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MONOGRAPH OF THE CUBAN GENUS *VIANA* (MOLLUSCA: ARCHAEOGASTROPODA: HELICINIDAE)

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ABSTRACT. The genus *Viana* in the family Helicinidae is limited in its distribution to the Sierra de los Organos in Pinar del Río, the westernmost province of Cuba. All members are found only on limestone substrate. The genus consists of one species, *regina* Morelet, with two subspecies, *laevigata* Pfeiffer and *subunguiculata* Poey, that form many races which are not clearly discrete morphologically and which show no coherent geographical distribution.

INTRODUCTION

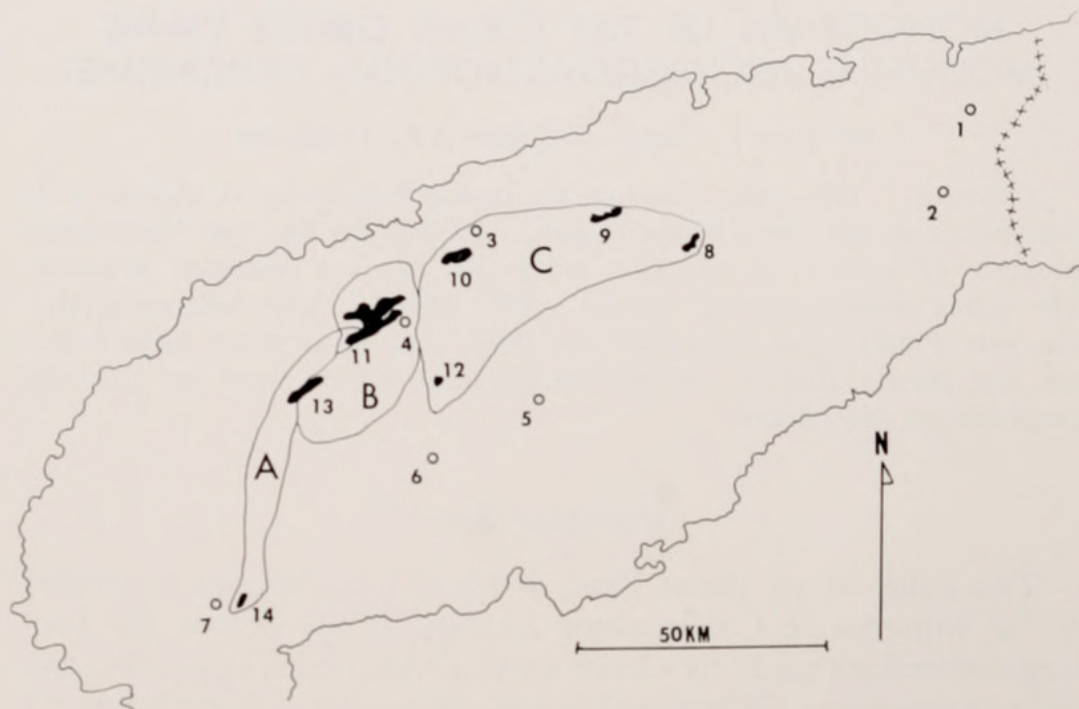
This study of the genus *Viana* is based upon specimens housed in the Museum of Comparative Zoology which include the very large collections made by Carlos de la Torre, Pedro Bermúdez and Julio Armenteros. Much additional material was contributed by Thomas Barbour, William J. Clench, Paul Bartsch, Carlos G. Aguayo, Miguel L. Jaume, Morris K. Jacobson, and numerous other Cuban and American collectors.

The strikingly handsome shells of the helicinid genus *Viana* are confined to the Sierra de los Organos, Pinar del Río Province, in the western end of Cuba. Their range is limited in the west by the sierras and mogotes¹ about Mendoza, and in the east by the Sierra Rangel, about 75 miles away. The species of *Viana* are purely calciphilous, living exclusively on the limestone mogotes and sierras which emerge from the surrounding red, iron-bearing soil. In such locations during the rainy season they can be collected as readily as littorinids on rocky sea coasts. Unlike the related genus *Emoda*, they are found in no other part of the island.

Within their range they inhabit practically every outcrop of limestone of any size which enjoys sufficient moisture and shade.

¹ In western Cuba a mogote is any isolated limestone block separated from the main sierra.

Thus they are common on high sierras like those of Guane, Paso Real, Viñales, San Carlos, San Andrés, Guajaibón, and Rangel, and on the small mogotes in the valley of Viñales, the Laguna de la Piedra, and around Luis Lazo, Isabel María, and between the Estrechura of San Carlos and Guane (Tenería, Punta de la Sierra, La Muralla, and Los Portales).



Map 1. Showing the greater part of the Province of Pinar del Río, Cuba, outlining the areas containing the sierras and mogotes which are occupied by the three subspecies of *Viana regina* Morelet.

A. *Viana regina subunguiculata* (Poey). B. *V. r. laevigata* (Pfeiffer). C. *V. r. regina* (Morelet).

Cities and towns

1. Guanajay
2. Artemisa
3. Consolación del Norte
4. Viñales
5. Consolación del Sur
6. Pinar del Río
7. Guane

Sierras and Mogotes

8. Sierra Rangel
9. Pan de Guajaibón
10. Sierra San Andrés
11. Sierra Viñales
12. Mogotes at "Km. 14"
13. Sierra del Quemado
14. Sierra Paso Real

The genus *Viana* appears in a series of differentiated forms. These vary in sculpture from smooth and shining to dull and spirally grooved; in color from yellow to reddish and purple, ornamented at times with red, yellow, or diaphanous bands, or with

whitish mottling; and in size from the large forms of Sierra Rangel, (29.5 mm in width) to the small forms (18.2 mm in width) which inhabit small mogotes such as those at Kilometer 14, Viñales. In most cases, specimens of *Viana* collected on small mogotes are dwarf forms about one-half the size of typical specimens. It is apparent that the size of individual specimens is a function of the area of the habitat and may very well be of selective value for survival, based upon the supply of food. In addition to other variations, the margin of the peristome may be simple and unreflected as in *V. regina regina* and *V. regina laevigata*, or more or less strongly reflected as in *V. regina subunguiculata*.

From the scant field notes we assembled we find that vianas are largely satisfied with the presence of limestone, shade, and moisture. We have never collected a live specimen other than on limestone rock. Nothing has been published about their food, but they probably eat the lichens found on the rocks on which they live.

They have an enemy in the larval form of the large Cuban firefly, *Alecton* sp.; pictures have been taken of such a larva devouring a *Viana* through the aperture (Pl. 1). Probably the firefly larva



PLATE 1

Viana regina (Morelet)

Viana regina Morelet being attacked by a lampyrid beetle larva (*Alecton* sp.). Photo by F. de Zayas (about 6 X).

attacks its prey when the snail is relaxed. The predator may wait for the *Viana* to relax the operculum and then attack, much like the marine predators of the genus *Melongena*, among others.

