

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

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Dr. P. P. Carpenter was the first to record members of the genus *Alvania* from the west coast of America. In his Catalogue of Mazatlan Shells¹ we find ?*Alvania excurvata*, *Alvania effusa*, and *Alvania tumida* described as new. In the same work occurs ?*Rissoa lirata* Carpenter, which is now placed in the genus *Alvania*.

In the following year Doctor Carpenter's Report on the Present State of our Knowledge with Regard to the Mollusca of the West Coast of America was published.² In this he refers the species described by Prof. C. B. Adams³ as *Cingula* (?) *inconspicua*, *C.* (?) *terebellum*, and *C.* (?) *turrita* doubtfully to *Alvania*. This decision he changed in 1863,⁴ when he referred all three to the Pyramidellidæ. They are all *Odostomias*.

The next to contribute to our knowledge of *Alvania* was O. A. L. Mörch, who described *Alvania perlata* from the west coast of Central America.⁵

This was followed four years later by *Rissoa* now *Alvania albolirata* Carpenter⁶ and *Diala electrina* Carpenter,⁷ which is also an *Alvania*.

In volume 14 of the same publication, also printed in 1864, *Alvania reticulata* Carpenter and *Alvania filosa* Carpenter will be found described on page 429.

The following year Weinkauff rechristened Carpenter's *Alvania reticulata* *Alvania carpenteri*, *A. reticulata* Carpenter being preoccupied by *Turbo* (= *Alvania*) *reticulatus* Montagu. The same year Doctor Carpenter published *Rissoa compacta*,⁸ which is also an *Alvania*.

¹ Pages 359-360, 1856.

² Rep. Brit. Ass. Adv. Sci. for 1856, published in 1857.

³ Ann. Lyc. Nat. Hist. N. Y., vol. 5, 1852, pp. 405-406.

⁴ Proc. Zool. Soc. London, 1863, pp. 353-354.

⁵ Mal. Blätt., vol. 7, 1860, p. 68.

⁶ Ann. Mag. Nat. Hist., ser. 3, vol. 13, 1864, p. 477.

⁷ Idem, p. 478.

⁸ Proc. Acad. Nat. Sci. Phila., 1865, p. 62.

In 1866 Doctor Carpenter added *Rissoa* (= *Alvania*) *acutilirata*.¹ which has been generally considered a synonym of *Alvania compacta* Carpenter, but is in reality quite distinct.

Six years later Doctor Dall described *Alvania purpurea*,² and in 1886 he added the following new forms from Alaska:³ *Alvania castanea* Möller, var. *alaskana*, *Alvania castanella*, and *Alvania aurivillii*.

The following year Professor Keep gave a terse diagnosis⁴ of *Alvania æquisculpta*, which was later redescribed as *Alvania grippiana* Dall.

For the next 21 years no additions were made. In 1908 Doctor Dall published *Rissoa* (*Alvania*) *grippiana*,⁵ and last year the present writer described *Alvania bakeri* from Alaskan waters.⁶

A careful examination of the many bottom samples collected on the west coast by the United States Bureau of Fisheries steamer *Albatross* has added a number of new and interesting forms, some of which come from a considerable depth, while the careful and painstaking collecting by many private collectors has brought to light other new forms from the littoral zone, all of which are here described.

Only two species are known as fossils, and as fossils only, from the west coast of California. These are *Alvania pedroana* and *fossilis*, and come from Sand Rock at San Pedro, California.

KEY TO THE GENUS ALVANIA.

Spiral sculpture much stronger than the axial.

Axial sculpture reduced to incremental lines or mere raised threads, which are developed best between the spiral keels or cords.

Spiral sculpture consisting of strong keels.

Spiral keels between the sutures, 6.....*castanella*, p. 336.

Spiral keels between the sutures, 3.

Adult shell more than 4 mm. long.....*aurivillii*, p. 336.

Adult shell less than 2 mm. long.....*bakeri*, p. 337.

Spiral sculpture consisting of well-rounded cords.....*albolirata*, p. 338.

Axial sculpture consisting of broad, subobsolete ribs.....*lirata*, p. 338.

Spiral sculpture not stronger than the axial.

Junction of axial ribs and spiral cords not nodulose.

Sutures channeled.

Shell large and robust; adult more than 2.75 mm. long.

Penultimate whorl with about 22 axial ribs.....*trachisma*, p. 339.

Penultimate whorl with about 34 axial ribs.....*californica*, p. 340.

Shell small and delicate; adult less than 2.25 mm. long.

Whorls strongly rounded.....*carpenteri*, p. 341.

Whorls almost flattened.....*pedroana*, p. 341.

¹ Proc. Cala. Acad. Nat. Sci., vol. 3, 1866, p. 217.

² Amer. Journ. Conch., vol. 7, 1872, p. 116.

³ Proc. U. S. Nat. Mus., vol. 9, pp. 307-308.

⁴ Keep's West Coast Shells, 1887, p. 65.

⁵ Nautilus, vol. 21, 1908, p. 136.

⁶ Idem, vol. 23, 1910, p. 137.

Sutures not channeled.

Sutures strongly constricted.

Spiral cords between the sutures on the penultimate whorl, 12.....*filosa*, p. 342.

Spiral cords between the sutures on the penultimate whorl, 5*alaskana*, p. 343.

Spiral cords between the sutures on the penultimate whorl, 4.....*montereyensis*, p. 343.

Spiral cords between the sutures on the penultimate whorl, 3.....*excurvata*, p. 344.

Sutures not strongly constricted.

Spiral cords between the sutures more than 10 on the last whorl.

Shell ovate.....*profundicola*, p. 345.

Shell elongate-conic.....*hoodensis*, p. 345.

Spiral cords between the sutures less than 7 on the last whorl.

Shell elongate-conic.....*electrina*, p. 346.

Shell ovate.

Base with 4 spiral cords.....*perlata*, p. 347.

Base with more than 4 spiral cords.

Spiral cords between the sutures, 4.

Axial ribs on the last whorl,
20.....*galapagensis*, p. 347.

Axial ribs on the last whorl,
14.....*nemo*, p. 348.

Spiral cords between the sutures more than 4.

Body whorl inflated.

Whorls strongly rounded..*rosana*, p. 349.

Whorls almost flattened..*fossilis*, p. 349.

Body whorl not inflated.

Axial ribs on last whorl
about 45.....*iliuliukensis*, p. 350.

Axial ribs on last whorl
about 30.....*compacta*, p. 351.

Axial ribs on last whorl
about 20.....*acutilirata*, p. 352.

Junction of axial ribs and spiral cords nodulose.

Sutures channeled.

Spiral cords between the sutures, 2.

Basal cords, 3.....*cosmia*, p. 352.

Basal cords, 4.....*purpurea*, p. 353.

Spiral cords between the sutures more than 2.

Spiral cords between the sutures, 3.

Cord at the summit equal to the other two in strength.....*halia*, p. 354.

Cord at the summit not equal to the other two in strength.....*ima*, p. 355.

Spiral cords between the sutures more than 3.

Spiral cords between the sutures, 6, or more.

Spiral cords between the sutures equal....*clarionensis*, p. 356.

Spiral cords between the sutures unequal..*lara*, p. 357.

Sutures not channeled.

Shell elongate-conic.

Spiral cords between the sutures, 5.....*effusa*, p. 358.

Spiral cords between the sutures, 3.....*æquisculpta*, p. 358.

Shell not elongate-conic.

Shell broadly ovate.

Basal cords, 2.....*almo*, p. 359.

Basal cords, 4.....*oldroydæ*, p. 360.

Shell subglobose.....*tumida*, p. 361.

ALVANIA CASTANELLA Dall.

Plate 29, fig. 1.

Alvania castanella DALL, Proc. U. S. Nat. Mus., vol. 9, 1886, p. 307, pl. 3, fig. 5.

Shell elongate-ovate, thin, yellowish-white. Nuclear whorls about one and three-quarters, well rounded, smooth. Post-nuclear whorls strongly, slopingly shouldered at the summit, well rounded, marked between the sutures by six spiral keels, the first of which adjoins the strongly channeled suture, while the second marks the angle of the shoulder; the remaining four growing gradually and successively weaker and a little closer spaced. In addition to the spiral sculpture, the whorls are marked by numerous very fine, incremental lines. Suture quite strongly constricted. Periphery of the last whorl well rounded. Base moderately long, well rounded, very narrowly umbilicated, marked by six equal and equally spaced, spiral keels. Aperture semicircular; posterior angle obtuse; outer lip thin, showing the external sculpture within; inner lip thin, strongly curved and slightly revolute; parietal wall covered with a moderately thick callus, which renders the peritreme complete; operculum thin, horny.

The type (Cat. No. 213677, U.S.N.M.) and another specimen were collected by Doctor Dall at Atka Island, Alaska. The type has four post-nuclear whorls and measures: Length 2.4 mm., diameter 1.3 mm. Cat. No. 213678, U.S.N.M., contains 9 specimens taken from sponges on the beach, at low water, at Kyska Harbor, Aleutian Islands, Alaska.

ALVANIA AURIVILLII Dall.

Plate 29, fig. 5.

Alvania aurivillii DALL, Proc. U. S. Nat. Mus., vol. 9, 1886, p. 308, pl. 4, fig. 8.

