823 in 26½ fathoms, on broken shell bottom off Cacachitas, Gulf of California. They are entered as Cat. no. 96705, U.S.N.M. Cat. no. 96710, U.S.N.M., contains 173 specimens dredged at station 2822 in 21 fathoms, on coral sand and broken shell bottom in the Gulf of California. Cat. no. 151950, U.S.N.M., contains 910 specimens dredged at U. S. Bureau of Fisheries stations 2826 to 2828 in 9½ to 10 fathoms, on shell bottom, near La Paz, Gulf of California.

ALABINA IGNATI, new species.

Plate 62, fig. 3.

Shell elongate conic. Early whorls bright, light chestnut brown, later wax yellow. Nuclear whorls 3, small, strongly rounded, smooth; post-nuclear whorls with a strong, sloping shoulder which extends from the summit to the middle of the whorl; marked by 4 spiral keels of which the strongest is on the middle of the whorl, the next stronger about half way between the suture and the median, and the next half between the median and the summit, the fourth remaining a slen-

der thread at the summit. In addition to these spiral cords, the whorls are marked by well-rounded, slender, somewhat retractive axial riblets, which, like the spiral sculpture, become obsolete on the last volution. Of these riblets, 22 appear upon the second and third, 24 upon the fourth and fifth, and about 40 upon the last volution. Sutures constricted; periphery of the last whorl marked by a broad, shallow sulcus. Base somewhat inflated, well rounded, marked by 6 low, rounded, subequal and subequally spaced spiral keels. Anterior portion of the base surrounding the umbilical area smooth, excepting slender lines of growth. Aperture broadly ovate, somewhat effuse anteriorly; posterior angle acute; outer lip thin, showing the external sculpture within; columella slender, strongly curved, and very slightly revolute.

The type (Cat. no. 105515, U.S.N.M.) has 7 post-nuclear whorls, and measures: Length 4 mm., diameter 1.7 mm. It comes from San Ignacio Lagoon, Lower California.

ALABINA CALIFORNICA Dall and Bartsch.

Plate 62, fig. 7.

Bittium (Elachista) californicum DALL and BARTSCH, Nautilus, vol. 15, 1901, pp. 58-59.

Shell elongate-conic, yellowish white. Nuclear whorls $2\frac{1}{10}$, moderately rounded, smooth. Post-nuclear whorls strongly rounded, somewhat inflated, appressed at the summit, marked by broad, low, strong, protractive axial ribs of which 14 occur upon the first to third, 16 upon the fourth, and 18 upon the penultimate whorl. In addition to the axial ribs, the whorls are marked on the spire by three feebly impressed, spiral lines which pass over the ribs as well as the broad, intercostal spaces. The middle one of these three lines is halfway between the sutures. The other two divide the space anterior and posterior to it into equal halves. Sutures strongly constricted. Periphery and base of the last whorl well rounded, smooth, excepting faint lines of growth. Aperture broadly ovate; posterior angle acute; outer lip thin; columella short, moderately strong, strongly curved and slightly reflected over the reinforcing base.

The type has 8 whorls and measures: Length 5.3 mm., diameter 2.2 mm. It is one of 7 specimens (Cat. no. 162548, U.S.N.M.) and came from Dead Man's Island, San Pedro, California. Cat. no. 162547, U.S.N.M., one specimen, came from the Lower San Pedro Series, Dead Man's Island, California; and Cat. no. 195215, U.S.N.M., 75 specimens, came from the same locality.

ALABINA IO, new species.

Plate 61, fig. 1.

Shell conic, white. Nuclear whorls small, well rounded. Post-nuclear whorls well rounded, appressed at the summit, marked by rather broad, low, obsolete, retractive ribs, of which 18 occur upon the fourth and fifth, and 20 upon the penultimate turn. Sutures strongly constricted. Periphery of the last whorl well rounded. Base moderately long, well rounded. Aperture oval; posterior angle obtuse; outer lip thin; columella short, slightly revolute, and reinforced by the base.

The type (Cat. no. 148669, U.S.N.M.) comes from the Post Pliocene beds of San Diego, California. It has 7 post-nuclear whorls and measures: Length 6 mm., diameter 2.3 mm.

ALABINA MONICENSIS, new species.

Plate 62, fig. 5.

Shell small, white. Nuclear whorls partly decollated, those remaining, well rounded, without apparent sculpture. Post-nuclear whorls well rounded, appressed at the summit, separated by constricted sutures, marked by numerous raised axial threads and 7 subequally spaced, low broad spiral cords between the sutures. Periphery of the last whorl well rounded. Base moderately long, well rounded, marked like the spire. Aperture broadly ovate; outer lip thin; columella slender, decidedly curved, reflected slightly over the base; parietal wall glazed with a thin callus.

