

THE WEST AMERICAN MOLLUSKS OF THE GENUS TRIPHORIS.

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The West American members of this genus were first brought to the attention of conchologists by Prof. C. B. Adams, who in 1852 described three species in his catalogue of shells collected at Panama,^a *Triphoris alternatus*, *inconspicuus*, and *infrequens*. Of these, the last, *Triphoris infrequens* has proved to be a *Cerithiopsis*.^b Later,^c Doctor Carpenter reported the occurrence of *Triforis adversa* Montagu, a common European species, on the West Coast. The specimens referred to, by him, are not the Old World species but must be cited under one or several of the forms described in the present report.

Through the kindness of Prof. John Tyler, of Amherst College, I have been enabled to examine, redescribe, and figure, the original specimen described by Doctor Adams.

TRIPHORIS MONTEREYENSIS, new species.

Plate XVI, fig. 17.

Shell rather stout, brown, with a wax-yellow band about one-third the width of the height of the whorls encircling the middle of the turns. (Nucleus decollated in all the specimens examined), post-nuclear whorls separated by strongly channeled sutures, ornamented on the early turns by a double spiral^d row of tubercles and on the last

^aAnn. Lye. Nat. Hist., V, pp. 382-383.

^bProc. Zool. Soc. London, 1863, p. 350.

^cRept. Brit. Ass. Adv. Sci., 1864, p. 613.

^dIn the preparation of the present diagnosis the following terminology is used:

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

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 from the preceding suture forward;

Retractive, when the markings slant from the suture backward.

three by a triple row, the median one of which is very slender on all but the last turn and is situated a little nearer the posterior row than the suprasutural one. There are twenty tubercles upon the second and twenty-six upon the penultimate turn. These tubercles are joined by moderately strong spiral bands and axial riblets which inclose strongly impressed rounded pits between them. The periphery is marked by a keel almost as strong as the suprapерipheral one, while the base, which is uniformly dark brown, bears two prominent keels, the anterior one of which is well upon the short, stout columella. The channels between these keels are crossed by the feeble extensions of the axial riblets. Aperture strongly channeled anteriorly and posteriorly; columella and parietal wall covered with a strong callus.

The type and two additional specimens, Cat. No. 32216, U.S.N.M., come from Monterey, California. The type has the last seven whorls and measures: length, 4.6 mm.; diameter, 2.2 mm. Two other specimens, Cat. No. 56015, U.S.N.M., come from the same locality, and a sixth, in the collection of Mr. S. S. Berry, was dredged in 12 fathoms off Del Monte, Monterey Bay, California.

TRIPHORIS PEDROANUS, new species.

Plate XVI, fig. 1.

Shell sinistral, elongate-conic, light brown. Nuclear whorls four, increasing regularly in size. The first three smooth, probably by erosion, the next faintly, obsoletely sculptured by about thirty-six slender, equally strong and equally spaced, axial riblets and two slender spiral threads, separated by a narrow channel near the periphery of the whorl. Succeeding turns separated by broad and deep channeled sutures; the first seven ornamented by two equally strong spiral rows of tubercles, which are separated by a channel, as wide as that at the sutures. Beginning with the eighth turn, a slender tuberculate keel makes its appearance in this channel, situated a little nearer the posterior keel than the suprasutural one. This keel increases steadily in size and on the penultimate turn exceeds the suprapерipheral one in strength. On the last three turns the tubercles of the posterior keel are a little more strongly developed than on the other keels. On all the keels the tubercles slope a little more abruptly at their posterior border, the anterior edge being gently rounded. There are fifteen tubercles upon the first, seventeen upon the fifth, and twenty-four upon the penultimate postnuclear turn. The tubercles are connected spirally by a moderately wide band and axially by slender riblets, the spaces inclosed between these connections appearing as rounded pits. The entire surface of the spire is crossed by numerous microscopic spiral lines and lines of growth. Periphery of

the last whorl ornamented by a tubercular keel, which is not quite as strong as the supraperipheral keel. Base dark brown, moderately long, marked by two strong spiral keels, the anterior one of which is situated partly upon the columella, while the other one occupies a plane half way between the anterior and the peripheral keel. The spaces which separate these keels are about equal in width and are crossed by slender continuations of the axial riblets. Columella stout and twisted, marked by slender spiral lirations. Aperture pyriform, strongly channeled anteriorly and posteriorly; outer lip patulous, marked within by a light brown band posteriorly and a narrow dark-brown zone at the base; columella and parietal wall covered with a thick callus.