Shell elongate-conic, thin, light yellow. Nuclear whorls one and one-half, strongly rounded, smooth. Post-nuclear whorls rounded, shouldered at the summit, marked by two strong, spiral keels, between the sutures, on the first two turns; the first keel being on the middle and the second a little posterior to the suture; the space between the summit and the first keel slopes regularly. Beginning with the third whorl a third keel appears, and the space between the sutures is here divided into four parts, of which the one at the summit is a little broader than the rest. On the last turn the peripheral keel

is completely shown in the suture, and a slender, spiral thread appears immediately below the summit. The spaces between the keels are about four times as wide as the keels. Suture quite strongly constricted. Periphery of the last whorl marked by a strong, spiral keel which is a trifle nearer to the first keel posterior to it than that is to its neighbor. Base moderately long, well rounded, narrowly umbilicated, marked by three equal and almost equally spaced spiral keels. In addition to the spiral sculpture, the whorls are marked by numerous, very slender, raised, axial threads which are best developed in the broad spaces between the spiral keels. Aperture subcircular, slightly expanded anteriorly; posterior angle obtuse; outer lip thin, showing the external sculpture within; inner lip strongly curved, somewhat reflected; parietal wall covered with a thick callus which joins the posterior angle to the columella and renders the peritreme complete; operculum thin, corneous.

The type (Cat. No. 213680, U.S.N.M.) and four other specimens were collected at Adakh Island, Alaska. The type has five post-nuclear whorls and measures: Length 4.2 mm., diameter 2 mm.

Specimens examined.

Catalogue No.	Locality.	Number of specimens.
161077.....	Kyska Harbor, Aleutian Islands, Alaska.....	1
213681.....	Pass, Kyska Harbor, Aleutians, Alaska (10 fathoms, rocky bottom).....	1
195372.....	Kyska Harbor, Aleutians, Alaska.....	1
161100.....	do.....	19
161092.....	Amchitka Island, Aleutians, Alaska.....	5
213683.....	Constantine Harbor, Amchitka Island, Aleutians, Alaska.....	2
213682.....	Amchitka Island, Aleutians, Alaska (low water).....	1
213680.....	Adakh Island, Alaska (1=type).....	5

ALVANIA BAKERI Bartsch.

Plate 29, fig. 2.

Alvania bakeri BARTSCH, Nautilus, vol. 23, 1910, No. 11, p. 137, pl. 11, fig. 8.

Shell minute, bluish-white. Nuclear whorls one and one-third, forming a moderately elevated spire. Upper half of the well-rounded nuclear whorls marked by about ten very fine, closely spaced, spiral striations; lower half marked by numerous, closely spaced, depressed, elongate granules, each of which has the long axis decidedly protractively slanted, which lends to this part of the turn a finely blistered appearance. Post-nuclear whorls a little more than two, well rounded, separated by a strongly constricted suture, marked by three strong, rounded, spiral keels, of which the strongest is a little anterior to the posterior third between the sutures, while the anterior of the other two, which are of equal strength, is at the periphery and the third halfway between them. In addition to these keels, the whorls

are marked by fine, incised, spiral lines between the keels, which are best developed on the well-rounded shoulder, between the summit of the whorls and the strong keel below it. Base of the last whorl slightly protracted, well rounded, marked by two broad, depressed, spiral cords, of which the basal one, which is a little anterior to the middle, is the broader. In addition to these there are numerous, exceedingly fine, spiral striations. The axial sculpture of the entire spire and base consists of very fine, incremental lines only. Aperture very broadly ovate, almost circular; peritreme continuous; outer lip thick within, beveled at the margin to form a sharp edge, which is rendered slightly sinuous by the external spiral sculpture; inner lip strong and strongly curved; parietal wall of the aperture appressed to the preceding whorl.

The type (Cat. 208445, U.S.N.M.) was collected by Dr. Fred Baker at Port Graham, Alaska; it measures: Length 1.4 mm., diameter 1.2 mm.

ALVANIA ALBOLIRATA Carpenter.

Plate 29, fig. 6.

Rissoa albolirata CARPENTER, Ann. Mag. Nat. Hist., ser. 3, vol. 13, 1864, p. 76.

Shell elongate-conic, rather thick, yellowish white. Nuclear whorls two and one-half, well-rounded, smooth. Post-nuclear whorls marked by low, rounded, subequal, spiral keels, excepting the one at the summit, which is considerably wider than the rest. Of these keels, 6 occur upon the first, 9 upon the second, and 12 upon the penultimate turn. Summit of the whorls appressed. Sutures very poorly defined. Periphery of the last whorl well rounded. Base somewhat produced, well rounded, marked by 9 subequal and subequally spaced, spiral cords. In addition to the above sculpture, the entire surface of the spire and base is marked by exceedingly fine, incremental lines which are best seen on the spaces between the spiral keels. Aperture decidedly oblique, broadly oval; outer lip decidedly expanded anteriorly, reenforced with a thick callus; inner lip very oblique, slightly reflected over and appressed to the base; parietal wall covered with a thick callus.

The type (Cat. No. 16216, U.S.N.M.) comes from Cape San Lucas, Lower California. It has four post-nuclear whorls and measures: Length 3 mm., diameter 1.3 mm.

ALVANIA LIRATA Carpenter.

Plate 29, fig. 3.

?*Rissoa lirata* CARPENTER, Cat. Maz. Shells, 1856, p. 358.

Shell elongate-ovate; early whorls light brown, later ones milk white. Nuclear whorls two, small, well rounded, smooth. Post-nuclear whorls marked by feebly developed, broad, axial ribs, of

which 16 occur upon the second and third and 18 upon the penultimate turn. These ribs are best shown immediately posterior to the deeply channeled suture, where they appear as a cord of slender tubercles. The main sculpture of the shell consists of fine, spiral lirations, of which 6 occur between the summit and the tubercles on the first turn and 10 upon the second. The space between the tubercles and the suture seems to be marked by a single, spiral liration only. On the last whorl the tubercles are altogether obsolete and the surface of this whorl is marked by 12 subequal and subequally spaced spiral cords, of which the 3 near the summit are the weakest. The spaces between these cords are narrower than the cords. Suture very strongly and deeply channeled. Periphery of the last whorl marked by an impressed groove, which bears a slender, spiral cord in its middle. Base somewhat produced, scarcely rounded, marked by eight equal and equally spaced, spiral cords. Aperture very oblique, rather large, oval; posterior angle acute; outer lip decidedly thickened immediately behind the thin edge; inner lip stout, curved, reflected over, and appressed to the base; parietal wall covered with a thick callus which joins the posterior angle of the aperture with the columella and renders the peritreme complete.

The specimen described and figured is one of ten (Cat. No. 208500, U.S.N.M.), which come from the Gulf of California. It has four post-nuclear whorls and measures: Length 2.8 mm., diameter 1.3 mm. Cat. No. 16207, U.S.N.M., contains one specimen from Cape San Lucas, Lower California, and Cat. No. 32368, U.S.N.M., contains two from the Gulf of California.

ALVANIA TRACHISMA, new species.

Plate 29, fig. 7.

Shell elongate-ovate, yellowish white. (Nuclear whorls decolated.) Post-nuclear whorls slightly rounded, marked by slender, well rounded, almost vertical, axial ribs, of which 26 occur upon the first and second and 22 upon the third and the penultimate turn. These axial ribs are about one-third as wide as the spaces that separate them and extend prominently from the summit of the whorls, where they terminate in rounded cusps, to the umbilical area. In addition to the axial sculpture, the whorls are marked by spiral cords, of which 3 occur between the sutures on the first and second whorls, 5 on the third, and 6 on the penultimate turn. The spiral cords pass over the axial ribs as cords. The spaces inclosed between the axial ribs and the spiral cords are elongate oval pits, having their long axes parallel with the spiral sculpture. Suture broad and very deeply channeled. Periphery of the last whorl marked by a sulcus a little wider than those occurring on the spire, crossed by the

continuations of the axial ribs. Base moderately produced, slightly concave in the middle, marked by six equal and almost equally spaced spiral cords and the continuations of the axial ribs. Aperture oblique, moderately large, oval; posterior angle acute; outer lip very thick, reenforced immediately behind the edge by a strong varix, showing about 10 internal lirations within the aperture; inner lip very stout, curved, and reflected over and appressed to base; parietal wall covered with a thick callus which completes the peristome.

The type (Cat. No. 213684, U.S.N.M.) has 5 post-nuclear whorls and measures: Length 3.3 mm., diameter 1.9 mm. It comes from Monterey, California.

ALVANIA CALIFORNICA, new species.

Plate 29, fig. 9.

Shell elongate-ovate, the spire posterior to the periphery of the last whorl forming a perfect cone, yellowish white. Nuclear whorls two and one-half, well rounded, smooth, separated by a moderately constricted suture. Post-nuclear whorls moderately well rounded, marked by slender, rounded, slightly protractive, axial ribs, of which 26 occur upon the first and 34 upon the second and the penultimate turn. These axial ribs extend quite prominently from the summit of the whorls, where they form slender cusps, to the periphery of the whorls, becoming evanescent immediately anterior to the periphery. In addition to the axial ribs, the whorls are marked by spiral cords about as strong as the axial ribs. Of these two occur upon the first volution, where they divide the space between the sutures into three equal parts; on the second there are four, while upon the penultimate turn there are six. Suture strongly channeled. Periphery of the last whorl marked by a sulcus as wide as the one which separates the two cords posterior to it. Base moderately long, well rounded, marked by six almost equally spaced, spiral cords, which grow successively stronger from the periphery to the umbilical area. In addition to these spiral cords, there are feeble extensions of the axial ribs occurring in the space between the first and second sulcus anterior to the periphery. Aperture very broadly oval; posterior angle obtuse; outer lip very thick, reenforced immediately behind the edge by a strong varix, showing about 10 lirations within; inner lip stout, curved, strongly reflected over and appressed to the base; parietal wall covered with a thick callus, which completes the peristome.