Baker described the radula of *Viana* (1922) and its anatomy (1926). We could find nothing in print regarding its natural history. The following notes are translated from a personal communication from Oscar Alcalde Ledón who, until he left the country in 1963, was in charge of the Division of Malacology in the newly formed Academia de Ciencias de la República de Cuba. Alcalde tells us that he unfortunately left his notes behind and writes from recollection only.

"[The eggs] are subglobular in shape, the size of a capital letter 'O' in normal typewriter print, or perhaps a bit larger. I found them under a slab of rock and they were covered with the reddish soil on which the rock rested. After being washed, they proved to be wax colored [whitish]. I did not know at first that they were *Viana* eggs, but later upon breaking them, I found the nepionic whorls of a snail which under microscopic examination proved to be identical to the nepionic whorls of *Viana*. The operculum was very small and thin."

According to Thiele (1929:81), all heliciniids lack a male copulatory organ, and the manner of transfer of sperm from male to female is unknown.

Several of the forms of *Viana* mentioned above were given names by the late Dr. Carlos de la Torre, but almost all remain in manuscript. Under these manuscript names they have been widely distributed by Cuban collectors, and one of the purposes of the present study was to examine the validity of these forms. After carefully localizing a large number of *Viana* specimens on an enlarged map of the Sierra de los Organos region, we find that we are amply justified in rejecting these names *in toto*.

The confusion in this genus is very much like that of *Polymita* and *Liguus*. That is, unless the localities of the various forms are carefully plotted, the worker would find it easy to attach names to the many color forms and forms with only minor morphological differences. A review of the literature covering *Polymita* and *Liguus* has demonstrated amply the confusion which results from such a proliferation of names. We choose to follow a more conservative course and to refer to striking varieties, which blend into one another, by vernacular names such as marbled, lirate, smooth, banded, roseate, yellow, dwarf, shining, dull, etc., instead of using Latin infraspecific taxa which might be misunderstood as taxonomic designations.

In doing so we follow the procedure generally adopted for such a variable species as the intertidal marine mollusk from the north-east coast of North America, *Thais lapillus* (Linnaeus). The analogy between the two groups mentioned is quite close, since in both cases we are dealing with prosobranch mollusks living in more or less isolated colonies on rocks, and hence displaying a rich variety of sculpture, size, and color. The common practice today is to designate all the *lapillus* varieties under the simple name *Thais lapillus*. We propose to do the same for *Viana regina* (Morelet). The distribution of the various populations as revealed on our maps nevertheless seems to justify the recognition of *subunguiculata* Poey and *laevigata* Pfeiffer as valid subspecies.

V. subunguiculata extends southwestward from a line running between Sierra del Quemado-Sierra Viñales (with a very strong salient reaching into the Sierra Celadas branch of the Sierra Viñales complex) and Sierra Cabezas. Southwestward from this line, *subunguiculata* is found reaching to the extreme western limit of the distribution of the genus *Viana* at Sierra de Guane and Sierra Paso Real near Guane. This range includes the sierras around Luis Lazo (San Carlos, Los Acostas), at Isabel María and Cabezas, and at the isolated mogotes between Luis Lazo and Guane.

The subspecies *laevigata* is centered about the complex of mountain ranges which go under the name of Sierra de Viñales,¹ with disconnected outrunners at the Cayos de San Felipe, Lagunillas, Matahambre, Pan de Azúcar, Cabezas, Isabel María, and some colonies on the Sierra del Quemado. The line separating *laevigata* from *regina*, *sensu stricto*, appears to run south between the Baños de San Vicente on the west and the Sierra San Andrés (with La Jagua) to the east. East of this line, and reaching to the eastern limit of the range of the genus at Rangel, the nominate subspecies *regina regina* can be found. The mogotes at Kilometer 14 and El Guamá also are inhabited by *regina regina*, as are many mogotes in the Viñales valley (Dos Hermanos, Mogote La Vega, Hoyo de los Santos, Mogote de los Muertos), whereas others in the same area (Mogote Pequeño, Mogote Alto, Hato Morales, El Cuajaní) have populations of *laevigata*.

We realize, of course, that certain populations are sufficiently distinct to enable the student to recognize the locality from which

¹ Sierra del Infierno, Sierra Penitencia, Sierra Pan de Azúcar, Sierra Martillo, and others.

they come. Nevertheless, there are many specimens for which this is not possible, nor did we find it easy to establish fixed dividing lines between the various characteristics, with the exceptions noted below. Throughout the range of the genus there is much duplication of the characteristics upon which de la Torre based his manuscript names.

This separation of the genus into three subspecies and numerous, if not clearly defined, races presupposes an early continuous limestone area which, by subsequent lifting and corrosion, was broken up into a series of discontinuous ranges (sierras) and isolated blocks (mogotes). There is a small amount of territory at the southwestern end of Sierra de Viñales and at Sierra del Quemado where *laevigata* and *subunguiculata* overlap with very little fusion of characters. However, more collecting is needed in these two areas. This is also true of the small territorial overlap in Viñales at El Queque between *laevigata* and *regina*. Mechanical dispersal may be responsible for this overlap. Gene flow, however, between members of the same subspecies must be very rare, particularly between isolated populations, such as those of Pan de Guajaibón and Sierra Rangel. Hurricanes could be the means of such mechanical dispersal, carrying specimens or their eggs.

Writing about a large mogote near Viñales, called previously El Tumbadero but now El Queque, Henderson (1916:234) states:

"The rock is discolored and considerably altered by metamorphic process. It is just possible that the limestone of this southern range of the Organos Mountains is a shade older than that of the northern system (the Costanera), but the folding upward of the two was certainly contemporaneous. All the mogotes of the Viñales valley, including the large Tumbadero, the Dos Hermanos, and the many smaller ones scattered about the valley floor are clearly but fragments of the main sierra now wholly detached and isolated by erosion [corrosion]. The ammonites, which Dr. Torre has been collecting for several years, come principally from the rocks of this southern range and indicate probably Jurassic origin of the limestone.¹ As heretofore noted, the mogotes about 'Kilometer 14' do not belong to the Viñales range, but together with the Cerro de Cabras hills farther west, represent either remnants of a third line of Jurassic sierra that once followed a course parallel with the existing ranges, or possibly a later Tertiary deposit upon the flanks of the older mountains."

¹ According to Weyl (1966: 42-47), the Viñales limestone (Kalk) is of Upper Jurassic age and has come by three overthrusts from the north.

Some of the localities cited here must be taken provisionally. There are no reliable detailed maps of the Sierra de los Organos region. Even the map composed by the Cuban army engineers in 1933-1941 is too general, not always accurate, and in several instances illegible. Coupled with this difficulty is the haphazard way in which the Cuban peasant assigns names to the various features of his local geography. Many mogotes, cerros, vegas, hoyos, and arroyos have the same name, but on the other hand, many of these features have several. Frequently the name of a mogote is that of the farmer near or on whose land it stands; hence, when this land changes hands, these names frequently change. There is no certainty that such names were ever officially recognized or published, or even that they appear on local land records. A final difficulty lies in the matter of spelling. The unique Cuban pronunciation of Castillian is reflected at times in the orthography. Thus, AYÚA, the local name of a tree (*Fagara* sp.), which is also associated with the name of a hill and cove in the Sierra San Andrés, appears as AYÚDA, ALLÚA and ALLÚDA on field labels. In one instance a mogote called MUELA DE LA VIEJA (Old Woman's Tooth) also appears on a collecting label as COLMILLO DE LA VIEJA (Old Woman's Fang).