The above description is based upon two specimens, cotypes, Cat. No. 152206, U.S.N.M. An adult individual, from San Pedro, California, has furnished the description of the adult features. It has lost the nuclear whorls. The eight which remain measure: Length, 5.1 mm.; diameter, 1.9 mm. Cat. No. 56910, U.S.N.M., a juvenile specimen, collected by Dr. W. H. Dall, at Catalina Island, California, has furnished the description of the nuclear and early post-nuclear turns. It has four nuclear whorls and seven and one-half post-nuclear turns, and measures: Length, 3 mm.; diameter, 1.35 mm. A third specimen, Cat. No. 56017, U.S.N.M., was collected by Doctor Dall at San Diego, California. A fourth was collected by Mr. F. W. Kelsey among rocks in sand and gravel at low tide at Ocean Beach, California. Three fossil specimens from the Upper San Pedro Series, at the lumber yard, San Pedro, California, were examined in Mr. Delos Arnold's collection.

TRIPHORIS CALLIPYRGUS, new species.

Plate XVI, fig. 4.

Shell elongate, conic, subturritid, uniformly light brown. (Early whorls decollated.) The remaining seven are separated by strongly impressed sutures, and are ornamented with three spiral tuberculate keels on the spire. The middle one of these keels is decidedly stronger than the rest and marks the widest part of the turns, while the anterior one is the least developed on all the early turns. On the last whorl the three are subequal. In addition to the spiral keels the spire is marked by slender, axial riblets, of which there are about eighteen upon the first of the remaining and twenty upon the penultimate turn, the intersection of the riblets and the spiral keels forming the tubercles. The tubercles slope convexly toward their anterior limit and are somewhat excavated posteriorly. Periphery of the last whorl marked by a sulcus. Base with two equally strong keels on the posterior half, separated from each other by a sulcus as wide as the peripheral one, and a third weak thread on the base of the thick

columella. Aperture irregular, the main portion subcircular, strongly channelled posteriorly and anteriorly; outer lip moderately strong, columella short, stout, and decidedly twisted, covered partly by the very strong purplish parietal callus.

The type, Cat. No. 195377, U.S.N.M., comes from San Pedro, California, and measures: Length, 5.2 mm.; diameter, 2.2 mm.

This species differs from all the other Californian *Triphoris* in having the middle keel between the sutures best developed, forming a prominent shoulder at this point, while the one at the summit is only feebly represented, the reverse being true in the other species.

TRIPHORIS CARPENTERI, new species.

Plate XVI, fig. 16.

Triphoris adversa CARPENTER, Rept. Brit. Ass. Adv. Sci., 1863, p. 628, in part; not *Triphoris adversus*-Montagu.

Shell elongate-conic, almost cylindric, bleached, white. (Early whorls decollated.) Later turns ornamented by three spiral ridges, of which the posterior one is a little more strongly developed than the other two and forms the summit of the whorls. The other two spiral ridges are equal and equally spaced. In addition to the spiral ridges, the whorls are marked by axial ribs, about as strong as the spiral ridges, the intersection of the ribs and ridges forming strong tubercles, while the spaces inclosed between them appear as deeply impressed square pits. There appear to be about twenty-two tubercles upon all the whorls. The sutures appear as broad, deep channels, which are crossed by the extensions of the axial ribs. On the last three turns the posterior edge of the peripheral keel is apparent in the suture. In addition to the above sculpture, the entire surface of the spire is marked with microscopic lines of growth and equally fine spiral striations. Periphery of the last turn marked by a strong spiral keel. Base marked by two strong rounded keels, of which the posterior one is separated about as far from the peripheral keel as that is separated from the supraperipheral one. The anterior keel of the base is situated on the columella and is separated by a little wider and deeper channel from the posterior keel than that is from its posterior neighbor; anteriorly it is limited by a feebly impressed groove. The channels of the base are crossed by weak continuations of the axial riblets. Aperture ovate, strongly channelled anteriorly and moderately so posteriorly; columella short, stout, and twisted; covered by a strong callus which also extends over the parietal wall.