The type and 10 other specimens (Cat. No. 56347, U.S.N.M.) come from Monterey, California. The type has $3\frac{1}{2}$ post-nuclear whorls and measures: Length 2.5 mm., diameter 1.4 mm.

ALVANIA CARPENTERI Weinkauff.

Plate 29, fig. 8.

Rissoa carpenteri WEINKAUFF, Conch. Cab., p. 192, 1885=*Alvania reticulata* CARPENTER, Ann. Mag. Nat. Hist., ser. 3, vol. 14, 1865, p. 429. Not *Rissoa* (= *Alvania*) *reticulata* Montagu, 1808.

Shell small, elongate ovate, yellowish white. Nuclear whorls one and one-half, smooth, well rounded. Post-nuclear whorls well rounded; the first two slightly, slopingly shouldered at the summit, marked by slender, axial ribs, of which 24 occur upon the first, 32 upon the second, and 34 upon the penultimate turn. In addition to the axial ribs, the whorls are marked by spiral cords which equal the ribs in strength; of these cords, 4 occur upon the first and second turns, the space between the summit and the first cord is considerably wider than that between any of the cords and forms a sloping shoulder. On the penultimate whorl, this space is marked by two additional cords, one of which is at the summit and the other is halfway between this and the next cord. The spaces inclosed between the axial ribs and the spiral cords are elongated pits, which have their long axes parallel to the spiral sculpture in all cases except the median, where the pits are squarish. Suture strongly channeled. Periphery of the last whorl marked by a spiral sulcus equal to the one separating the first and second suprapерipheral cords. Base moderately long, well rounded, not attenuated anteriorly, marked by 6 equal and equally spaced, spiral cords and very feeble continuations of the axial ribs, which here appear as very slender threads. Aperture broadly oval; posterior angle obtuse; outer lip thin, showing the external sculpture within; inner lip very strongly curved and slightly reflected; parietal wall covered with a moderately strong callus, which renders the peritreme complete.

The type (Cat. No. 17728, U.S.N.M.) was collected by J. G. Swan at Neah Bay, Washington. It has three post-nuclear whorls and measures: Length, 2 mm., diameter, 1.1 mm.

ALVANIA PEDROANA, new species.

Plate 29, fig. 4.

Shell elongate-ovate, milk white. Nuclear whorls two, well rounded, smooth. Post-nuclear whorls almost flattened, marked by rather strong, vertical, axial ribs, of which 22 occur upon the first and second, and 25 upon the penultimate turn. In addition to the axial ribs, the whorls are marked by spiral cords which almost equal the axial ribs in strength. Of these cords, 5 occur between the sutures on all the whorls, the first being at the summit. The summit of the

last whorl falls anterior to the peripheral cord on the penultimate whorl, displaying the peripheral cord completely in the suture. The spaces inclosed between the spiral cords and the axial ribs are elongated, oval pits about as wide as the spiral cords. Suture strongly and deeply channeled. Periphery of the last whorl marked by a spiral cord, which is separated from the first suprapерipheral cord by a channel as wide as that separating the suprapерipheral cord from its posterior neighbor. The axial ribs terminate at the posterior edge of the peripheral cord. Base moderately long, slightly produced anteriorly, almost flattened, marked by 8 equal and equally spaced, spiral cords, which are a little broader than the channels that separate them. Aperture oval; posterior angle obtuse; outer lip thick within, thin at edge; inner lip strong, curved, reflected over and appressed to the base; parietal wall covered with a thick callus, which renders the peritreme complete.

The type and another specimen (Cat. No. 213685, U.S.N.M.) are fossils and come from sand rock, San Pedro, California. The type has $3\frac{1}{2}$ post-nuclear whorls and measures: Length, 2.2 mm., diameter 1.2 mm.

ALVANIA FILOSA Carpenter.

Plate 30, fig. 7.

Alvania filosa CARPENTER, Ann. Mag. Nat. Hist., ser. 3, vol. 15, 1865, p. 28.

Shell elongate-conic, thin, translucent, yellowish white. Nuclear whorls one and one-half, well rounded, smooth. Post-nuclear whorls well rounded, roundly shouldered at the summit, marked by slender, feebly developed, sinuous, axial riblets. In addition to these riblets, the whorls are marked by equal and equally spaced, spiral cords which are equal to the riblets in strength. Of these cords, 10 occur between the sutures on the antepenultimate, and 12 on the penultimate turn. The spaces inclosed between the spiral cords and the axial ribs are shallow, impressed, squarish pits. Suture strongly constricted. Periphery and the rather short base of the last whorl well rounded; the latter very narrowly umbilicated, marked by eight equal and equally spaced, spiral cords, which are a little wider than the spaces that separate them. The sulci between the spiral cords on the base are crossed by the feeble extensions of the axial riblets. Aperture broadly oval; posterior angle obtuse; outer lip thin, showing the external sculpture within; inner lip moderately stout, curved and reflected, the posterior half appressed to the base; parietal wall covered with a thick callus, rendering the peritreme complete.

Doctor Carpenter's type (Cat. No. 36632, U.S.N.M.) was collected by J. G. Swan at Neah Bay, Washington. It has 4 post-nuclear whorls and measures: Length 3.5 mm., diameter 1.7 mm. This shell suffered an injury shortly after passing the nepionic stage and it is quite possible that the multifilations which characterize this form

may be a pathologic expression due to the injury received. I am unable to refer it positively to any of the known species and therefore retain it in its present position.

ALVANIA ALASKANA Dall.

Plate 30, fig. 1.

Alvania castanea MÖLLER, var. *alaskana* DALL, Proc. U. S. Nat. Mus., vol. 9, 1886, p. 307, pl. 4, fig. 9.

Shell very elongate-ovate, white. Nuclear whorls one and one-half, strongly rounded, very finely papillose. Post-nuclear whorls strongly rounded, appressed at the summit, marked by fairly strong, spiral cords, of which three occur upon the first whorl, so arranged that the first below the summit marks the anterior termination of the posterior third between the sutures; the other two divide the space anterior to this into equal parts. The spaces separating these cords are a little narrower than the cords. On the second whorl an additional cord makes its appearance halfway between the summit and the first spiral cord on the preceding whorl, thus dividing the space between the sutures into five equal portions. The penultimate whorl has the same spiral sculpture as its predecessor, but in addition this whorl shows the peripheral spiral cord a little posterior to the suture. In addition to these spiral cords, the whorls are marked by numerous very fine, spiral striations, which are apparent on the cords and in the grooves that separate them. The axial sculpture is reduced to very feeble riblets, which are closely spaced and rather irregularly distributed. Suture very strongly constricted. Periphery of the last whorl well rounded. Base rather short, umbilicated, marked by six low, rounded, spiral cords which are situated on the posterior two-thirds of the base and numerous fine, closely spaced, spiral striations. Aperture subcircular; posterior angle obtuse; outer lip thin, showing the external sculpture within; inner lip slender, curved, reflected, but free from the base; parietal wall covered with a thick callus which renders the peritreme complete.

Cat. No. 213686, U.S.N.M., contains the two cotypes collected by Doctor Dall at Nunivak Island, Alaska. One of these has $3\frac{1}{2}$ post-nuclear whorls and measures: Length 2.9 mm., diameter 1.5 mm., the other has the same number of post-nuclear turns but has lost the nucleus and measures: Length 2.8 mm., diameter 1.5 mm. I have figured the last specimen.

ALVANIA MONTEREYENSIS, new species.

Plate 30, fig. 2.

Shell elongate-conic, yellowish white. Nuclear whorls $1\frac{1}{3}$, well rounded, marked by about 8 very slender, spiral lirations, of which the 3 near the summit are weaker than the rest. Post-nuclear whorls

well rounded, marked between the sutures by 4 strong, narrow spiral cords, which divide the space between the sutures into 5 almost equal parts, that between the summit and the first cord being a little wider than the rest. In addition to the spiral cords, the whorls are marked by slender axial riblets, which are about as strong as the spiral cords. Of these riblets, about 24 occur upon the first and second, and about 26 upon the penultimate, turn. The spaces inclosed between the spiral cords and the axial riblets are elongated pits, having their long axes parallel with the spiral sculpture. In addition to the above sculpture, the entire surface of the shell is marked by numerous very fine, closely spaced spiral striations. Suture strongly constricted. Periphery of the last whorl marked by a sulcus as wide as that which separates the first suprapерipheral cord from its posterior neighbor. Base moderately long, scarcely produced anteriorly, well rounded, marked by seven spiral cords, which grow successively weaker and closer spaced from the periphery to the umbilical region. Aperture moderately large, broadly oval; posterior angle obtuse; outer lip thin, showing the external sculpture within; inner lip slender, curved, and reflected, the posterior edge touching the body whorl; parietal wall covered with a moderately thick callus, which renders the peritreme complete.

The type (Cat. No. 160114, U.S.N.M.) comes from Monterey, California. It has $3\frac{1}{2}$ post-nuclear whorls, and measures: Length, 2.3 mm., diameter 1.1 mm. Cat. No. 213679, U.S.N.M., contains a specimen from Sitka Harbor, Alaska; Cat. No. 46174, U.S.N.M., contains three from Monterey, California; Cat. No. 126719, U.S.N.M., contains two, also from Monterey; and Cat. No. 219742, U.S.N.M., six from Pacific Grove.