The most useful local maps where those published by de la Torre and Bartsch (1938) and field maps prepared by Oscar Alcalde Ledón and Julio Armenteros. The gazetteer on Cuba published by the United States Board on Geographic Names (1957) was also very useful. In some cases, however, we have had to be satisfied with reporting localities as they appear on the collection labels. We do so in the hope that local inquiry at a later date will enable the collector to find these localities.

ACKNOWLEDGMENTS

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SYSTEMATIC DESCRIPTION

Genus VIANA H. and A. Adams

Viana H. and A. Adams, March 1854, The Genera of Recent Mollusca, 2: 305 [as subgenus of *Trochatella* Swainson] (type-species, *Helicina regina* Morelet 1849, subsequent designation, Pilsbry and Brown 1910,

Proc. Acad. Nat. Sci. Philadelphia, **62**: 525); *non* Walker 1869 [Lepidoptera]

Hapata Gray, November 1856, Ann. Mag. Nat. Hist., (2) **18**: 414 (type-species, *Trochatella regina* (Pfeiffer) [*sic*, Morelet], original designation).

Rhynchocheila Shuttleworth 1877, Notitiae Malacologicae, **2**: 15 (type-species, *Helicina regina* Morelet 1849, monotypic).

Fitzia Guppy 1895, Proc. Victoria Inst. Trinidad, **1**, pt. 2: 74 (type-species, *Helicina regina* Morelet 1849, monotypic).

Description. Shell large, reaching 29 mm in diameter, imperforate, trochiform, generally solid, faintly to rather strongly sculptured, and lacking periostracum in adult specimens. Shells unicolorous, or ornamented with bands of varying width, or with a marbled or mottled design; a thin reddish subsutural line is present in some specimens. Lip simple and occasionally sinuous or flaring, male shell with a notch midway between the outer lip and its insertion in the parietal area. Protoconch $1\frac{1}{2}$ whorls, smooth or irregularly pitted, sharply raised above the succeeding whorls as in *Eutrochatella*, generally lighter in color than the rest of the shell except the base.

Operculum calcareous, auriculate, white externally with a thin, light brown, internal corneous layer and darker at the periphery. The outer margin is widely rounded, the columellar margin concave above, generally straight and descending almost vertically below. It is rounded at the base, generally on a single plane, but sharply raised basally and less so along the columellar margin. There is a long, rounded, low, more or less vertical protuberance along the inner margin, thickest centrally. Outer margin very slightly thickened; a thin, opaque, transverse area reaches internally across the mid-line. Nucleus lateral and central near the columellar margin, with concentric lines of growth which follow the outline of the shell.

Remarks. The notch on the peristome of the male, which we hereafter call the peristome notch, was one cause of the repeated renaming which this genus underwent. Morelet (1849: 19) writes "Peristomo supero. . . profunde emarginato." Gray (1856: 414) likewise thought the notch was characteristic of the entire group and created his genus *Hapata*. H. and A. Adams (1854: 305) also thought this to be true of their genus *Viana*. Fischer (1885: 796), citing Pfeiffer, says "les coquilles d'une même espèce ont leur labre tantôt échancré, tantôt à peine sinueux et cette différence serait en rapport avec la sexe." Arango (1878: 41) took the notched shells to be females. Wagner (1908: 129) correctly stated that it was the male which possessed the notch, but then changed his opinion (1910: 185). He was corrected by

Baker (1926: 52), and the dissections performed for this study by Turner¹ support Baker's contention that the notched shells are male. Although Thiele (1929: 83), correctly describes the situation, Wenz (1938: 438) and Keen (1960: 288) state that the entire genus is characterized by the notch. Wagner (1910: 184) noted other features of sexual dimorphism in the shell which our examinations did not seem to justify.

Baker (1922: 62) considered *Ampullina* De Blainville a synonym of *Eutrochatella sensu stricto*, a Jamaican group. However, the only helicínids of Jamaica that compare in size with De Blainville's figure of the type, *A. striata* (1827: pl. 35, fig. 4a-c), are *Eutrochatella tankervillei* (Gray) and *Alcadia major* (Gray). But neither the description (1824: 441) nor the rather poor figure indicate either of these. There is no mention of the strong sculpture of *tankervillei*, and the aperture of *Alcadia major* is quite different.

Ampullina striata De Blainville (1824: 567) (locality unknown) has been considered to be in the genus *Viana*, but a re-examination of the figure published by De Blainville in his *Manuel de Malacologie* (1827, pl. 35, fig. 4a-c) indicates that it is not a member of this genus. The operculum figured (4b-c) is quite different from that of *Viana*. De Blainville shows a strong ridge on the inner face from the center margin at the parietal area and extending horizontally to the opposite margin. This morphological structure does not appear in any of several hundred opercula examined in the three subspecies of *Viana*. The whereabouts of the figured specimen (type) is unknown to us.

The range of *Viana* extends in a broad arc from the Sierra Rangel near San Cristóbal, west and south to the immediate vicinity of Guane, all within the Province of Pinar del Río, Cuba.

VIANA REGINA REGINA (Morelet)

Plate 2, figures 1-4

Helicina virginea d'Orbigny 1842 [*in*] Sagra, Hist. l'Île de Cuba, Mollusques, 1: 241 (Intérieur de l'Île de Cuba); *non* Lea 1834.

Helicina regina Morelet 1849, Testacea Novissima Insulae Cubanae et Americae Centralis, Paris, 1: 19 (Ad Montes Guajaibón, Insulae Cuba). [Paratypes, MCZ 146706, ex Putzey's collection.]

Helicina maculosa 'Newcomb' Jay 1850, A Catalogue of the Shells Contained in the Collection of John C. Jay, 4th ed., New York, p. 261 [*nomen nudum*].

¹ Dr. Ruth D. Turner is in the process of preparing a detailed anatomical investigation of *Viana*, which will appear later in this series of reports.

Helicina multistriata 'Velasquez' Jay 1850 *ibid.*, p. 261 [*nomen nudum*].

Eutrochatella (*Hapata*) *regina* Morelet. Wagner 1908, [*in*] Conchylien-Cabinet, (2) 1, Sect. 18, pt. 2: 130, pl. 25, figs. 12, 13, 18, 19.

Viana regina (Morelet). Baker 1922, Proc. Acad. Nat. Sci. Philadelphia, 74: 63, pl. 7, figs. 34-36.

Viana regina marmorata (Torre MS) Webb 1948, Foreign Land and Fresh Water Shells, St. Petersburg, Florida, p. 143, pl. 65, fig. 6.