The type, Cat. No. 15583, U.S.N.M., was collected in Neah Bay, Washington, by J. G. Swan. It consists of the last eight turns, which measure: Length, 7.2 mm.; diameter, 2.2 mm.

TRIPHORIS HEMPHILLI, new species.

Plate XVI, fig. 12.

Shell sinistral, elongate-conic, chestnut brown. (Nuclear whorls decollated.) Succeeding turns separated by strong channeled sutures, ornamented on the first five turns by a double spiral row of tubercles which are separated by a channel a little wider than the tubercles. Beginning with the sixth turn, a slender, spiral, faintly tuberculate keel, placed a little nearer the posterior than the suprasutural row of tubercles, makes its appearance in the channel. This keel remains slender and does not quite attain the strength of the suprasutural one, even on the last turn. The tubercles are joined spirally by quite strong connections and axially by moderately strong riblets. The spaces inclosed by these joining elements appear as elongated pits, of which the axial axis is the longest. There are sixteen tubercles upon the second and twenty-two upon the penultimate turn. The tubercles, as well as their spiral connections, are somewhat excavated posteriorly, but well rounded anteriorly, and the posterior row of tubercles is considerably more strongly developed than the suprasutural on the last five turns. In addition to the sculpture described, the entire surface of the spire, tubercles, and intertubercular spaces are marked by slender lines of growth. Periphery of the last whorl, marked by a tubercular cord, a little less strongly developed than the suprasutural one. Base rather elongated, marked by two rather broad, low, spiral cords, the anterior one of which is partly situated upon the columella. The well rounded channel, which separates these keels, as well as the supraperipheral channel, are crossed by weak continuations of the axial riblets. Aperture decidedly channeled anteriorly, posterior angle obtuse; columella thick and twisted, covered with a thick callus, which extends over the parietal wall.

The type has ten post-nuclear whorls and measures: Length, 5.1 mm.; diameter, 1.6 mm. It and two additional specimens are entered as Cat. No. 106423, U.S.N.M. They were collected by Mr. Henry Hemphill from shell washings at Point Abreojos, Lower California.

TRIPHORIS CATALINENSIS, new species.

Plate XVI, fig. 18.

Shell sinistral, elongate-conic, rather stout, with the posterior half of the exposed portion of the whorls white and the anterior half light brown. (Part of the nuclear whorls decollated.) The three and one-half remaining turns of the nucleus increase regularly in size and are marked by about twenty-six slender axial riblets on the first and thirty-two on the next and the third whorl. In addition to these riblets the nuclear whorls are encircled by two prominent sublamellar

slender, finely tuberculate spiral keels, which are placed about equidistant from the sutures and are a little nearer to each other than to the sutures. The anterior one of these keels is much more strongly developed on the last nuclear turn than the posterior member. The intersection of the spiral keels and axial riblets are tuberculate. The whorls have a strong sloping shoulder which extends from the posterior keel to the summit. Post-nuclear whorls separated by strongly marked sutures, ornamented by two spiral rows of nodules, of which the posterior one is the stronger. These two rows of nodules are separated on the first seven post-nuclear whorls by a spiral channel almost as wide as the suture. From the seventh post-nuclear whorl on, a slender, spiral, weakly tuberculate cord makes its appearance in the channel, growing stronger with each succeeding turn. This cord is situated a little nearer the posterior row of tubercles than the anterior, and like the posterior row of tubercles is white. The tubercles are connected by blunt, ill-defined, axial riblets. There are about twenty tubercles on the first and fifth post-nuclear whorls and twenty-four upon the penultimate turn. In addition to the strong sculpture just defined, the entire surface, tubercles and depressions, are crossed by many fine lines of growth and spiral striations. Periphery of the last whorl marked by a slender, weakly tuberculate keel. Base exceedingly short, almost flat, crossed by strong lines of growth and fine spiral striations, marked by a brown band at the insertion of the columella. Aperture subquadrate, outer lip sinuous, conforming with the external sculpture, basal wall slightly concave; columella very stout, short, and strongly twisted. Basal channel well developed.