The type (Cat. no. 195217, U.S.N.M.) has 8 whorls remaining and measures: Length 5 mm., diameter 1.7 mm. It comes from the Upper San Pedro Series at Santa Monica, California.

ALABINA TENUISCULPTA Carpenter.

Plate 61, fig. 6.

Mesalia tenuisculpta CARPENTER, Rep. Brit. Ass. Adv. Sci. for 1863, 1864, pp. 612 and 655.—? *Mesalia tenuisculpta* CARPENTER, Proc. Cal. Acad. Nat. Sci., vol. 3, 1866, p. 216.

Shell acicular, light chestnut brown. Nuclear whorls very small, $2\frac{1}{2}$, increasing regularly in size, well rounded. Post-nuclear whorls with a strong, very wide, sloping shoulder which extends over the posterior half of the whorls between the sutures; and is bounded at the summit by a slender spiral thread. The first five post-nuclear turns have a strong, median, spiral cord and a second as strong as the median, about halfway between the suture and the median cord. Midway between these two, a slender spiral thread can be seen on the third to the sixth whorl. On the last three

whorls the median cord is almost completely lost, while the one above the sutural line retains its strength. On these three whorls additional fine spiral lines make their appearance. The axial sculpture consists of fine lines of growth only. Sutures weakly channeled. Periphery and base of the last whorl well rounded, marked by eight subequal and subequally spaced, spiral keels and fine lines of growth. The space immediately surrounding the umbilical area has no spiral sculpture. Aperture broadly ovate; posterior angle obtuse; outer lip thin; columella slender, decidedly curved and slightly reflected over the narrow umbilicus; parietal wall glazed with a thin callus.

Doctor Carpenter's type (Cat. no. 40933, U.S.N.M.) was collected by Dr. J. G. Cooper at San Diego, California. It has 9 post-nuclear whorls and measures: Length 7.2 mm., diameter 2.4 mm. Two additional lots are in the U.S.N.M., Cat. no. 195218 (1 specimen) from San Pedro, California, and Cat. no. 160095a (1 specimen) from San Diego, California.

ALABINA TENUISCUPTA DIEGENSIS, new subspecies.

Plate 61, fig. 4.

Shell elongate-conic, chestnut brown, excepting the extreme apex and the last volution, which are paler. Nuclear, whorls 3, small, increasing regularly in size, well rounded, without sculpture. The early post-nuclear whorls have a decidedly sloping shoulder which extends from the middle to the whorls, between the sutures to the summit. This shoulder is marked on the first whorl by a single cord that limits it anteriorly, on the second by an additional cord, which divides the shoulder in two equal halves, while on the third, two additional cords a little less strong than the other two divide the space between the summit and the first cord, and the space between the next two cords into equal halves. The sculpture on the anterior half of the whorls between the suture consists of a single cord on the first and second, which is halfway between the median cord and the suture. On the third, an additional cord a little less strong appears between the two. This cord becomes equal in strength to the other two on the succeeding turns. The space between the suture and the first supra-sutural cord remains plain, barring exceedingly fine microscopic spiral striations and is as wide as the space between this cord and the median cord. In addition to the spiral sculpture, the whorls are marked by very many irregular decidedly curved and regularly distributed axial riblets, which render their intersections with the spiral cords very weakly nodulose. The summits of the whorls are roundly shouldered and make the sutures appear constricted. Periphery and base of the last whorl somewhat inflated, well rounded, the latter marked by seven equal and equally spaced, low, rounded, spiral cords and feeble axial threads. The space

immediately surrounding the umbilical area is free from all spiral sculpture. Aperture very broadly ovate; outer lip thin, showing the external sculpture within; columella slender, strongly curved and slightly revolute; parietal wall glazed with a thin callus.

The type (Cat. no. 195219, U.S.N.M.) comes from San Pedro, California, and has 8 post-nuclear whorls and measures: Length 7.5 mm., diameter 2.7 mm.

Specimens examined.

Catalogue number.	Locality.	Number of specimens.
195219	San Pedro Bay, California.....	2
191578	Terminal Island, California.....	41
32205	San Diego, California.....	26
56449	do.....	3
109368	do.....	1
160095	do.....	2
198585	do.....	1
198589	do.....	1
206667	United States Bureau of Fisheries, station 3568, San Diego Bay, California (4 fathoms, hard, broken shell bottom).....	1
213010	United States Bureau of Fisheries, station 3573, San Diego Bay, California (1½ fathoms, mud and sand bottom).....	24
213011	United States Bureau of Fisheries, station 3572, San Diego Bay, California (2 fathoms, mud and sand bottom).....	5
195220	Southern California.....	11
212035	United States Bureau of Fisheries, station 3564, San Diego Bay, California (5 fathoms, sand, mud, and shell bottom).....	3
212036	United States Bureau of Fisheries, station 3566, San Diego Bay, California (3 fathoms, sand and shell bottom).....	57

ALABINA TENUISCULPTA PHALACRA, new subspecies.