Description. Shell moderately large, turbate, sculptured with spiral cords of varying degrees of strength, from deeply lirate to quite smooth, crossed by weak, oblique, irregular growth lines. Color basically yellow, whitish, or light reddish purple, at times with faintly outlined spiral bands. Shell with some degree of mottling, occasionally covering the entire surface or else being confined to the spire. When such a shell is held to the light, the whitish or yellowish markings are seen to be more opaque than the base color of the shell, and they apparently constitute an added layer of shell matter on the surface. These markings, however, are so closely bound to the rest of the shell that they cannot be removed even by the most diligent scraping. Whorls $6\frac{1}{2}$, moderately inflated, regularly widening; body whorl rounded. Aperture widely lunate, white near the edge, yellowish or light reddish purple internally. Outer lip entire, not reflected and not flaring, except very weakly near the insertion with the columella, and deflected downward at the base of the aperture. Peristome notch rather deep, V-shaped, narrowly rounded at the base. Parietal lip smooth, without folds, gently convex above, sharply and almost vertically descending below, barely rounded at the juncture with the basal part of the lip. Columella without a fold but with a low, oblique, rounded and slightly raised margin at the umbilical area, appearing as a slight tubercle on the outer basal edge. Shell imperforate, but with a shallow excavation just above the base of the columella. Sutures moderately impressed, faintly and irregularly scalloped by the edges of the growth lines. Operculum as in the generic description.

Height Width

mm mm

20.5	23.0	♀	Pan de Guajaibón. Syntype.
24.5	29.5	♂	Sierra Rangel.
21.5	23.5	♂	Pico Grande, Sierra San Andrés.
23.0	25.0	♀	Sierra de Guacamaya, San Andrés.
15.5	18.2	♂	Kilometer 14, Viñales.
15.2	17.5	♂	" " "
16.5	18.5	♀	" " "

Remarks. There are many intergrading forms throughout the range of this subspecies. Some populations are composed largely of a single variety, while others are a mixture of several forms. At Guajaibón, the type locality, there exists a pale yellow form, occasionally ornamented with a more or less distinct reddish subsutural line. The shell here is moderately lirate, dull, and rather coarse to the touch. The characteristic marbling is confined to the upper whorls. At San Andrés a rather spectacular form is found. The early whorls are pale yellow but this soon gives way to a light reddish purple or roseate ground color, variously ornamented with irregular white or pale yellow marbling. This marbling is occasionally arranged in broad spiral bands distinguished by the differing nature of the spots. The ground color, as well as the marbling designs, becomes obsolete near the aperture and at the base, both of which are white. The lirations are very faint, not perceptible to the touch and barely visible under a magnifying glass, but the shell, though smooth, does not possess the brilliant sheen which occurs in some of the populations of the subspecies *laevigata*. In some colonies in the San Andrés region (e.g., El Aserradero near Caiguanabo and Puerto Escondido), yellow shells occur together with purplish ones, as well as some that have varying mixtures of purple and yellow. The marbling in both color forms covers practically the entire shell. The bands sometimes consist of a solid color and hence resemble the prominent spiral bands of the subspecies *laevigata*. Occasional populations, as at La Sierra, have both the yellow and purple colors, which, however, are very pale and appear faded, and the marbling is widely scattered over the surface. At some isolated mogotes (Bella María and Talavera near La Palma, Hoyo de los Mogotes near Viñales, La Catalina near San Diego de los Baños, Mogote del Rojero between Cayo San Felipe and Isabel María, and some of the mogotes about Kilometer 14) a dwarf form occurs, generally in some shade of yellow.

These remarks are not to be construed as having at all exhausted the range of variations of *regina*. Variations of all sorts occur, in sculpture, color, and size, sometimes in localities quite close to one another (as near Isabel María), sometimes even on a single mogote (as El Queque). It is not the purpose of this study to give a full account of all the forms in which *regina* or either of the other two subspecies occurs, or to give a detailed description of each population. Such an undertaking would lead us far beyond our original purpose.

Specimens examined. CUBA: PINAR DEL RÍO. *Viñales*: Mogote W of Kilometer 14; Mogote E of Kilometer 14; Abra de la Colmena;

Arroyo Melindre; Encinar Alto; La Laguna, Potrero Constancia; Mogote de José María García; Hoyo de la Sierra; Hato Morales; Hoyo de los Mogotes; Hoyo de los Santos; Mogote la Cañona; Constancia; Mogote Capón; Mogote Dos Hermanos. *Viñales (Palmarito)*: Ensenada de Antonio Miranda; Vega de Lorenzo Martínez; Hoyo de Majá; Vegas de Palmarito; Ensenada Martín Miranda; El Grillo; Vega de Lorenzo. *Viñales (El Queque [Tumbadero])*: Ensenada del Valle; lower part of El Queque; Ensenada del Río; Hoyo de los Muertos; Ensenada de la Bandera. *San Andrés*: Ensenada de la Ayúa; Pasada de la Ayúa; Colmillo (or Muela) de la Vieja; Mogote La Paloma, NW of La Paloma; entrada a la Ayúa; Sitio de la Sierra; Mogote de la Tumba, Puerto Escondido; Ensenada del Corojal, Puerto Escondido; Mogote del Puerto Escondido; La Pastora, Puerto Escondido; Ensenada del Cafetal; Mogote Simón; Mogote del Indio; Pico Grande; Pico Chico; Los Caracoles; Hoyo del Infierno; Mogote Luis Díaz, Falda de Pico Chico; Mogote las Cuevitas; Hoyo Largo de San Antonio. *San Andrés (Canalete)*: Los Hoyos; Mogote del Abra de Canalete; Ensenada de Borges; Ensenada de los Colorados; Mogote de Abraham; Ensenada de Canalete. *San Andrés (Caiguanabo)*: El Aserradero; Mogote Largo; Mogote Puertecitas; Mogote Andrés Díaz; Mogote de Caiguanabo; Abra de Caiguanabo. *San Andrés (Consolación del Norte or La Palma)*: Sierra de Guacamaya; Río de la Puerta, Guacamaya; Las Vulicas; Farallón de las Avispas; Mogote de la Palma; Mogote Bella María. *San Andrés (Galalón)*: Mogote Colmena de Piedra; Cueva del Chino; Pinalito; Las Calabazas; Mogote de Galalón; Mogote Fuerte, SW of Sierra de Galalón; Mogote Campamento; Mogote Delicias. *San Diego de los Baños*: Cueva del Indio; La Cumbre; Mogote de los Portales de San Diego; Mogote Colorado; Los Cayitos, Catalina; Mogote de los Indios; Bermejales, Sierra de la Güira; La Catalina, N of San Diego; Lagunita, Sierra la Güira; Hoyo de la Jutía, 1 km E of San Diego; Mogote el Bosque; Camino de Galalón, Sierra de la Cumbre; Soroa. *Pan de Guajabón*: San José de Sagua, Pan de Guajabón and Sierra Chica, S of Pan de Guajabón. *Rangel*: Rancho Mundito; El Retiro; El Taco; La Plata; about 2 km S of Rancho Mundito, San Cristóbal; Loma Sabicú; El Aspiro; Guanibadro; about 3 km N of Santa Cruz de los Pinos.