The type, which is unique—Cat. No. 193998, U.S.N.M.—is an immature specimen and comes from Catalina Island, California. It has ten post-nuclear whorls and measures: Length, 5.3 mm.; diameter, 2.2 mm.

TRIPHORIS STEARNSI, new species.

Plate XVI, fig. 3.

Shell elongate-conic, sinistral, flesh colored. (Early whorls decolored.) The nine remaining are moderately high, marked by a double spiral row of very strong, equally developed, rounded tubercles, which are separated on the first three turns by a channel as deep and well marked as the sutures. This space between the two rows of tubercles gradually develops into a slender tuberculate keel, which on the last turn is about half as wide as the tubercular ridges. There are about eighteen tubercles on the third to seventh of the remaining whorls and twenty on the penultimate. Periphery angulated. Base short, marked by two strong spiral keels. (Aperture fractured.)

The type, Cat. No. 32259, U.S.N.M., belongs to the Stearns collection and was found in the Gulf of California. It measures: Length, 4.1 mm.; diameter, 1.4 mm.

TRIPHORIS PENINSULARIS, new species.

Plate XVI, fig. 2.

Shell sinistral, small, broadly elongate, conic, dark brown. Nuclear whorls four, light brown, increasing regularly in size, provided with spiral and axial sculpture (but this is too badly worn to be properly diagnosed in all our specimens). Post-nuclear whorls eight, separated by channelled sutures. The first four post-nuclear whorls have a double spiral row of tubercles, the posterior row being a little more strongly developed than the anterior. These rows are separated by a channel about as wide as the tubercular ridges. Beginning with the fifth whorl, a slender tuberculate cord appears in the middle of the channel which separates the two spiral ridges; this grows steadily in size with each turn, until on the last volution it is quite as strong as the suprasutural cord. On the later turns the middle and suprasutural spiral cords and their tubercles fall off quite abruptly at their posterior border and slope roundly toward their anterior limit. The tubercles on all the turns are joined by rather wide spiral bars and axial ribs, which inclose deep squarish pits between them. Periphery and base of the last turn well rounded, the former marked by a low somewhat flattened keel, which is separated from the suprapерipheral cord by a channel as wide as the one which separates the suprapерipheral keel from the middle one. The channel is crossed by the extension of the axial riblets. The base is marked by two spiral cords about as broad and of the same character as the peripheral one. These cords are separated by channels as broad as that which separate the peripheral cord from the suprapерipheral one and are crossed by feeble extensions of the axial riblets. The anterior basal cord is situated upon the base of columella and its anterior border fuses almost imperceptibly with it. The entire surface is crossed by many exceedingly fine spiral striations and lines of growth. Aperture subquadrate, posterior angle obtuse, anteriorly strongly channelled; outer lip subpatulous anteriorly, not sinuous; columella short, thick, twisted. Columella and the parietal wall are covered with a strongly developed callus.

There are three specimens of this species in the collection of the U. S. National Museum, Cat. No. 106424, collected by Mr. Henry Hemphill, at Point Abreojos, Lower California. The type, which is one of these three, has lost three of its nuclear whorls; the remaining nine turns measure: Length, 4.0 mm.; diameter, 1.5 mm.

TRIPHORIS EXCOLPUS, new species.

Plate XVI, fig. 8.

Shell sinistral, with alternating brown and white zones. (Nuclear whorls decollated.) The first three of the succeeding turns are marked by a double spiral row of tubercles. On the first two turns

the posterior row is less strongly developed than the anterior and is brown in color, while the channel that separates it from the anterior and the anterior row are yellowish white. From the third whorl on the posterior row of tubercles becomes more strongly developed than the other. Beginning with the fourth turn, a slender tubercular keel appears in the space between the two tubercular ridges, which on the sixth turn is as strong as the anterior cord. Thus the shell is marked by a brown tubercular ridge at the summit and two white tubercular ridges anterior to it after the fourth turn. The tubercles are joined by a broad spiral cord and axial riblets. The connections inclose quite deep oblong pits. There are eighteen tubercles upon the first whorl, twenty-two upon the fifth, and twenty-four upon the penultimate turn. Sutures channelled. Periphery of the last whorl strongly angulated, marked by a low subacute keel. The channel between the peripheral keel and the suprapерipheral row of tubercles is crossed by weak extensions of the axial riblets. Base short, light brown, having a single slender, spiral thread, about as far anterior to the periphery as the suprasutural tuberculated ridge is posterior to it. There are also very slender extensions of the axial riblets, which pass from the periphery to the insertion of the columella. In addition to the above sculpture, the base is marked by many exceedingly fine spiral striations and lines of growth. Aperture subquadrate; posterior angle obtuse, strongly channelled anteriorly, outer lip rendered sinuous by the external sculpture. Columella short, thick, and somewhat curved, covered by a faint callus which also extends over the parietal wall.