ALVANIA EXCURVATA Carpenter.

Plate 30, fig. 6.

?*Alvania excurvata* CARPENTER, Cat. Maz. Shells, 1856, p. 359.

Shell elongate-conic, brownish gray. Nuclear whorls 2, smooth. Post-nuclear whorls well rounded, marked by slender, axial ribs, of which about 16 occur upon the first, 18 upon the second, 20 upon the third and fourth, and 30 upon the penultimate turn. In addition to the axial ribs, the whorls are marked by slender spiral cords, of which 2 occur upon the first and second, 3 upon the third and fourth, and 5 upon the penultimate turn between the sutures. The spaces inclosed between the cords and ribs are squarish pits. Suture strongly constricted. Periphery of the last whorl well rounded. Base moderately long, scarcely attenuated, well rounded, marked by the feeble continuations of the axial ribs and three spiral cords. Aperture oval; outer lip thin; inner lip strongly curved and slightly

reflected; parietal wall covered with a thick callus, which renders the peritreme complete.

Doctor Carpenter's specimens were taken from *Chama* and *Spondylus*, at Mazatlan. The type, which has 6 post-nuclear whorls, and is in the Liverpool Collection of the British Museum, measures: Length, 2.8 mm., diameter 0.95 mm.

ALVANIA PROFUNDICOLA, new species.

Plate 30, fig. 5.

Shell ovate, yellowish white, nucleus yellow. Nuclear whorls 3, showing 8 fine spiral lirations, which are about half as wide as the spaces that separate them. The spiral sulci between the lirations are crossed by quite regular, very slender axial threads, lending the surface of the nucleus a finely reticulated appearance. Post-nuclear whorls well rounded, weakly shouldered at the summit, marked by rather strong, very regular, curved axial ribs, of which 25 occur upon the first, 26 upon the second, and 32 upon the penultimate turn. Intercostal spaces about three times as wide as the ribs, crossed by fine spiral striations, of which the first below the summit is stronger than the rest and passes over the ribs, constricting them so as to form a series of crenulations at the suture. Anterior to this line the spiral striations are usually much enfeebled. On the last whorl there are about 12 of these lines between the periphery and the summit. Suture strongly constricted. Periphery of the last whorl well rounded. Base well rounded, decidedly attenuated anteriorly, marked by the feeble continuations of the axial ribs, which become evanescent on the middle of the base, and seven subequal and subequally spaced spiral lirations. Aperture subcircular; posterior angle obtuse; outer lip thin at the edge, reenforced immediately behind the edge by a thick varix; inner lip slender, decidedly curved, and reflected over and appressed to the base; parietal wall covered with a thick callus, which renders the peritreme complete.

The type and 24 other specimens (Cat. No. 207606, U.S.N.M.) were dredged by the United States Bureau of Fisheries steamer *Albatross* at station 2808, in 634 fathoms, on coral sand bottom, bottom temperature 39.9°, near the Galapagos Islands. The type has 4 post-nuclear whorls, and measures: Length 3.2 mm., diameter 1.7 mm.

ALVANIA HOODENSIS, new species.

Plate 30, fig. 3.

Shell small, elongate-conic, white. Nuclear whorls a little more than 1, sufficiently eroded to make the question of sculpture doubtful. Post-nuclear whorls slopingly shouldered at the summit, marked by obsolete, rounded, rather broad, vertical axial ribs of which about 20 occur upon the second and 24 upon the third and the penultimate

turn. In addition to the axial sculpture, the post-nuclear whorls bear quite regular, rounded spiral cords, of which 3 occur upon the first whorl between the sutures, 4 upon the second, 8 upon the third—where the primary 4 seem to have undergone bifurcation—and about 14 upon the penultimate turn. The spiral cords are superimposed upon the axial ribs. The spaces inclosed between the spiral cords and axial ribs are very elongated narrow pits, having their long axes parallel with the spiral sculpture. The sloping shoulder on the whorls extends from the appressed summit to the anterior limit of the posterior fourth of the whorls between the sutures. Suture moderately constricted. Periphery of the last whorl well rounded. Base moderately long, slightly produced anteriorly, marked by 9 equal and equally spaced spiral cords, which are considerably wider than the spaces that separate them. Aperture irregularly oval; outer lip slightly thickened behind the edge, rendered sinuous at the edge by the external sculpture; inner lip decidedly curved and slightly reflected over and partly appressed to the base; parietal wall covered with a moderately thick callus.

The type and two other specimens (Cat. No. 213687, U.S.N.M.) were dredged by the United States Bureau of Fisheries steamer *Albatross* at station 2813, off Hood Island, Galapagos Islands, in 40 fathoms, on coral sand bottom, bottom temperature 81°. The type has 5 post-nuclear whorls, and measures: Length 2.5 mm., diameter 1.1 mm.

ALVANIA ELECTRINA Carpenter.

Plate 30, fig. 4.

?*Diala electrina* CARPENTER, Ann. Mag. Nat. Hist., ser. 3, vol. 3, 1864, p. 478.

Shell elongate-conic, golden brown. Nuclear whorls two and one-quarter, well rounded, smooth. Post-nuclear whorls faintly shouldered at the summit, well rounded, marked by low, poorly developed, rounded, almost vertical, axial ribs which are very poorly expressed on the first turn, but slightly better on the remaining ones. Of these ribs, 18 occur upon the second, and 22 upon the penultimate turn. In addition to the axial ribs, the whorls are marked by low, spiral cords which increase in width successively from the summit to the periphery. Of these cords, 5 occur between the sutures on the second and on the penultimate turn. The spiral cords pass regularly over the axial ribs. The spaces inclosed between the spiral cords and axial ribs are narrow, elongated pits, having their long axes parallel to the spiral sculpture. Suture weakly impressed. Periphery of the last whorl well rounded. Base moderately long, evenly and well rounded, marked by three low, broad, rounded, spiral cords which are separated by narrow, incised lines. Aperture oblique, ovate; posterior angle almost acute; outer lip rather thick; inner lip short, strongly curved, reflected over and appressed to

the base; parietal wall covered with a thick callus which renders the peritreme complete.

Doctor Carpenter's type (Cat. No. 12217, U.S.N.M.) comes from Cape San Lucas, Lower California. It has 4 post-nuclear whorls and measures: Length 2.7 mm., diameter 1.1 mm.

ALVANIA PERLATA Mörch.

Alvania perlata MÖRCH, Mal. Blätt., vol. 7, 1868, p. 68.

Shell small, solid, elongate-ovate, marked by a peripheral chestnut band which is apparent upon all the whorls of the spire. Nuclear whorls smooth. Postnuclear whorls marked between the sutures by four spiral cords, the spaces between which are not crossed by the continuations of the axial ribs. Aperture small, subcircular; outer lip somewhat constricted and expanded anteriorly.

Mörch's type, which is in the Copenhagen Museum, came from Central America. It has 6 post-nuclear whorls and measures; length 2.8 mm., diameter 1.5 mm.

ALVANIA GALAPAGENSIS, new species.

Plate 30, fig. 9.

Shell ovate, yellowish white. Nuclear whorls at least two (having their surface eroded in all our specimens). Post-nuclear whorls flattened in the middle, marked by rather slender, irregularly slanting axial ribs, of which 18 occur upon the second and third, and 20 upon the penultimate turn. The ribs are less than one-third as wide as the spaces that separate them. In addition to the axial ribs, the whorls are marked by poorly developed, spiral cords, of which 3 occur upon the second and third, the first being at the summit and the second marking the termination of the anterior third between the sutures, while the third is halfway between this and the suture. The intersections of the axial ribs and spiral cords form the merest indications of nodules, while the spaces inclosed between them are squarish pits on the second and third whorls, and also between the first and second cords on the penultimate whorl. The space between the second and third cords on the penultimate whorl is divided by a slender, spiral thread which renders the pits elongate, with their long axes parallel to the spiral sculpture. Suture slightly constricted, showing the posterior edge of the first basal cord. Periphery of the last whorl marked by a sulcus as wide as that separating the first and second spiral cords between the sutures and, like it, crossed by the feeble continuations of the axial ribs, which terminate at its posterior border. Base produced anteriorly, slightly rounded, with a faint suggestion of concavity in its middle, marked by six spiral cords, which grow successively weaker and closer spaced from the periphery to the umbilical region. Aperture subcircular; outer lip very thick,

reenforced immediately behind the edge by a strong varix; inner lip short, very stout, reflected over the attenuated base; parietal wall covered with a thick callus, which renders the peritreme complete.

The type and two other specimens (Cat. No. 207590, U.S.N.M.) were dredged by the United States Bureau of Fisheries steamer *Albatross* at station 2808, near the Galapagos Islands, in 634 fathoms on coral sand bottom, with a bottom temperature of 39.9°. The type has 4 post-nuclear whorls and measures: Length 3.3 mm., diameter 1.9 mm.

ALVANIA NEMO, new species.

Plate 30, fig. 8.