Plate 61, fig. 5.

Shell broadly elongate-conic, light chestnut brown. Nuclear whorls $2\frac{1}{2}$, small, increasing regularly in size, smooth. Post-nuclear whorls slightly shouldered at the summit, marked by slender, axial ribs, of which 18 occur upon the first to fourth, 20 upon the fifth and sixth, and 24 upon the penultimate turn. Upon the early whorls the ribs are almost vertical; on the last two they are decidedly retractive. Here also they are less regular. In addition to the axial ribs, the whorls are marked by three obsolete spiral cords, of which one is median, another a little nearer to the median cord than the summit, and the third about halfway between the median and the suture. Periphery and base of the last whorl inflated, the latter narrowly umbilical, marked by five subequal subobsolete cords. The space immediately about the umbilical area is smooth. Aperture very broadly ovate; posterior angle obtuse; outer lip thin, showing the external sculpture within; columella slender, curved, and slightly revolute; parietal wall glazed with a thin callus.

The type and another specimen (Cat. no. 32205a, U.S.N.M.) come from San Diego. The type has 8 post-nuclear whorls, and measures: Length, 7.5 mm.; diameter, 3 mm.

EXPLANATION OF PLATES.

PLATE 61.

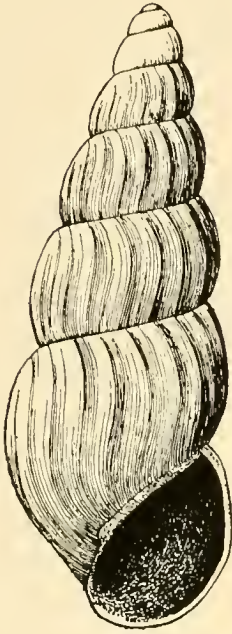
All figures on this plate are enlarged 10 times.

- FIG. 1. *Alabina io*.
2. *Alabina hamlini*.
3. *Alabina barbarentis*.
4. *Alabina tenuisculpta dicgensis*.
5. *Alabina tenuisculpta phalacra*.
6. *Alabina tenuisculpta*.

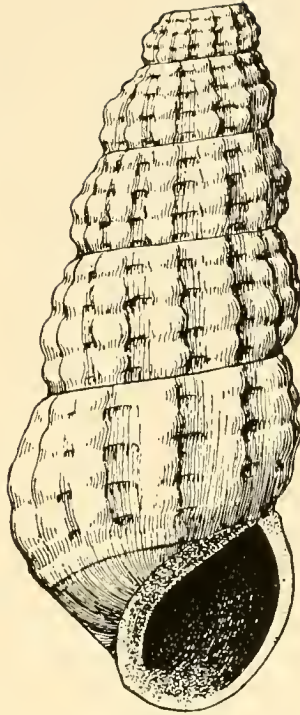
PLATE 62.

All figures on this plate excepting No. 4 are enlarged 12.5 times. No. 4 is enlarged 22.5 times.

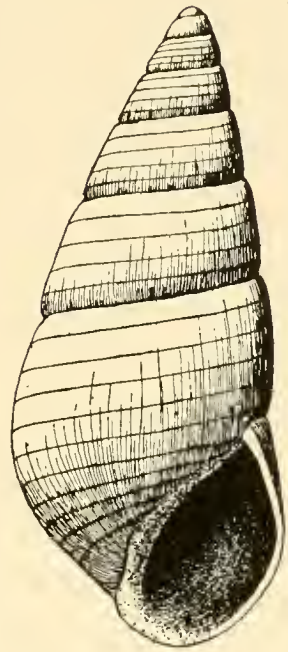
- FIG. 1. *Alabina diomedææ*.
2. *Alabina occidentalis*.
3. *Alabina ignati*.
4. *Alabina turrita*.
5. *Alabina monicensis*.
6. *Alabina phanca*.
7. *Alabina californica*.