The type is an immature specimen which has lost the nucleus. The eight remaining whorls measure: Length, 3.7 mm.; diameter, 1.6 mm. It is Cat. No. 4069, U.S.N.M., and was collected at Cape St. Lucas, Lower California. Another badly worn individual, Cat. No. 15434, U.S.N.M., is from Guacomayo, Mexico.

TRIPHORIS PANAMENSIS, new species.

Plate XVI, fig. 19.

Shell sinistral, elongate conic, of dark-brown color. Nuclear whorls three, forming a cylindrical, smooth apex. The five succeeding turns are marked by a double spiral row of tubercles, which are separated by a channel considerably wider than the channeled sutures. Beginning with the eighth turn a tuberculate cord makes its appearance in the space between the two tubercular ridges, a little nearer to the one at the summit than the suprapерipheral one. This cord, at first faintly developed, increases steadily in size, until on the last volution it almost equals the other two in strength. The tubercles occur in regular axial series and are connected spirally and axially by slender riblets, the riblets inclosing small squarish meshes. There

are about fourteen tubercles on the fourth (the first sculptured) whorl and twenty-four on the tenth and the penultimate turn. On the last ten whorls the tubercles at the summit of the whorls are considerably stronger than the other two and darker colored. The sutures on the later whorls are deeply channeled; the channels are crossed by a slender riblet at each tubercle. Periphery of the last whorl marked by a strong keel which is weakly tuberculate. Base marked by two spiral keels a little weaker than the peripheral one. These two are ornamented by feebly developed tubercles, the deep channels between them being crossed by the continuations of the slender axial riblets. Aperture of irregular outline; posterior angle well rounded, strongly channeled anteriorly; outer lip sinuous to correspond with the external sculpture; columella very strong, twisted.

The type, Cat. No. 56014, U.S.N.M., is from Panama. It has seventeen whorls, and measures: Length, 8.7 mm.; diameter, 2.2 mm.

TRIPHORIS DALLI, new species.

Plate XVI, fig. 14.

Shell acicular, increasing regularly in size, irregularly variegated with varying shades of brown, yellow, and white. Nuclear whorls four, brown, marked by two strong, narrow spiral threads which divide the space between the sutures into three parts, of which the anterior two are about equal, while the posterior one is a little wider than the rest. In addition to the spiral threads, the surface is marked by many regular, slender, axial riblets, almost as strong as the spiral keels; of these there are about thirty upon the second and twenty-eight upon the fourth turn. The first three postnuclear turns are white, the remaining variegated. The early ones are marked by a double row of tubercles, one at the summit, the other at the periphery, separated by a broad channel. The anterior one is the stronger. Beginning with the fourth turn, a slender thread makes its appearance in the intermediate channel, a little posterior to the middle. This remains slender and on none of the turns, not even the last, becomes as strongly developed as the other two. The postnuclear whorls are also marked by poorly developed, rather broad, axial riblets, the intersection of which with the spiral keels marks the tubercles. The tubercles slope more abruptly posteriorly than anteriorly. The entire surface is crossed, in addition to the above-described sculpture, by microscopic spiral and axial lines. Sutures strongly impressed. Periphery of the last whorl marked by a well-impressed channel. Base rather short, evenly rounded, marked by three keels, of which the first adjoins the peripheral sulcus and is beaded and colored like its posterior neighbor. The other two keels are not tuberculate and

are separated by a channel a little deeper and wider than the channel which separates the middle keel from the first. The third keel is the least developed and is situated on the base of the columella. The anterior part of the base, including the median keel, is of light-brown color. Aperture irregular, the main portion circular. The posterior slit closed at the edge, but with a circular perforation a little distance behind the edge; anteriorly the outer lip is closely appressed to the columella, but a circular perforation is present at the base of the columella. Columella short and decidedly twisted. The type has seventeen whorls, and measures: Length, 6.5 mm.; diameter, 2.0 mm.