Shell ovate, white. Nuclear whorls two and one-half, marked by two very strong, spiral keels which are separated by a sulcus as broad as the keels. Post-nuclear whorls well rounded, marked by low, rounded, slightly retractive, axial ribs, 14 of which occur upon all the turns. In addition to the axial sculpture, the whorls are marked by a low, poorly developed, rounded, spiral cord at the summit, and two considerably stronger cords—separated by a narrow channel—a little anterior to the middle of the whorl. On the penultimate whorl a slender, spiral cord appears, halfway between the one at the summit and the first one below it. The spaces inclosed between the spiral cords and axial ribs are squarish pits at the summit on all the whorls except the penultimate and last, where an intercalated spiral cord renders them oblong. The spaces between the two strong, spiral cords and the axial ribs are very long, narrow pits, having their long axes parallel to the spiral sculpture, while the spaces inclosed between the last spiral cord, the suture, and the axial ribs are also squarish in form. Suture moderately constricted. Periphery of the last whorl marked by a broad sulcus, which is bounded anteriorly by a strong spiral cord. This sulcus is crossed by the continuations of the axial ribs which terminate at the posterior edge of the basal spiral cord. Base produced anteriorly, very slightly rounded, marked by eight low, poorly developed, flattened spiral cords, of which the one immediately below the periphery is the strongest. Aperture broadly oval; posterior angle obtuse; outer lip very thick, reenforced immediately behind the edge by a strong varix; inner lip very oblique, curved, reflected over, and appressed to the base; parietal wall covered with a thick callus, rendering the peristome complete.

The type and three other specimens (Cat. No. 195011, U.S.N.M.) were dredged by the United States Bureau of Fisheries steamer *Albatross* at station 2813, in 40 fathoms, on coral sand bottom; bottom temperature 81°, off the Galapagos Islands. The type has 4 post-nuclear whorls and measures: Length 2.6 mm., diameter 1.2 mm.

ALVANIA ROSANA, new species.

Plate 31, fig. 6.

Shell broadly ovate, yellowish white. Nuclear whorls two and one-half, smooth, well rounded. Post-nuclear whorls well rounded, marked by narrow, well-rounded, somewhat sinuous, almost vertical, axial ribs which are about one-third as wide as the spaces that separate them. Of these ribs 24 occur upon the second and the penultimate turn. In addition to the axial sculpture the whorls are marked by low, rounded, equal and equally spaced spiral cords, which are a little weaker than the axial ribs. Of these cords 6 occur between the sutures on the second turn and 7 on the penultimate turn, the first being at the summit. These spiral cords are a little narrower than the spaces that separate them. Suture moderately constricted. Periphery of the last whorl inflated, marked by a sulcus which is as wide as the spaces that separate the cords on the psire and, like them, crossed by the continuations of the axial ribs, which terminate at the posterior border of the first basal keel. Base strongly rounded, narrowly umbilicated, very slightly attenuated anteriorly, marked by eight equal and equally spaced spiral cords which are about as wide as the spaces that separate them. Aperture broadly oval; posterior angle obtuse; outer lip thick, reenforced immediately behind the edge by a moderately thick callus; inner lip strongly curved and somewhat reflected over and partly appressed to the base; parietal wall covered with a moderately thick callus.

The type and 72 specimens (Cat. No. 213688, U.S.N.M.) were dredged by the United States Bureau of Fisheries steamer *Albatross* at station 2901 in 48 fathoms, off Santa Rosa Island, California, on mud bottom, bottom temperature 55°. The type has three post-nuclear whorls and measures: Length 2.6 mm., diameter 1.5 mm. Cat. No. 213689, U.S.N.M., contains 45 specimens dredged by the United States Bureau of Fisheries steamer *Albatross* at station 2902 in 53 fathoms, off Santa Rosa Island, California, on mud bottom, bottom temperature 45°. Cat. No. 23762, U.S.N.M., contains one specimen dredged in 30 fathoms off Catalina Island, California, and Cat. No. 46169, U.S.N.M., contains one which was also dredged in 30 fathoms off Catalina Island, California.

ALVANIA FOSSILIS, new species.

Plate 31, fig. 8.

Shell broadly ovate, white. Nuclear whorls at least two, having their surface eroded. Post-nuclear whorls almost flattened, marked by rather strong, protractive, axial ribs, of which 24 occur upon all the whorls. These ribs are about one and one-half times as wide as the spaces that separate them and terminate at the posterior edge

of the first basal cord. In addition to the axial ribs the whorls are marked by low spiral cords, almost equaling the axial ribs in strength. Of these cords there are 5 between the sutures on the first whorl and 6 on the last one. The spaces between these cords are about one-fourth as wide as the cords. Suture poorly marked, scarcely at all impressed. Periphery of the last whorl marked by a sulcus a little wider than the spaces that separate the cords on the spire, crossed by the continuations of the axial ribs. Base somewhat inflated, well rounded, marked by eight ill-defined spiral cords, which are separated by shallow impressed lines. Aperture oval; posterior angle obtuse (outer lip fractured); inner lip strong, strongly curved, and slightly reflected over and appressed to the base; parietal wall covered with a strong callus.

The type (Cat. No. 213691, U.S.N.M.) is a fossil and comes from sand rock, San Pedro, California. It has $2\frac{1}{2}$ post-nuclear whorls and measures: Length 2 mm., diameter 1.2 mm.

ALVANIA ILIULIUKENSIS, new species.

Plate 31, fig. 2.

Shell ovate, light purplish brown. Nuclear whorls two (surface eroded). Post-nuclear whorls well rounded, appressed at the summit, marked by slender, protractively curved axial riblets, of which 24 occur upon the first, 36 upon the second, and about 45 upon the last turn. These riblets are almost as wide as the spaces that separate them. In addition to the axial ribs the whorls are marked by low spiral cords which equal the axial ribs in strength. Of these cords 6 occur upon the first and 7 upon the second and the penultimate turn, between the sutures. The spaces inclosed between the axial ribs and spiral cords are small, squarish pits. Suture moderately constricted. Periphery of the last whorl marked by a sulcus equal to those occurring between the spiral cords on the spire. Base strongly rounded, somewhat inflated, marked by 8 equal and equally spaced, somewhat flattened, low spiral cords which equal the sulci between them in width. In addition the base is marked by very fine lines of growth which extend over the cords and interspaces. Aperture broadly ovate; posterior angle obtuse; outer lip thin, with a very faint varix immediately behind its edge; inner lip moderately strong, strongly curved and reflected over and appressed to the base; parietal wall covered with a thin callus.

The type and 7 other specimens (Cat. No. 213690, U.S.N.M.) were dredged by the United States Bureau of Fisheries steamer *Albatross* at station 3333 in 19 fathoms, off Iliuliuk Harbor, Alaska, bottom temperature 43.9°. The type has $3\frac{1}{2}$ post-nuclear whorls and measures: Length 3 mm., diameter 1.7 mm. Cat. No. 208750, U.S.N.M., contains a specimen dredged by Doctor Dall in 15-75 fathoms off Belkoffski, Alaska.

ALVANIA COMPACTA Carpenter.

Plate 31, fig. 7.

Rissoa compacta CARPENTER, Proc. Acad. Nat. Sci. Phila., 1865, p. 62.

Shell ovate, light chestnut brown. Nuclear whorls two and one-quarter, well rounded, smooth. Post-nuclear whorls well rounded, slightly shouldered at the summit, marked by poorly developed, slightly protractive, axial ribs, of which 24 occur upon the first and second and 30 upon the penultimate whorl. In addition to these axial ribs the whorls are marked by equal and equally spaced spiral cords, which are almost equal to the axial ribs in strength and of which 6 occur upon the first and 7 upon the second and the penultimate turn between the sutures. The first of these spiral cords is at the summit, which it renders feebly crenulate. The spaces inclosed between the axial ribs and spiral cords are rectangular pits, just a trifle longer than broad, their long axes corresponding to the spiral sculpture. In addition to the above sculpture the entire surface of the spire is marked by exceedingly fine, closely spaced spiral striations and axial lines of growth. Suture moderately impressed. Periphery of the last whorl marked by a sulcus as wide as those which separate the spiral cords on the spire. Base strongly rounded, feebly produced anteriorly, marked by nine equal and equally spaced somewhat flattened spiral cords, which are about as wide as the spaces that separate them, and the fine sculpture noted for the spire. Aperture broadly ovate; posterior angle obtuse; outer lip thin, showing the external sculpture within; inner lip strongly curved, slightly reflected over and appressed to the base; parietal wall covered with a thick callus.

The specimen described and figured is a perfect individual (Cat. No. 204018, U.S.N.M.) and was collected in Bear Bay, Peril Strait, Baranoff Island, Alaska. It has 4 post-nuclear whorls and measures: Length 3 mm., diameter 1.7 mm. Doctor Carpenter's cotypes, four specimens (Cat. N. 4338, U.N.S.M.), come from Puget Sound, Washington. None of these is as perfect as the specimen described and figured.

Specimens examined.

Catalogue No.	Locality.	Number of specimens.
160992.....	Port Etches, Alaska.....	1
206308.....	Virgin Bay, Prince William Sound, Alaska.....	3
204018 (figured).....	Bear Bay, Peril Strait, Baranoff Island, Alaska.....	1
204040.....	Windfall Harbor, Alaska.....	2
107442.....	Cumshewa Inlet, Queen Charlotte Island, Alaska (10-15 fathoms).....	3
213692.....	Saturnia Island, British Columbia (in crop of Harelda).....	17
203959.....	Saturnia Island, British Columbia (in duck crop).....	1
126650.....	Victoria, Vancouver Island, British Columbia.....	9
211610.....	Barkley Sound, Vancouver Island, British Columbia.....	160
15518.....	Neah Bay, Washington.....	7
4338 (cotypes).....	Puget Sound, Washington.....	4

ALVANIA ACUTILIRATA Carpenter.