VIANA REGINA LAEVIGATA (Pfeiffer)

Plate 3, figures 1-4

Trochatella regina Morelet, var. Pfeiffer 1864, Malakozoologische Blätter, 11: 106 (Cayos de San Felipe [Charles Wright]; Pan de Azúcar [Rafael Arango] [both Viñales, Pinar del Río], Cuba); Pfeiffer 1865,

Novitates Conchologicae, 2: 253, pl. 44, figs. 4, 5. [Holotype probably destroyed.] We here limit the type locality to the Cayos de San Felipe close to the town of Viñales.

Trochatella regina laevigata Pfeiffer 1865, Monographia Pneumonopomorum Viventium, 3: 211 (Cuba).

Eutrochatella regina lyrata Torre. Hand 1927, Nautilus, 40: 89 [*nomen nudum*].

Description. Shell similar to *regina regina*, but lacking mottling or marbling. It differs from *regina subunguiculata* in having the lip of both male and female specimens simple and not flaring.

Height	Width		
mm	mm		

21.5	25.5	♀	Sitio del Infierno, Viñales.
22.0	23.0	♂	La Chorrera, San Vicente, Viñales.
21.0	24.0	♂	Cayos de San Felipe, Viñales.
21.0	23.0	♀	Sierra Celadas, Viñales.

Remarks. As is the case with the other subspecies, *laevigata* is variable in size, sculpture, and color pattern. This subspecies seems to have more populations in which pronounced, and occasionally quite spectacular, banding occurs, as for example the populations in several of the sierras of the Sierra del Infierno complex, at the Sitio del Infierno and at Cayos de San Felipe. The last two localities have some of the most beautiful shells in the genus. They are gleaming roseate, purplish, or bright lemon-yellow and generally have three rather broad alternate whitish bands. Many of the lemon-colored shells have a thin, dark-reddish subsutural line. As is the case with the other two subspecies, some populations consist of shells differing in color, ornamentation, and sculpture, whereas others are more or less uniform.

At Sierra del Quemado and Sierra Celadas there are populations of *subunguiculata* as well as *laevigata*. At El Queque, besides *laevigata*, populations of *regina* also occur. See remarks under *subunguiculata*.

Specimens examined. CUBA: PINAR DEL RÍO. *Viñales*: Sitio del Infierno; Mogote del Cejanal, El Abra, Sierra de Viñales; La Penitencia; Pan de Azúcar; Sierra de Pan de Azúcar; Sierra de Viñales; Cayos de San Felipe; Sierra Derrumbada; El Cuajaní; Hoyo del Majagual; Sierra Serrucha; Hoyo de la Jutía; Mogote de los Muertos; Mogote de la Vega; Mogote Pequeño; Potrero de Manuel Sánchez (near Capón). *Viñales (San Vicente)*: Las Cuevitas, Finca Ancón; Llana Manacas; Mogote La Cañona (between Laguna de la Piedra and Constancia); La Guasasa; Ensenada de los Baños; San Vicente de los Baños; Puerta del Ancón; Costanera de San Vicente

(or Ancón); Valle de Delicias; Finca Ancón; La Chorrera; Cejanal, El Abra; Punta de la Costanera; Ensenada de los Baños; Mogote Pequeño, Costanera de San Vicente (or Ancón); Cueva de José Miguel Gómez; Hoyo de Magdalena, Costanera de San Vicente; Mogote del Cao, Laguna de la Piedra; Mogote de Justo; Cueva del Río San Vicente; Sierra Gorda, Ancón; Sierra del Ancón. *Isabel María*: Mogote Isabel María; boundary between Isabel María and Cabezas.

VIANA REGINA SUBUNGUICULATA (Poey)

Plate 4, figures 1-4

Helicina subunguiculata Poey 1857, *Memorias sobre la Historia Natural de la Isla de Cuba, Habana*, 2: 34 (Sierra de Guane). [Lectotype, here selected, MCZ 73672.]

Description. Shell similar to the typical form but differing in the nature of the lip, which in the female is expanded and slightly reflected, in the male is extended into a claw-like structure which is sometimes expanded, especially at the base where it joins the columellar margin.

Height	Width		
mm	mm		
24.0	24.5	♀	Sierra de Guane. Syntype.
22.0	24.0	♂	Punta de Sierra de Guane.
23.5	26.5	♀	Sierra San Carlos, Luis Lazo.
25.0	28.5	♂	Sierra Celadas, Viñales.

Remarks. In size, the shells vary from the medium-sized ones found at the type locality and near Mendoza to the rather large ones from Luis Lazo and especially on the Sierra Celadas of the Sierra Viñales complex. The shells at the type locality are white or pale yellow in color, and sculptured with spiral lirations of moderate strength so that they are moderately rough to the touch. At La Muralla on the road to Luis Lazo the shells are larger, quite smooth, although with very faint, widely spaced lirations, pale lemon-yellow, and frequently ornamented with a red subsutural band. These shells also display some degree of whitish banding and mottling on the spire as in some populations of *regina*, but their large size, and especially the flaring lip in the female, and the strong and at times flaring ungulation in the male, reveal their true subspecific standing. At Luis Lazo the shells are similar, the lirations somewhat stronger, and many purplish or roseate specimens

appear. At Gramales and especially on the Sierra Celadas a population of large, heavy, smooth, generally pale yellow shells occurs, with a strongly flaring lip and white bands that vary from moderately broad to quite narrow. Occasionally a purplish specimen occurs. This population seems to share the Sierra Celadas with a typical broadly banded, purplish colony of *laevigata*. In all likelihood the two subspecies, as at Sierra del Quemado, live in isolated areas in the sierra. It must be borne in mind that the sierras of the Sierra Viñales complex do not necessarily constitute a continuity of ecological conditions. Isolation of populations sometimes occurs as the result, among other things, of gaping chasms or hoyos that present effective barriers even to calciphiles like *Viana*. A population of stenomorphs, light purplish in color, of this subspecies lives on a mogote at the border between Isabel María and Luis Lazo.

Specimens examined. CUBA: PINAR DEL RÍO. *Guane*: Sierra Paso Real; Sierra de Guane; Mogote 1 km N of Mogote Punta de la Sierra; Punta de la Sierra; Mogote near Punta de la Sierra. *Luis Lazo* (*Sumidero*): Entrada a Sumidero; Ensenada de los Barrios; La Picapica; Ojo de la Palma, Finca "La Güira." *Luis Lazo*: La Estrechura; Valle de San Carlos; Sabanas Llanas; Sierra Los Acostas; Valle de Luis Lazo (Valle de San Carlos [El Potrerito]); La Claraboya; La Güira; Mogote Central; El Junco. *Isabel María* (*Guamá*): El Guamá; Hoyo El Guamá; Mina El Guamá. *Isabel María* (*Cabezas*): Ensenada Chica; Valle Cabezas; Mogote del Cementerio; Ensenada los Burros.

