

The genus *Chondropometes* (Littorinoidea: Annulariidae) from the western karstic hills of Cuba

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ABSTRACT The named taxa of *Chondropometes* land snails from western Cuba Annulariidae are reviewed and illustrated. Following a discussion of the taxonomic work to date and the morphology, distribution and ecology of these land snails, the authors make suggestions for future work based upon shell morphological features and geographic isolation of various populations.

KEYWORDS Mollusca, *Chondropometes*, land snails, Cuba, karst

INTRODUCTION

Taxonomic background 1920-2006.

In 1863 Ludwig Pfeiffer published the description of *Chondropoma vignalense* based on specimens sent by Charles Wright. This description was part of the series of papers titled “Zur Molluskenfauna von Cuba” printed under the famous Malakozoologische Blätter from Cassel in Germany. *C. vignalense* was placed in the family in the late 19th century, and later became the type species for the genus *Chondropometes*.

The Annulariidae family or “New World Cyclostomoid mollusks” was established by John B. Henderson and Paul Bartsch in 1920. The keys and grouping to the genera and subgenera were based mainly on external morphological characteristics of the shells. They wrote:

“To further refine the classification we have created a generous number of subgenera based almost wholly upon shell characters, using especially the “breathing apparatus” and the

sculptural features in their various combinations. A final division under the subgenera carrying the classification to its ultimate rational end has been adopted by designating specific groupings wherever obvious similarity in form has made such assemblages useful for systematic study. Among the numerous shell characters employed in our classification we have considered the most important the presence or absence of punctures or slits within or on the edge of the aperture, and when present, the nature of such devices for enabling the animal to obtain air when the operculum is withdrawn or seals the aperture. This character we believe to be of less taxonomic value than that of the opercula but of paramount importance among the shell characters. Among the Annulariidae we have found no important radular differences and no range in nuclear characters worthy of note. A sufficiently large number of species from the different genera have already been described anatomically, or observed by ourselves, to warrant our belief that no fundamental anatomical differences exist within the scope of the entire family. The length of the proboscis seems to be merely relative. The division of the

foot by a longitudinal groove into two independently functioning muscular masses is always present, but the peculiar method of progression caused thereby is merely exaggerated in those species where the foot is short and less apparent when the foot is longer” (Henderson & Bartsch, 1920).

Chondropometes was defined to be a turbinate shell with spiral sculpture not confined to the umbilicus, and *Chondrothyroma* was distinguished as a turbinate shell with a spiral sculpture absent except in the umbilicus. Both taxa were placed as subgenera inside the subfamily Chondropominae, and related to the genera *Chondropoma* (Pfeiffer, 1847) and *Chondrothyra* (Henderson & Bartsch, 1920). In fact, Henderson and Bartsch created different groups of taxa inside the Annulariidae based on the diversity of operculum structures, and the “flat proteinaceous “chondroid” operculums with little or no secondary calcification” which were placed in Chondropomatinae (Watters, 2006).

The genus *Chondropometes* was described as: “Shell of turbinate form, openly umbilicated, marked by axial and spiral threads. Operculum typically chondropomoid with the nucleus sub central”. Pfeiffer, incorrectly identifies Gundlach as the collector of the type species of the subgenus-*Chondropoma*, *C. vignalensis* specimens, when in fact it was Wright as it appears on the original publication. (Henderson & Bartsch 1920; Watters, 2006.)

The genus *Chondrothyroma* was described as: “Shell turbinate, openly umbilicated, marked by axial ribs only, excepting the umbilical wall, which shows strong spiral threads. The breathing pore is on the parietal wall, a little behind the broadly expanded peristome, close to the posterior angle of the aperture. Operculum typically Chondropomoid with subcentral

nucleus”. The type species of the subgenus-*Cyclostoma*, is *C. sagebieni* (Poey, 1857).