Plate 31, fig. 3.

Rissoa acutilirata CARPENTER, Proc. Cala. Acad. Sci., vol. 3, 1866, p. 217.

Shell small, ovate, yellowish white, with the base of the columella and the posterior angle of the aperture purplish chestnut brown. Nuclear whorls two and one-half, small, strongly rounded, smooth. Post-nuclear whorls very feebly shouldered at the summit, marked by regular, slender, slightly protractive, axial ribs, which are about half as wide as the spaces that separate them. Of these ribs 24 occur upon the first, 22 upon the second, and 20 upon the penultimate turn. In addition to the axial ribs, the whorls are marked by slender spiral cords which are a little more than half as strong as the axial ribs, and about half as wide as the spaces that separate them. Of these cords, 6 occur between the sutures on the first, and 7 on the second and the penultimate turn. The spaces inclosed between the axial ribs and the spiral cords are elongated pits, having their long axes parallel to the spiral sculpture. Suture well impressed. Periphery of the last whorl marked by a well-rounded, spiral cord, at the posterior edge of which the axial ribs terminate. Base well rounded, feebly produced anteriorly, marked by 8 spiral cords, which grow successively weaker and more closely spaced from the periphery to the umbilical region. Aperture broadly oval; posterior angle acute; outer lip rather thin at the edge, thinner within, showing the external sculpture within; inner lip moderately stout, strongly curved and reflected over and appressed to the base; parietal wall covered with a thick callus, rendering the peritreme complete.

The specimen described and figured (Cat. No. 153072, U.S.N.M.) comes from San Diego Bay, California. It has 3 post-nuclear whorls and measures: Length 2.3 mm., diameter 1.2 mm.

Specimens examined.

Catalogue No.	Locality.	Number of specimens.
195335.....	Monterey, California.....	1
213693.....	San Pedro, California.....	30
152195.....	Do.....	1
129005.....	San Diego, California.....	7
153072 (figured).....	San Diego Bay, California (drift).....	1
213694.....	United States Bureau of Fisheries station 2932, Los Coronados Island, California (20 fathoms, 58°, gray sand and broken shell bottom).	4
198958.....	Todos Santos Bay, Lower California.....	1

ALVANIA COSMIA, new species.

Plate 31, fig. 4.

Shell small, elongate-ovate, white, semitranslucent. Nuclear whorls one and one-half, marked by four, moderately strong, spiral lirations which are separated by strongly impressed lines. Post-

nuclear whorls appressed at the summit, strongly, slopingly shouldered, the shoulder extending from the summit to the anterior termination of the posterior third between the sutures, marked by two strong nodulose, spiral keels, of which the first is situated on the angle of the shoulder, while the second is about as far posterior to the suture as the first is anterior to the summit. In addition to these spiral keels, the whorls are marked by moderately strong, axial ribs which become enfeebled on the shoulder and anterior to the second keel. Of these ribs, 16 occur upon the first and second, and 18 upon the penultimate turn. The spaces inclosed between the spiral keels and axial ribs are large, deeply impressed, squarish pits, while their junctions form cusplike tubercles. Suture strongly channeled. Periphery of the last whorl marked by a strong, sublamellar, spiral keel. Base moderately long, marked by three spiral keels, which grow successively weaker and closer spaced from the periphery to the umbilical area. The broad spaces between the spiral keels are marked by slender, axial lines of growth. Aperture broadly ovate; posterior angle obtuse; outer lip reenforced immediately behind the edge by a strong varix, transparent, showing the external sculpture within; inner lip rather stout, decidedly curved, and strongly reflected over and appressed to the base; parietal wall covered with a thick callus which renders the peritreme complete.

The type (Cat. No. 213698, U.S.N.M.) comes from San Pedro, California. It has $3\frac{1}{2}$ post-nuclear whorls and measures: Length 2.2 mm., diameter 1.2 mm. Cat. No. 162661, U.S.N.M., contains one specimen from La Jolla, California, and Cat. No. 162664, U.S.N.M., contains one from San Martin Island, Lower California.

ALVANIA PURPUREA Dall.

Plate 31, fig. 1.

Alvania purpurea DALL, Amer. Journ. Conch., vol. 7, 1872, pp. 116-17.

Shell elongate-ovate, light yellow. Nuclear whorls one and one-half, well rounded, very finely papillose. Post-nuclear whorls appressed at the summit, strongly, slopingly shouldered, marked by lamellar, slightly retractive, axial ribs, of which 18 occur upon the first and second, and 20 upon the penultimate turn. In addition to these axial ribs, the whorls are marked between the sutures by two spiral lamellæ which divide the space between the sutures into two almost equal portions, the one at the summit being a little narrower than the other. The junctions of the axial and spiral sculpture form spiral cusps, while the spaces inclosed between them are broadly rectangular pits, having their long axes parallel with the axial sculpture. The spaces inclosed between the summit, the first spiral lamella, and the axial ribs are rhomboidal, while those between the second spiral lamella, the suture, and the axial ribs are very broadly rhomboidal.

The sloping shoulder extends from the summit to the first spiral lamella. Suture strongly channeled. Periphery of the last whorl marked by a spiral cord, to which the axial ribs extend. Base moderately produced, well rounded, marked by three strong, sublamellar, subequal, spiral cords which divide the base into four equal parts. These cords are about one-fourth as wide as the concave spaces that separate them, which are marked by fine incremental lines only. Aperture broadly, regularly oval, slightly effuse anteriorly; posterior angle obtuse; outer lip thin at the edge, thicker within; inner lip strongly curved and reflected over, and appressed to the base; parietal wall covered with a thick callus, rendering the peritreme complete.

The specimen described and figured (Cat. No. 152193, U.S.N.M.) is a little more perfect than Doctor Dall's cotypes. It has almost 4 post-nuclear whorls and measures: Length 2.6 mm., diameter 1.4 mm.

Specimens examined.

Catalogue No.	Locality.	Number of specimens.
56416 (cotypes).....	Monterey, California.....	2
46173.....	Do.....	1
152193 (figured).....	San Pedro, California.....	3
129005.....	San Pedro and San Diego, California.....	3
134856.....	San Diego, California (on kelp root).....	6
105468.....	San Diego, California.....	12
213695.....	United States Bureau of Fisheries station 2932, Los Coronados Island, California (20 fathoms, 58°, gray sand and broken shell).	1
162665.....	San Martin Island, Lower California.....	1

ALVANIA HALIA, new species.

Plate 31, fig. 5.

Shell elongate-conic, white. Nuclear whorls one and one-half, well rounded apparently with several spiral lirations, which are ill-defined on the somewhat eroded surface of our shells. Post-nuclear whorls shouldered at the summit, ornamented by strong, axial ribs, of which 14 occur upon the second, 16 upon the third, and 20 upon the penultimate turn. These ribs extend strongly from the summit of the whorls to the suture. In addition to the axial ribs, the whorls are marked by three spiral cords which are about half as wide as the spaces that separate them. The first of these cords is at the angle of the shoulder near the summit, the second on the middle of the whorl, while the third is immediately above the deeply channeled suture. The intersections of the axial ribs and spiral cords form strong tubercles, while the spaces inclosed between them are deeply impressed, squarish pits. Periphery of the last whorl marked by a sulcus which is almost as wide as that separating the supraperipheral from the median cord and, like it, is crossed by the continuations of the axial

ribs. Base attenuated anteriorly, marked by five strong, spiral cords which are almost equal. The spaces separating these cords are a little narrower than the cords and are crossed by axial lines of growth. Aperture very oblique, ovate; posterior angle obtuse; outer lip very much thickened by an external varix; inner lip very stout, very strongly curved, reflected over, and appressed to the base; parietal wall covered with a thick callus which renders the peritreme complete.

The type has 4 post-nuclear whorls and measures: Length 2.4 mm., diameter 1.1 mm. It and 16 other specimens (Cat. No. 195009, U.S.N.M.) were dredged by the United States Bureau of Fisheries steamer *Albatross* at station 2813 in 40 fathoms, on coral sand bottom, bottom temperature 81°, off Galapagos Islands.

ALVANIA IMA, new species.

Plate 32, fig. 8.

Shell elongate-ovate, white excepting a broad, yellow band which encircles the periphery and shows above the suture on all the turns. Nuclear whorls at least two, smooth. Post-nuclear whorls narrowly, slopingly shouldered at the summit, marked by strong, protractive, axial ribs, of which 14 occur upon the first, 18 upon the second, and 20 upon the penultimate turn. In addition to the axial ribs, the whorls are marked between the sutures by three spiral cords, of which the first—which is quite slender—is at the summit; the second, which is very broad, being double the width of the next, is on the middle of the whorl; while the third, which is a little stronger than the first, forms the posterior border of the deeply channeled suture. The space separating the first cord from the median one is about as wide as the median cord, while that which separates the median from the third is equal to the third cord. The intersections of the axial ribs and spiral cords form tubercles which are small and rounded on the first cord; on the second they are truncated posteriorly, sloping gently anteriorly, somewhat flattened and enlarged; on the third they are somewhat flattened, truncated posteriorly and gently rounded anteriorly. The weak cord at the summit and the broad space immediately below it give to the whorls a constricted appearance at this point. Periphery of the last whorl marked by a deep sulcus across which the axial ribs do not extend. Base well rounded, produced anteriorly, marked by five spiral cords, which grow successively weaker from the periphery to the columella. Aperture very oblique; posterior angle obtuse; outer lip thin at the edge, reenforced immediately behind the edge by a strong varix; inner lip stout, strongly curved, and reflected over, and appressed to the base.