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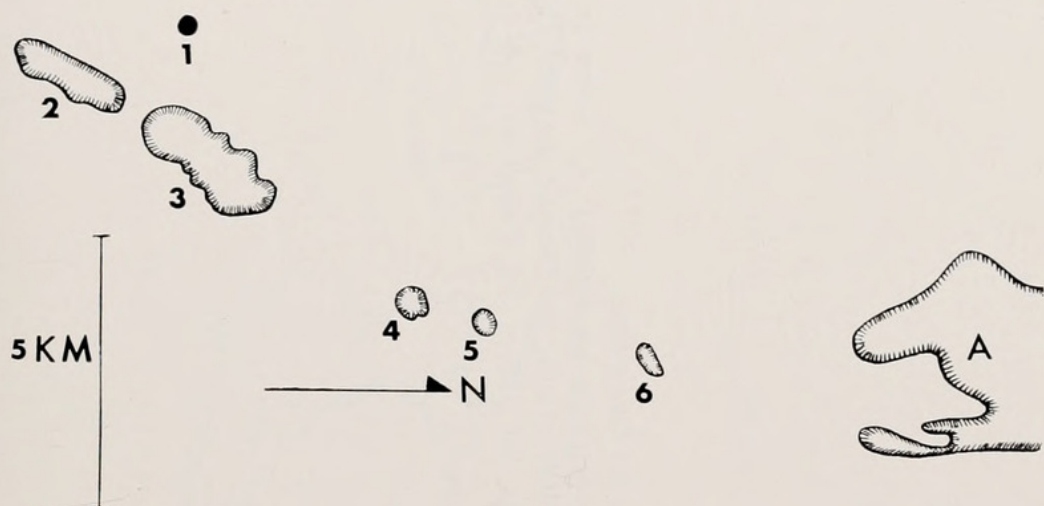
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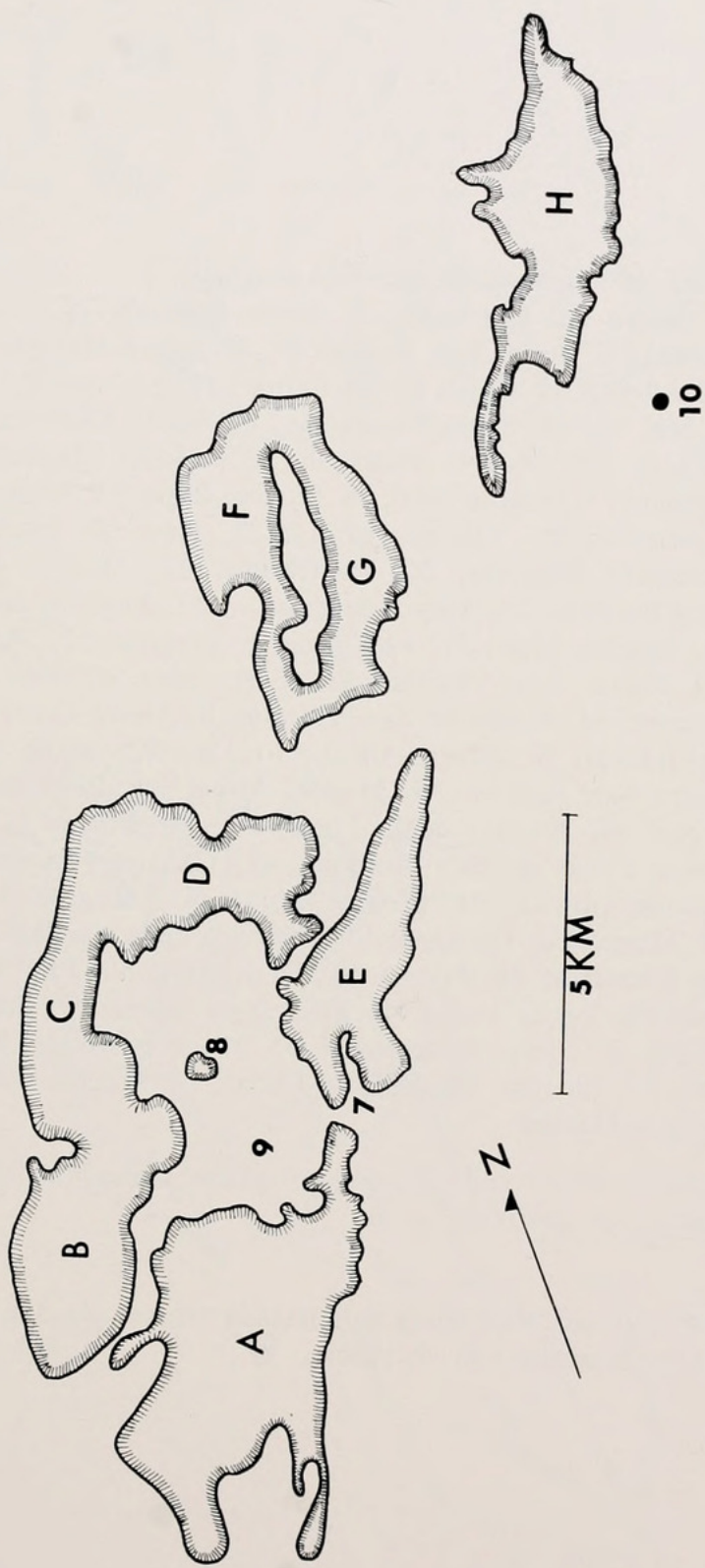
Map 2. Sierra Paso Real to Sierra San Carlos.¹

1, Guane (town); 2, Sierra Paso Real; 3, Sierra de Guane;
4, Los Portales; 5, La Muralla; 6, Tenería.
A. Sierra San Carlos.

¹ Maps 2 to 5 were redrawn from those given by Torre and Bartsch (1938) and the military (topographic) maps of Cuba (1933-1934).

Map 3. Sierra de San Carlos to Sierra del Quemado.

A, Sierra de San Carlos. B, Sierra de los Acostas. C, Sierra de Francisco. D, Sierra Resolladero. E, Sierra Sumidero; 7, La Estrechura; 8, Mogote Central; 9, Potrero de Luis Lazo. F, Sierra Gramales. G, Sierra Cabezas. H, Sierra del Quemado; 10, Isabel María (town).