The type and three specimens, Cat. No. 195375, U.S.N.M., were dredged by the steamer *Albatross*, of the U. S. Bureau of Fisheries, at Station 2798, in 18 fathoms in the Bay of Panama.

TRIPHORIS INCONSPICUUS C. B. Adams.

Plate XVI, fig. 15.

Triphoris inconspicuus C. B. ADAMS, Ann. Lyc. Nat. Hist. N. Y., 1852, p. 383.

Shell small and slender, reddish brown fading to reddish yellow on the last turn, with the supra-sutural keel yellowish white. Nuclear whorls fine, the first two yellowish white, feebly sculptured, the other three brown, marked by two strong narrow spiral threads, which divide the space between the sutures into three parts, of which the anterior two are about equal while the posterior one is a little wider than the rest. In addition to the spiral threads, the surface is marked by regular, slender, axial riblets, which are about as strong as the spiral threads; of these there are about twenty-four upon the fourth and twenty-eight upon the fifth turn. Post-nuclear whorls separated by deeply channeled sutures, ornamented on the early whorls by two narrow, tuberculate, spiral keels, which are separated by a very wide channel. The tubercles are connected across this channel by the rather strong, protractive, axial riblets, of which there are about sixteen upon the first, twenty-two upon the fifth, and twenty-six upon the penultimate post-nuclear whorls. Beginning with the fifth post-nuclear turn, the middle band makes its appearance in the middle of the channel. This increases steadily in size, but attains only about half the size of the anterior keel on the last turn. In addition to this strong sculpture, the entire surface of the spire, tubercles, and interspaces are marked by microscopic lines of growth and spiral striations. Periphery of the last whorl marked by a rather narrow deep channel. Base with three prominent, equally strong, and equally spaced keels. The peripheral sulcus and the two basal sulci between the keels are marked by the continuations of the axial riblets. Aperture irregular, pyriform, decidedly channeled posteriorly, main portion subcircular; parietal wall covered with a very thick callus, which extends down along the short, stout, and anteriorly decidedly twisted columella.

The basal portion of the outer lip is closely appressed to the columellar callus and completely closes the anterior channel, leaving only a round perforation at the anterior extremity of the columella.

The specimen described and figured, Cat. No. 195376, U.S.N.M., has fifteen whorls and measures: Length, 4.1 mm.; diameter, 1.1 mm. It was dredged by the steamer of the U.S. Bureau of Fisheries steamer *Albatross* at Station 2798, in 18 fathoms, in the Bay of Panama. The type lot, No. 208 C. B. Adams collection, at Amherst, New Hampshire, contains ten specimens, none of which are as well preserved as the one figured.

A color form of this species has the posterior and median keel white, while the supra-peripheral one and the base are light brown. I will suggest for this form the varietal name, *bicolor*, fig. 6, Cat. No. 195376, U.S.N.M., dredged by the Fisheries steamer *Albatross* at the same station. Another specimen of this form was found among C. B. Adams type lot of *Triphoris alternatus* from Panama.

TRIPHORIS ALTERNATUS C. B. Adams.

Plate XVI. fig. 11.

Triphoris alternatus C. B. ADAMS, Ann. Lyc. Nat. Hist. N. Y., V, 1852, pp. 382-3.