The type and two other specimens (Cat. No. 213697, U.S.N.M.) were dredged by the United States Bureau of Fisheries steamer

Albatross at station 2813 in 40 fathoms, on coral sand bottom, bottom temperature 81°, Galapagos Islands. The type has 4 post-nuclear whorls and measures: Length 2 mm., diameter 1.2 mm.

ALVANIA CLARIONENSIS, new species.

Plate 32, fig. 4.

Shell very elongate-ovate, milk white. Nuclear whorls one and one-third, well rounded, smooth. Post-nuclear whorls strongly, concavely shouldered at the summit on all but the last turn, where the summit is rounded. Beginning with the posterior termination of the anterior fourth between the sutures, the shell slopes suddenly toward the suture, forming a strong angle at the widest portion of each whorl. In addition to the above, the whorls are marked by strong, decidedly protractive, axial ribs which are about one-fourth as wide as the spaces that separate them. Of these ribs, 14 occur upon the first, 16 upon the second, 18 upon the third and the penultimate turn. In addition to the axial sculpture, the whorls are marked by slender, spiral lirations of which the one at the suprasutural angle is the strongest, the rest being equal. Of these cords, only the one marking the suprasutural angle is present on the first turn, while on the second a slender cord bounds the channeled summit and a few feeble lirations are indicated between this and the strong suprasutural cord; on the third turn five spiral lirations are apparent between the summit and the suprasutural cord. The space between the suprasutural cord and the suture appears to be devoid of sculpture on the first three whorls; on the penultimate whorl the suprapерipheral angle and the shoulder at the summit are lost, and the six spiral cords which appear between the summit and the periphery are about half as wide as the spaces that separate them, being equal and equally spaced and much stronger than on the preceding turn. Here, too, the first two basal cords become apparent in the suture. All the junctions of the spiral cords and axial ribs are feebly tuberculated, excepting those formed by the suprasutural cord and the ribs; these are strongly tuberculated on the first three whorls. On the last whorl the spiral cords appear superimposed upon the axial ribs. Suture decidedly channeled. Periphery of the last whorl marked by a broad sulcus which bears two raised, spiral threads. The first basal cord being considerably more elevated than the sulcus, lends the anterior edge of the base an angular aspect. Base decidedly produced, weakly rounded, marked by eight equal and equally spaced spiral cords, which are about one-third as wide as the spaces that separate them. Aperture very oblique, effuse anteriorly; posterior angle obtuse; outer lip thin at the edge, reenforced immediately behind the edge by a very strong varix; inner lip very stout, reflected over and appressed to the base;

parietal wall covered with a thick callus which renders the peristome complete.

The type (Cat. No. 127373, U.S.N.M.) was dredged by the United States Bureau of Fisheries steamer *Albatross* off Clarion Island, Mexico, in one of the five hauls—2991 to 2995, the depths of which ranged from 31 to 460 fathoms. It has $4\frac{1}{2}$ post-nuclear whorls and measures: Length 2.9 mm., diameter 1.3 mm.

ALVANIA LARA, new species.

Plate 32, fig. 6.

Shell elongate-ovate, white. Nuclear whorls decollated, excepting the last quarter turn, which is smooth. Post-nuclear whorls shouldered at the summit, marked by lamellar spiral keels, of which three occur between the sutures on the first turn. Of these, the suprasutural one is decidedly the strongest and gives a very strongly pronounced angle to the whorls. The keel immediately below the summit is next in strength, while the one between them—which is nearer the suprasutural one than the one at the summit—is but feebly expressed. On the second whorl an additional spiral cord makes its appearance at the summit, while the two anterior to it gain considerably in strength and become equal; the suprasutural one remains strong and an additional slender cord makes its appearance halfway between the strong suprasutural cord and the suture. On the penultimate whorl the cord at the summit has increased in size to equal the cord adjacent to it, and a slender thread appears in the space which separated the second cord from the third on the preceding turn. The strong cord on the preceding turn becomes considerably enfeebled and the space between this and the suture is crossed by two rounded, slender, spiral cords. In addition to the spiral sculpture, which exceeds the axial sculpture in strength, the whorls are marked by rather strong, almost vertical, axial ribs, of which 14 occur upon the first and second, and 16 upon the penultimate turn. The intersections of the spiral cords and axial ribs form compressed tubercles, having their long axes parallel to the spiral sculpture. Suture strongly channeled. Periphery of the last whorl decidedly channeled, the posterior edge of the base being suddenly truncated at the channeled suture, which makes the peripheral sulcus appear as a triangular notch in profile. Base moderately long, attenuated anteriorly, marked by eight spiral cords, the posterior of which is the strongest and is followed by three very slender threads which in turn are succeeded by two strong and two low feeble cords. Aperture oblique, oval; posterior angle obtuse; outer lip thin at the edge, reenforced immediately behind the edge by a strong varix; inner lip oblique, stout, curved and somewhat reflected over, and appressed to the base; parietal wall covered by a moderately thick callus.

The type (Cat. No. 195010, U.S.N.M.) was dredged by the United States Bureau of Fisheries steamer *Albatross* at station 2813, in 40 fathoms, on coral sand bottom, bottom temperature 81°, off Galapagos Islands. It has almost 4 post-nuclear whorls and measures: Length 2.5 mm., diameter 1.3 mm.

ALVANIA EFFUSA Carpenter.

Plate 32, fig. 5.

Alvania effusa CARPENTER, Cat. Maz. Shells, 1856, p. 359.

Shell elongate-conic. Nuclear whorls two, smooth, well rounded. Post-nuclear whorls well rounded, marked by strongly developed narrow, almost vertical, axial ribs of which 14 occur upon the first, 16 upon the second to fourth, and 22 upon the penultimate turn. In addition to the axial ribs, the whorls are marked by spiral cords, of which two appear upon the first whorl, dividing this into three equal spaces, three upon the second, four upon the third, five upon the fourth, and seven upon the penultimate turn, between the sutures. The junctions of the axial ribs and spiral cords form strong cusps, while the spaces inclosed between them are rectangular pits, having their long axes parallel with the spiral sculpture. Suture strongly channeled. Periphery of the last whorl marked by a spiral sulcus, which is about as wide as the sulci occurring between the cords on the last turn of the spire. Base produced anteriorly, moderately rounded, marked by the feeble continuations of the axial riblets and five spiral cords. Aperture oval; posterior angle obtuse; outer lip rendered sinuous by the external sculpture; inner lip strong, curved, slightly reflected over, and appressed to the base; parietal wall covered with a thick callus which renders the peritreme complete.

The unique type of this species, contained on Tablet 1710, Liverpool Collection, British Museum, was taken from *Spondylus* at Mazatlan. It has six post-nuclear whorls and measures: Length 2.9 mm., diameter 1.5 mm.

ALVANIA ÆQUISCULPTA Keep.

Plate 32, fig. 7.

Alvania æquisculpta KEEP, West Coast Shells, 1887, p. 65=*Rissoa* (*Alvania*) *grippiana* DALL, Nautilus, vol. 21, No. 12, 1908, p. 136.

Shell very elongate-conic, light yellow. Nuclear whorls two, moderately well rounded, marked by six spiral threads, which are about as wide as the spaces that separate them, and numerous slender, closely spaced, axial threads, which are about one-fourth as strong as the spiral threads between which they occur, giving the entire surface a finely reticulated appearance. Post-nuclear whorls appressed at the summit, with a sloping shoulder which extends

over the posterior fourth between the sutures, marked by strong, slightly retractive, axial ribs which are about one-fourth as wide as the spaces that separate them. Of these ribs, 14 occur upon the first, 16 upon the second, and 18 upon the penultimate turn. In addition to the axial ribs, the whorls are marked between the sutures by three strong, spiral cords which are almost as strong as the ribs and divide the spaces between the sutures into four almost equal portions. The intersections of the spiral cords and the axial ribs form strong tubercles, while the spaces inclosed between them are well impressed, rectangular pits, having their long axes parallel with the spiral sculpture. Suture strongly constricted. Periphery of the last whorl marked by a spiral sulcus equal to that which separates the suprapерipheral spiral cord from its posterior neighbor and, like it, is crossed by the continuations of the axial ribs, which extend over the first two basal spiral cords and render them tuberculate. Base well rounded, rather short, produced anteriorly, marked by three strong, sublamellar, spiral cords which are about one-third as wide as the spaces that separate them. Aperture very oblique, twisted, ovate; posterior angle obtuse; outer lip thickened at the edge within the lip, reenforced behind the edge by a strong varix, inner lip very stout, strongly curved, and appressed to the base; parietal wall covered with a very thick callus, which renders the peritreme complete.

Professor Keep's cotypes were collected on mossy rocks at low tide at San Diego, California. One of these, the specimen figured, is Cat. No. 219564, U.S.N.M. This has 4 post-nuclear whorls and measures: Length 3.2 mm., diameter 1.8 mm.

Specimens examined.

Catalogue No.	Locality.	Number of specimens.
56752.....	Catalina Island, California.....	1
23749.....	Santa Barba Island, California.....	1
126624.....	San Pedro, California.....	4
56369.....	San Diego, California.....	20
153073.....	San Diego Bay, California (drift).....	1
213696.....	United States Bureau of Fisheries station 2932, Los Coronados Island, California (20 fathoms, 58°, gray sand and broken shell).....	4
46171.....	Todos Santos Bay, Lower California.....	42
46172.....	do.....	4
56353.....	do.....	8

ALVANIA ALMO, new species.