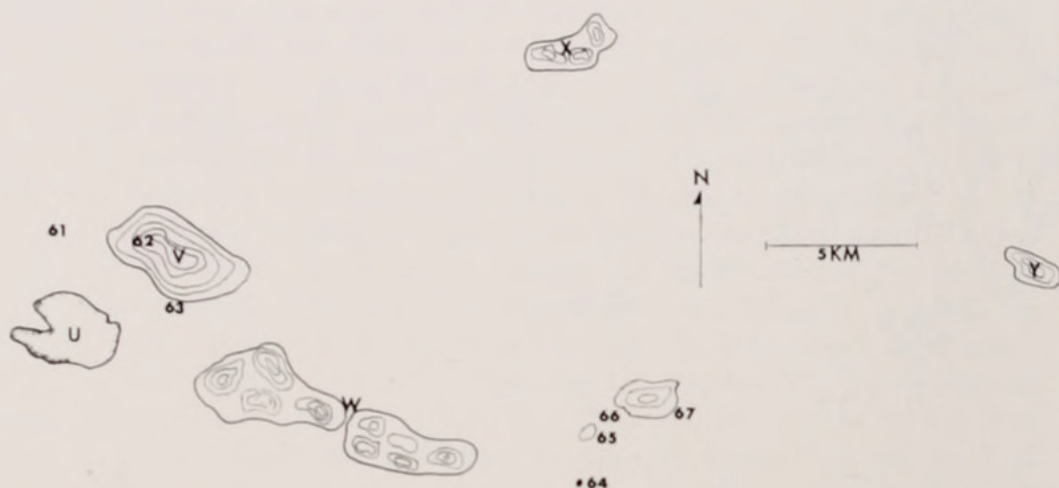
Map 4. Sierra del Quemado to Sierra Guacamaya.

H, Sierra del Quemado. I, Sierra Celadas; 11, Santo Tomás (town). J, Sierra Pan de Azúcar. K, Sierra Martillo. L, Sierra del Infierno; 12, Cayos de San Felipe¹; 13, El Guamá; 14, Mogotes de Km 14. M, Sierra Penitencia. N, Sierra El Abra. O, Sierra Viñales; 24, Mogote Palmarito; 25, Hoyo Magdalena. P, El Queque; 17, Mogote Vigil; 18, Mogote Rojas; 19, Abascal; 20, Dos Hermanos; 21, Viñales (town); 22, Hoyo de los Santos; 23, Ensenada Miranda; 26, Puertecites; 27, Mogote Capón. Q, La Chorrera; 28, Hoyo de Jaruca; 29, Laguna de la Piedra; 30, Mogote Jutía; 31, Fogón de los Negros; 32, West ridge of the Sierra San Vicente; 33, East ridge of the Sierra San Vicente; 34, Baños de San Vicente. R, Sierra Galeras; 15, Pan de Azúcar. S, Sierra Ancón; 61, San Cayetano (town). T, Sierra San Andrés; 35, Mogote Mina; 36, Rinconada; 37, La Jagua; 38, Asiento de la Jagua; 39, Mogote de la Jagua; 40, Hoyo Corto de San Antonio; 41, Canalete (town); 42, San Andrés (town); 43, Mogote Fonte; 44, Mogote de Canalete; 45, Mogotes de Canalete; 46, Ensenada de la Ayúa; 47, Pasada de las Escaleras; 48, Puerto de San Andrés; 50, Pico Grande; 51, Colmillo de la Vieja; 53, Sitio de la Sierra; 54, Mogote Bella María. U, Sierra Gaucamaya; 55, Mogote Grande; 56, Caiguanabo; 57, Pinalito; 58, Mogote Largo; 59, Mogote Angelena; 60, Mogote Mamey.

Localities numbered 49 and 52 represent place names that could not be located on any maps available to us.

¹ Not to be confused with the small islands "Cayos de San Felipe" off the northwest coast of the Isla de Pinos.





Map 5. Sierra Guacamaya to Sierra Rangel.

U, Sierra Guacamaya. V, Sierra Galalón; 61, Caracoles; 62, Mogote Colmena de Piedra; 63, Los Portales. W, Sierra La Güira; 64, San Diego de los Baños (town); 65, Los Cayitos de Catalina; 66, Mogote Bosque; 67, La Cumbre. X, Pan de Guajaibón. Y, Sierra Rangel.

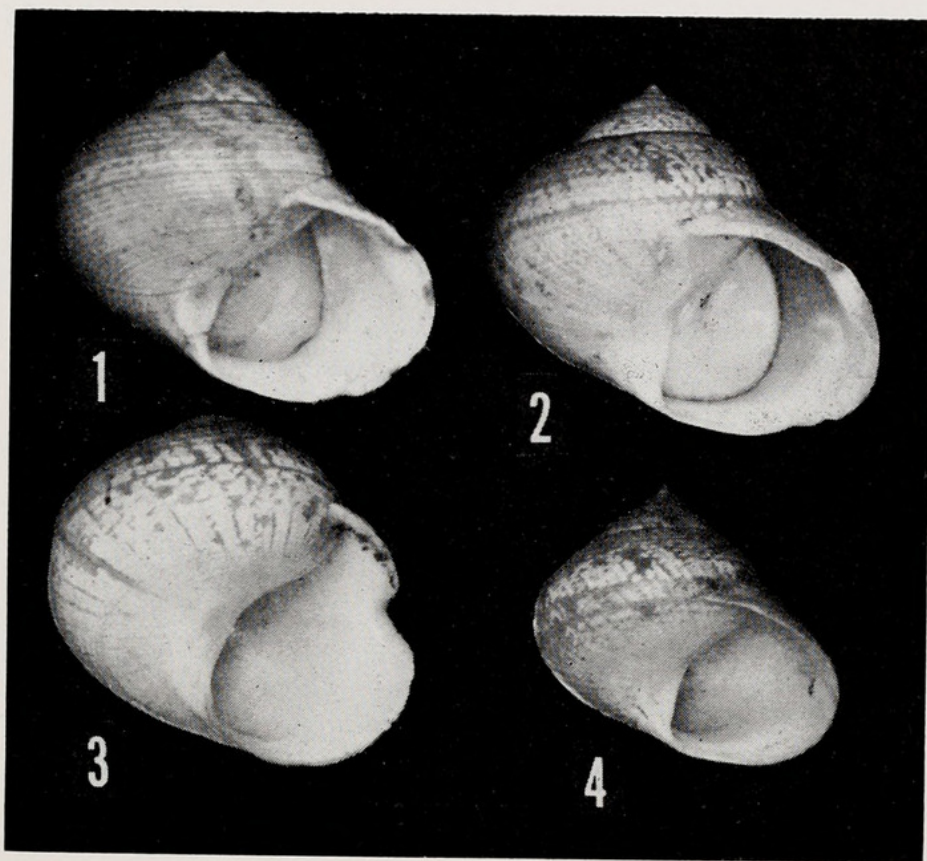


PLATE 2

Viana regina regina (Morelet)

FIG. 1. Pan de Guajaibón, Consolación del Norte, Pinar del Río (para-type, MCZ 146706 ♀).

FIGS. 2, 3. Pico Grande, Sierra de San Andrés, Consolación del Norte, Pinar del Río (MCZ 256282 ♂).

FIG. 4. La Catalina, San Diego de los Baños, Consolación del Sur, Pinar del Río (MCZ 126684 ♀) (all 2 X).