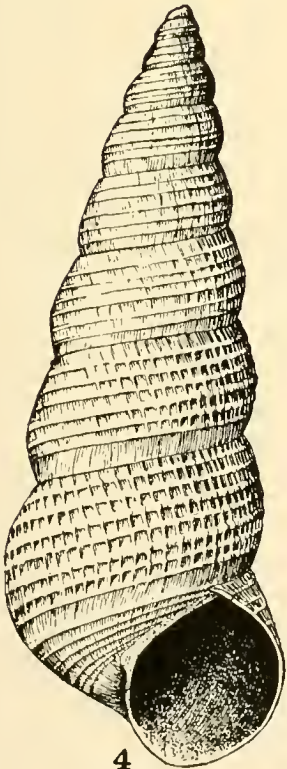
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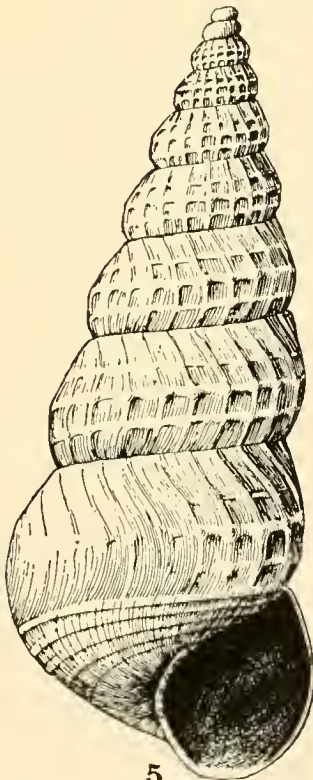
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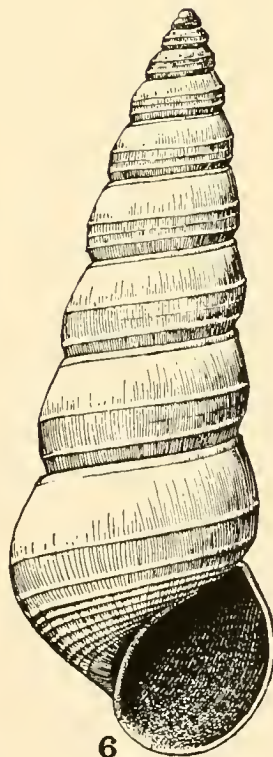
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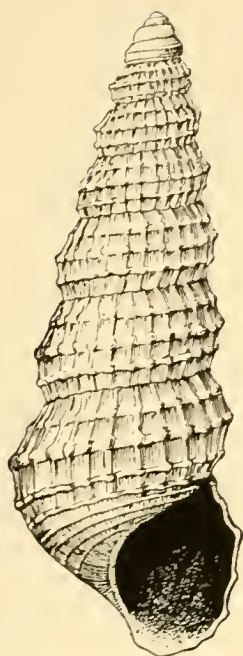
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ALABINA FROM THE WEST COAST OF AMERICA.

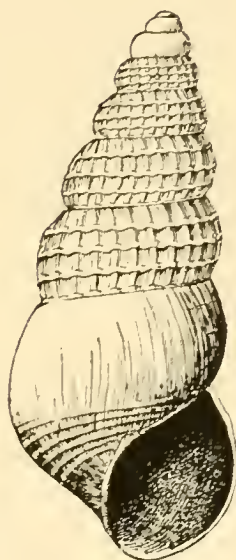
FOR EXPLANATION OF PLATE SEE PAGE 418.



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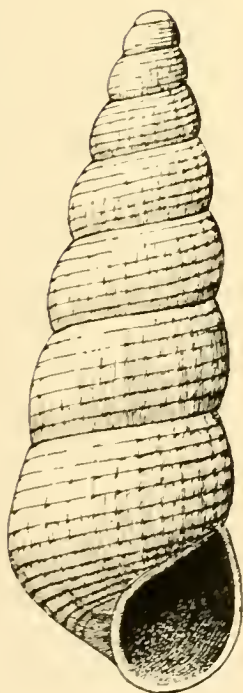
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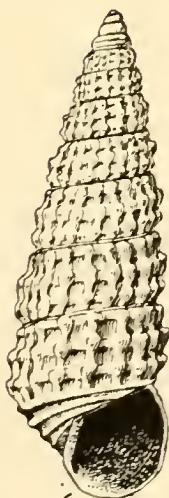
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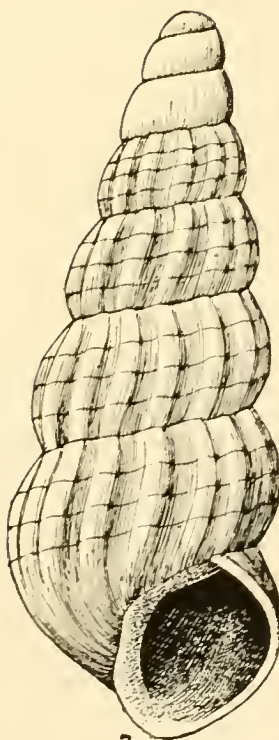
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ALABINA FROM THE WEST COAST OF AMERICA.

FOR EXPLANATION OF PLATE SEE PAGE 418.