Plate 32, fig. 1.

Shell minute, broadly ovate, yellowish white. Nuclear whorls one and one-half, well rounded, smooth. Post-nuclear whorls somewhat inflated, slopingly shouldered at the summit, marked by very slender, almost vertical, axial ribs, of which 18 occur upon the first, and 20

upon the penultimate turn. In addition to the axial sculpture, the whorls are marked between the sutures by two spiral cords equaling the ribs in strength. Of these, the first is a little posterior to the middle of the whorls, bounding the sloping shoulder, while the second is halfway between it and the suture. The intersections of the axial ribs and spiral cords form slender tubercles, while the spaces inclosed between them are well impressed, squarish pits. The spaces inclosed between the first spiral cord and the summit and the axial ribs are rhomboidal areas, having their long axes parallel to the axial sculpture, while the spaces inclosed between the second spiral cord and the axial ribs and the suture are squarish pits. Suture moderately constricted. Periphery of the last whorl marked by a spiral sulcus, which is crossed by the continuations of the axial ribs. Base narrowly umbilicated—the umbilical chink being bounded by a tumid area—moderately long, well rounded, slightly produced anteriorly, marked on the posterior half by two spiral cords equaling those between the sutures. Aperture almost circular; outer lip very thick all around, reenforced by a strong varix; inner lip very stout, partly reflected over, and appressed to the base; parietal wall covered with a very thick callus which renders the peritreme complete.

The type (Cat. No. 23749*a*, U.S.N.M.) comes from Santa Barbara Island, California. It has three post-nuclear whorls and measures: Length 1.5 mm., diameter 1 mm.

ALVANIA OLDROYDÆ, new species.

Plate 32, fig. 3.

Shell minute, broadly ovate, yellowish white. Nuclear whorls one and one-half, well rounded, smooth. Post-nuclear whorls inflated, weakly shouldered on the posterior fourth between the sutures, marked by numerous slender rather closely spaced well rounded slightly protractive axial ribs, of which 20 occur upon the first, 24 upon the second, and 28 upon the penultimate whorl. In addition to the axial sculpture, the whorls are marked by slender spiral threads which are almost equal to the axial ribs. Of these threads, three occur upon the first and second whorl, dividing the space between the sutures into four almost equal portions, the space at the summit being a little wider than the rest; the first spiral thread marks the termination of the sloping shoulder. On the penultimate whorl an additional spiral cord makes its appearance in the space immediately below the summit, a little nearer to the summit than the first spiral cord on the previous whorl. The intersections of the axial ribs and the spiral cords form slender rounded tubercles. The spaces inclosed between the three cords on the early whorls and the same on the last turn are squarish pits, while the spaces between the summit and the first spiral cord and the axial ribs on the first two turns are rectangular pits, having their long axes parallel

with the axial sculpture. On the last whorl an additional spiral cord renders the pits between this cord and the next spiral cord and the axial ribs also squarish. Suture strongly constricted. Periphery of the last whorl marked by a sulcus as wide as that separating the suprasutural cord from the one adjacent to it anteriorly. Base well rounded, strongly umbilicated, marked by four equal and almost equally spaced spiral cords, which are as strong as those occurring between the sutures and the feeble continuations of the axial ribs. Aperture subcircular; outer lip thickened all around by a very thick varix; inner lip stout, decidedly curved, somewhat reflected over and appressed to the base; parietal wall covered with a very thick callus, which renders the peritreme complete.

The type and another specimen (Cat. No. 213699, U.S.N.M.) come from San Pedro, California. The type has three post-nuclear whorls, and measures: Length 1.6 mm., diameter 1.05 mm. Cat. No. 152193*a*, U.S.N.M., contains one specimen from San Pedro, California; and Cat. No. 226454, U.S.N.M., two from 3 fathoms, off South Coronado Island. Ten more from the same locality are in Doctor Baker's collection.

Named for Mrs. T. S. Oldroyd.

ALVANIA TUMIDA Carpenter.

Plate 32, fig. 2.

Alvania tumida CARPENTER, Cat. Maz. Shells, 1856, p. 360.

Shell minute, subglobose, chestnut brown excepting the columella and the edge of the outer lip, which are light yellow. Nuclear whorls one and one-third, well rounded, very minutely papillose. Post-nuclear whorls inflated, slopingly shouldered at the summit, well rounded, ornamented with slender, almost vertical, axial riblets, of which 24 occur upon the first and 30 upon the penultimate turn. In addition to the axial riblets, the whorls are marked by four spiral cords, of which the first, which is at the summit, is very feeble; the remaining three, which equal the axial ribs in strength, divide the space between the sutures into four equal parts. The spaces inclosed between the axial riblets and the spiral cords are squarish pits, while their junctions are very feebly, roundly tuberculate. Suture moderately constricted. Periphery of the last whorl marked by a slender spiral thread, equaling those between the sutures in strength. The space between it and the suprasutural cord is crossed by the continuations of the axial riblets. Base narrowly umbilicated, well rounded, slightly inflated, marked by two spiral cords which equal the peripheral one. The spaces between the cords are about four times as wide as the cords and are crossed by the continuations of the axial riblets. The umbilical chink is bordered by a narrow tumid area. Aperture subcircular; outer lip thick at the edge, reenforced by a varix; inner lip decidedly curved, somewhat reflected over, and

appressed to the base; parietal wall covered with a thick callus, which renders the peritreme complete.

The specimen described and figured (Cat. No. 16206, U.S.N.M.) comes from Cape San Lucas, Lower California. It has $2\frac{1}{2}$ post-nuclear whorls, and measures: Length 1.2 mm., diameter 0.7 mm. The type and another specimen are on Tablet 1711, Liverpool Collection, British Museum. They were taken off *Spondylus*, Mazatlan.

EXPLANATION OF PLATES.

PLATE 29.

- Fig. 1. *Alvania castanella* Dall; Type; length 2.4 mm.; p. 336.
2. *Alvania bakeri* Bartsch; Type; length 1.4 mm.; p. 337.
3. *Alvania lirata* Carpenter; length 2.8 mm.; p. 338.
4. *Alvania pedroana* Bartsch; Type; length 2.2 mm.; p. 341.
5. *Alvania aurivillii* Dall; Type; length 4.2 mm.; p. 336.
6. *Alvania albolirata* Carpenter; Type; length 3 mm.; p. 338.
7. *Alvania trachisma* Bartsch; Type; length 3.3 mm.; p. 339.
8. *Alvania carpenteri* Weinkauff; Type; length 2 mm.; p. 341.
9. *Alvania californica* Bartsch; Type; length 2.5 mm.; p. 340.

PLATE 30.

- Fig. 1. *Alvania alaskana* Dall; Type; length 2.9 mm.; p. 343.
2. *Alvania montereyensis* Bartsch; Type; length 2.3 mm.; p. 343.
3. *Alvania hoodensis* Bartsch; Type; length 2.5 mm.; p. 345.
4. *Alvania electrina* Carpenter; Type; length 2.7 mm.; p. 346.
5. *Alvania profundicola* Bartsch; Type; length 3.2 mm.; p. 345.
6. *Alvania excurvata* Carpenter; Type; length 2.8 mm.; p. 344.

After a camera lucida sketch by Doctor Carpenter.

7. *Alvania filosa* Carpenter; Type; length 3.5 mm.; p. 342.
8. *Alvania nemo* Bartsch; Type; length 2.6 mm.; p. 348.
9. *Alvania galapagensis* Bartsch; Type; length 3.3 mm.; p. 347.

PLATE 31.

- Fig. 1. *Alvania purpurea* Dall; length 2.6 mm.; p. 353.
2. *Alvania iliuliukensis* Bartsch; Type; length 3 mm.; p. 350.
3. *Alvania acutilirata* Carpenter; Type; length 2.3 mm.; p. 352.
4. *Alvania cosmia* Bartsch; Type; length 2.2 mm.; p. 352.
5. *Alvania halia* Bartsch; Type; length 2.4 mm.; p. 354.
6. *Alvanis rosana* Bartsch; Type; length 2.6 mm.; p. 349.
7. *Alvania compacta* Carpenter; Type; length 3 mm.; p. 351.
8. *Alvania fossilis* Bartsch; Type; length 2 mm.; p. 349.

PLATE 32.

- Fig. 1. *Alvania almo* Bartsch; Type; length 1.5 mm.; p. 359.
2. *Alvania tumida* Carpenter; length 1.2 mm.; p. 361.
3. *Alvania oldroydæ* Bartsch; Type; length 1.6 mm.; p. 360.
4. *Alvania clarionensis* Bartsch; Type; length 2.9 mm.; p. 356.
5. *Alvania effusa* Carpenter; Type; length 2.9 mm.; p. 358.

After a camera lucida sketch by Doctor Carpenter.

6. *Alvania lara* Bartsch; Type; length 2.5 mm.; p. 357.
7. *Alvania æquisculpta* Keep; Type; length 3.2 mm.; p. 358.
8. *Alvania ima* Bartsch; Type; length 2 mm.; p. 355.



Bartsch, Paul. 1911. "The Recent and fossil mollusks of the genus *Alvania* from the west coast of America." *Proceedings of the United States National Museum* 41(1863), 333–362. <https://doi.org/10.5479/si.00963801.41-1863.333>.

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