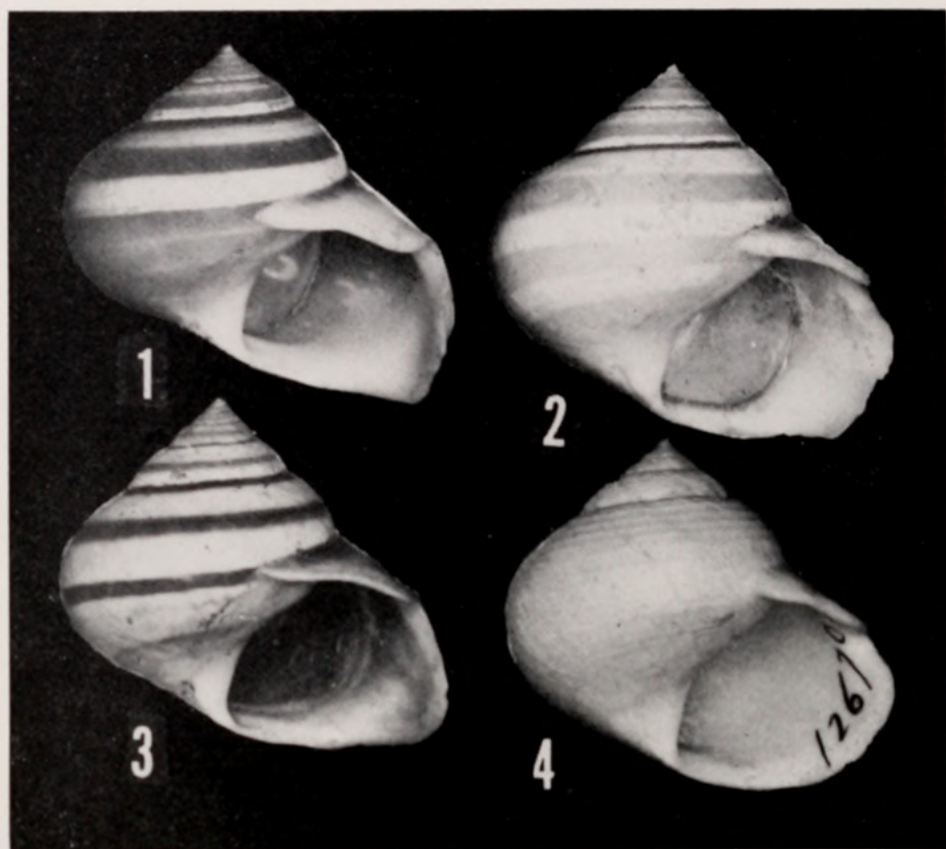


PLATE 3

Viana regina laevigata (Pfeiffer)

FIGS. 1, 2. Cayos de San Felipe, Viñales, Pinar del Río (Topotypes, MCZ 126716 ♂).

FIG. 3. Sierra Celadas, Viñales, Pinar del Río (MCZ 256173 ♂).

FIG. 4. Pan de Azúcar, Viñales, Pinar del Río (MCZ 126703 ♂) (all 2 X).

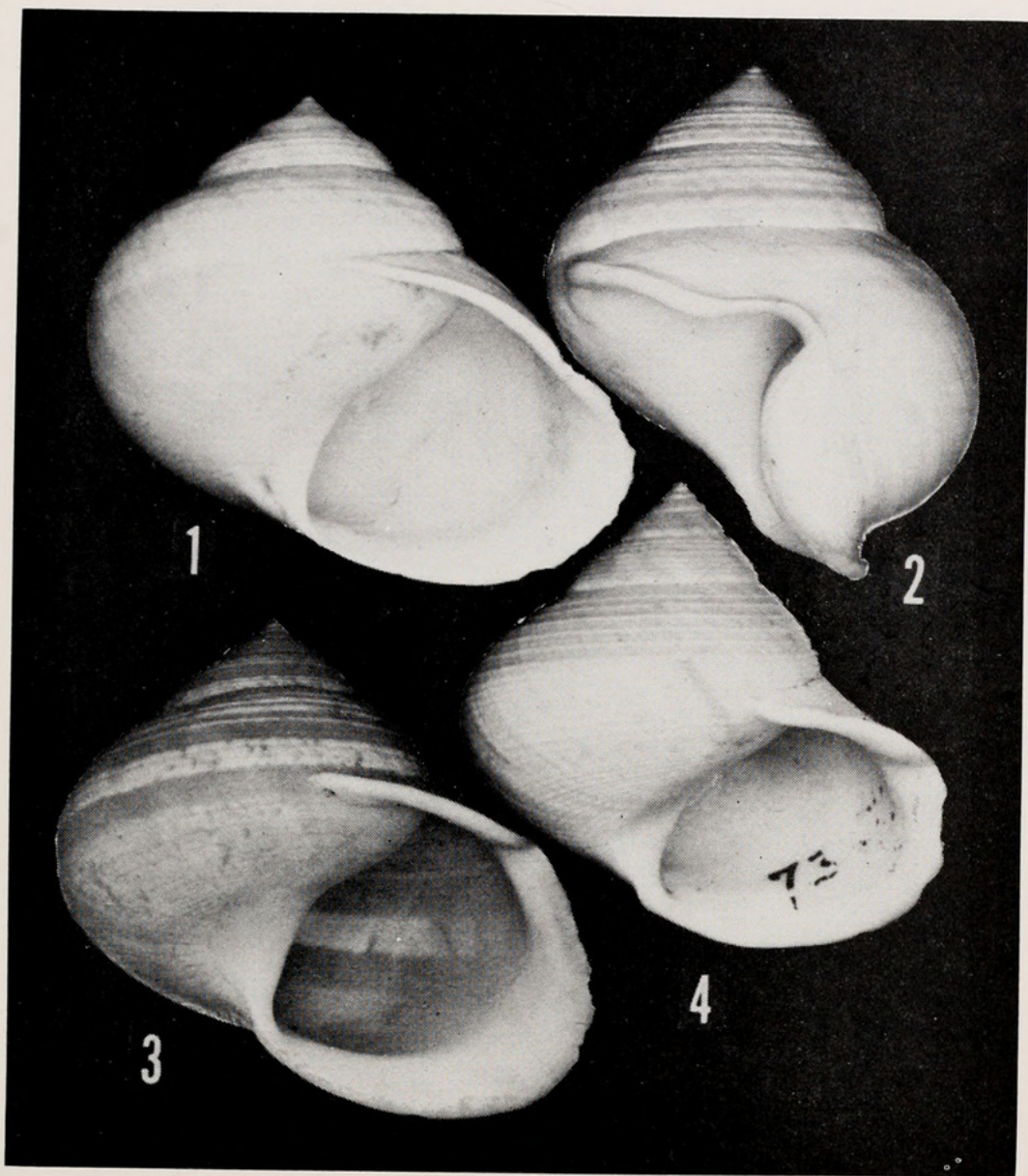


PLATE 4

Viana regina subunguiculata (Poey)

FIG. 1. Sierra Celadas, Santo Tomás, Viñales, Pinar del Río (MCZ 256342 ♂).

FIG. 2. Sierra Celadas, Santo Tomás, Viñales, Pinar del Río (MCZ 256342 ♂), to show the outer peristome notch in the male.

FIG. 3. Valle San Carlos, Luis Lazo, San Juan y Martínez, Pinar del Río (MCZ 256335 ♂).

FIG. 4. Sierra de Guane, Guane, Pinar del Río (Lectotype MCZ 73672 ♂) (all 2 X).



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