Shell regularly elongate-conic, with the median and anterior spiral row of tubercles wax yellow, and the rest of the spire, periphery, and base brown on the later whorls. Nuclear whorls five, wax yellow, ornamented by two spiral ridges, the posterior one of which falls on the middle of the turns and the anterior about half way between this and the anterior suture. In addition to this they are crossed by many slender raised axial threads, thirty-two of which occur upon the last turn. The whorls are slopingly shouldered from the posterior keel to the summit. Post-nuclear whorls separated by deeply channeled sutures ornamented on the early turns by two strongly tuberculate spiral keels—one at the summit, the other at the periphery. The tubercles are formed by the intersection of the spiral keels and the axial ribs and slope rather suddenly posteriorly and roundly toward their anterior limit. Beginning with the fifth post-nuclear whorl a slender spiral cord makes its appearance in the middle of the broad channel between the two keels; this increases steadily in size, and on the last turn bears tubercles which equal those of the anterior keel in strength. Axial ribs somewhat retractive, eighteen on the first, twenty upon the fifth, and twenty-two upon the penultimate whorl. The spaces inclosed between the spiral keels and axial ribs are deep oblong pits, the long axis of which coincides with the spiral keels. Periphery of the last turn marked by a strong spiral keel. Base well rounded, marked by two strong spiral keels, the posterior one of which agrees with those posterior to it in spacing and is weakly tuberculated, while the anterior one, which is situated on the base

of the columella, is smooth and separated a little more distantly from its neighbor. The supraperipheral and basal channels are crossed by the continuation of the axial ribs. Aperture (?) fractured; columella stout and twisted, covered by a strong callus which extends over the parietal wall.

The type, Cat. No. 207, C. B. Adams collection, Amherst College, Amherst, Massachusetts, has fifteen whorls, and measures: Length, 4.8 mm.; diameter, 1.5 mm.

There are two other specimens in the type lot, all of which were collected by Dr. C. B. Adams at Panama.

TRIPHORIS GALAPAGENSIS, new species.

Plate XVI, fig. 7.

Shell small, acicular, with the keel at the summit and the base light brown, the rest white. Nuclear whorls five, ornamented with two rather closely placed spiral threads, the posterior one of which marks the middle of the exposed portions of the nuclear whorls, and many slender, axial riblets, of which there are about twenty-four upon the fourth and twenty-eight upon the fifth turn. Post-nuclear whorls eight, separated by deep channeled sutures, ornamented on the early whorls by two strongly tuberculated keels, separated by a deep channel, which is crossed by the moderately strong axial riblets, which connect the tubercles of the two ridges. Beginning with the fourth whorl a slender keel makes its appearance between the other two, which rapidly increases in size, becomes tuberculated, and on the penultimate and last turn exceeds the basal keel in strength. There are about fourteen riblets upon the first, twenty upon the fifth, and twenty-two upon the penultimate, post-nuclear whorl. Base marked by three non-tuberculated, equally strong and equally spaced spiral ridges. Aperture irregular, pyriform, strongly channeled posteriorly and anteriorly, with a rounded opening at the anterior extremity of the short, stout, twisted columella. Parietal wall and columella covered by a strong callus.

The type and six specimens, Cat. No. 195380, U.S.N.M., were dredged by the steamer *Albatross* of the United States Bureau of Fisheries, at Station 2813, in 40 fathoms, off the Galapagos Islands. The type has thirteen whorls, and measures: Length, 3.2 mm.; diameter, 1.1 mm.

Two striking color forms of this species were found in the lot obtained from the above station. One, represented by a single specimen, Cat. No. 105380, U.S.N.M., which may be known as variety *postalbus*, fig. 5, has the posterior and median keel white, the rest brown. The other variety, *unicolor*, fig. 13, represented by nine specimens, Cat. No. 105379, U.S.N.M., is uniformly brown.

TRIPHORIS CHATHAMENSIS, new species.

Plate XVI, fig. 9.

Shell acicular, nuclear whorls light brown, the others white, excepting the narrow band that connects the tubercles into a spiral series which are brown. Nuclear whorls five, the first smooth, the rest marked by two, quite closely placed spiral threads, the posterior one of which falls on about the middle of the exposed portion of the turns. In addition to the spiral threads the whorls are marked by slender axial riblets, of which there are about twenty-four upon the second and twenty-eight upon the fifth turn. Post-nuclear whorls separated by deep sutures and ornamented from the very beginning by three tubercular spiral keels, of which the median is the most strongly and the anterior the least developed. All the tubercles slope very abruptly posteriorly, which lends them a somewhat truncated appearance at this end, and more gradually anteriorly. They are connected axially by slender riblets, of which there are about fourteen on the first, sixteen upon the fifth, and eighteen upon the penultimate post-nuclear whorl. Periphery of the last whorl marked by a slender tuberculate keel in the immature shell. Base sloping concavely from the keel to the columella; without spiral keels, crossed by the feeble continuations of the axial riblets which gradually evanesce as they approach the columella. Aperture subquadrate, irregular, strongly channeled anteriorly, outer and basal lip conforming with the external sculpture and slope, columella short, stout and slightly twisted.

The type and four specimens, Cat. No. 195381, U.S.N.M., were dredged by the U. S. Fisheries steamer *Albatross* at Station 2813, in 40 fathoms off Chatham Island, one of the Galapagos group. They are immature. The type has twelve whorls and measures: Length 2.8 mm.; diameter, 1.1 mm.

This is one of the most distinct forms known to us at present from the entire coast; the presence of the three spiral keels from the very beginning is a character possessed by only one other form, namely, *T. callipyrgus* from San Pedro, California, which is a much larger species with three basal keels.

TRIPHORIS ADAMSI, new species.

Plate XVI, fig. 10.

Shell acicular, uniformly yellowish white. Early nuclear whorls decollated; the three remaining are marked by the characteristic sculpture, the double spiral thread, the posterior one of which is upon the middle of the whorls, and many slender, axial riblets, of which there are about twenty-four upon the last turn. Post-nuclear whorls increasing very regularly in size, ornamented with a double

spiral row of strong tubercles. Channel separating these two rows quite wide. The tubercles are joined axially by low, rather broad riblets, which are decidedly protractive. Beginning with the seventh whorl the slender, median spiral thread makes its appearance. This is considerably nearer the posterior keel than the anterior, but in our specimens, which are all young, attains only a moderate development, with extremely weak tubercles. There are about eighteen ribs on the first, twenty upon the second, and twenty-two upon the penultimate post-nuclear turn. Periphery of the last whorl marked by a strong spiral keel. Base excavated without spiral keels covered by the feeble continuations of the axial riblets, which gradually fade out as they approach the short, stout slightly twisted columella. Aperture subquadrate, decidedly channeled anteriorly.

The type and two additional specimens, Cat. No. 195382, U.S.N.M., were dredged by the steamer *Albatross* of the U. S. Bureau of Fisheries, at Station 2813, in 40 fathoms, off Chatham Island, one of the Galapagos Islands. The type has twelve whorls (the first two nuclear probably having been lost) and measures: Length, 3.4 mm.; diameter, 1.2 mm.

In this form of the aperture and sculpture of the base this species agrees with *Triphoris chathamensis*, but the sculpture of the spire is entirely different.

EXPLANATION OF PLATE XVI.

The measurements cited after the name refer to the axial length of the specimen. All the figures have been enlarged six diameters.

- Fig. 1. *Triphoris pedroanus*, new species; type; 5.1 mm.
 2. *Triphoris peninsularis*, new species; type; 4.0 mm.
 3. *Triphoris stearnsi*, new species; type; 4.1 mm.
 4. *Triphoris callipyrgus*, new species; type; 5.2 mm.
 5. *Triphoris galapagensis postalbus*, new subspecies; type.
 6. *Triphoris inconspicuus bicolor*, new subspecies; type.
 7. *Triphoris galapagensis*, new species; type; 3.2 mm.
 8. *Triphoris excolpus*, new species; type; 3.7 mm.
 9. *Triphoris chathamensis*, new species; type; 2.8 mm.
 10. *Triphoris adamsi*, new species; type; 3.4 mm.
 11. *Triphoris alternatus* C. B. Adams; type; 4.8 mm.
 12. *Triphoris humphilli*, new species; type; 5.1 mm.
 13. *Triphoris galapagensis unicolor*, new subspecies; type.
 14. *Triphoris dalli*, new species; type; 6.5 mm.
 15. *Triphoris inconspicuus* C. B. Adams; 4.1 mm.
 16. *Triphoris carpenteri*, new species; type; 7.2 mm.
 17. *Triphoris montereyensis*, new species; type; 4.6 mm.
 18. *Triphoris catalinensis*, new species; type; 5.3 mm.
 19. *Triphoris panamensis*, new species; type; 8.7 mm.



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8



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10



11



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19

WEST AMERICAN MOLLUSKS.

FOR EXPLANATION OF PLATE SEE PAGE 262.