In 1938, the Cuban malacologist Carlos de la Torre together with Paul Bartsch published a volume dedicated to the landshells of the subfamily Chondropominae; Henderson died in 1923 leaving their project unfinished. In their work, they reinforced the idea that *Chondropometes* and *Chondrothyroma* subgenera were different based essentially on the presence or absence of the breathing device on those turbinate shells, which in the second subgenus was considered not a slit but a puncture. However, both taxa were placed under the genus *Chondropometes* referring to the type species as from Wright in Pfeiffer (1863) rather than as from Gundlach. The realignment of the subgenera was mainly based on the discovery of species without a breathing pore: *C. (Chondrothyroma) scopulorum perplexum* and *C. (Chondropometes) magnum magnum*.

The genus *Chondropometes* was then described as: “Shell of turbinate form, openly umbilicated, marked by axial and spiral threads. Lip simple or double. Breathing pore present or absent. Operculum subcircular, multispiral with the inner part of the whorls covered with a heavy calcareous callouslike deposit”.

In 1942, Torre and Bartsch still maintained their systematic arrangement for the genus *Chondropometes*. However, in 1949 Morris K. Jacobson published a short note on the three subspecies of *Chondropometes magnum* criticizing the validity of the distinguishing criteria used by de la Torre and Bartsch to divide them, questioning the “adnateness or soluteness of the last whorl” given by those authors as an appropriate diagnostic characteristic. Two years later in 1951, Mario Sánchez-Roig published the last two *Chondropometes* subspecies: *Chondropometes*

torrei colmenaris, and *Chondropometes segregatum palmae*.

For fifty five years there have been no publications on *Chondropometes* taxonomy; with only a few mentions of terrestrial mollusk inventories from Pinar del Rio province localities (*i.e.* Espinosa, 2004). In 2006, G. Thomas Watters published a huge work revising the Annulariidae higher taxa and cataloging all the Caribbean taxa previously described for that family, without recognizing the two subgenera previously assigned to the genus. Watters added to the former generic description of *Chondropometes* that “*the lip can be either narrow or expanded, and that the axial sculpture may become lamellate.*”

Shell Features, Distribution and Ecology.

The distribution of the genus is restricted to Sierra de los Órganos, the western section of the Guaniguanico mountain range. From Guane to Sierra de la Güira is by far the richest region of Annulariidae endemics (Watters, 2006) where various species are found in several localities. The distribution of species from both subgenera seem to overlap only in the area encompassed by Sierra Guacamayas, Sierra de Galalón and Sierra de San Andrés, all of which are in Consolación del Norte. Fontenla and López wrote about the biogeography of the genus, providing some insights into the distribution of these snails. (Fontenla & López, 2007)

Sexual dimorphism is apparent in the species of *Chondropometes* and can be seen in a wide array of rib sculptures, which can be significant or just feeble, covering entire or part of the opened coiling shells. Decollation, or apex rupture, commonly occurs in *Chondropometes* species, but explanations of this distinctive character are still speculative. The apex can display grain structures and lips can be

expanded in some species more than others. (Watters, 2006)

As a general rule, *Chondropometes* species are entirely calciphiles and more often found in shady or humid places than sunny cliffs. Many species are found while aestivating; hanging on their mucus threads, in dark crevices, cavern thresholds or caves with low light.



Figure 1. *Chondropometes magnum magnum* hanging from its own thread while aestivating. “Hoyo de los Helechos” (Fern’s Hole), from San Carlos Valley area.

Chondropometes species such as *vignalense* and *torrei* have many infraspecific taxa based mainly on color differences and geographic ranges. These criteria do not always hold up under scrutiny. For example, *C. v.*

bruneocinctum and *C. v. venerabile* morphs on Queque (spongy rock) are extremely close, and there simply is not enough morphological difference to support subspecific splitting.

In Viñales, there are several color morphs were given various *C. vignalensis* subspecies names, which is a similar situation to *C. torrei ssp.* over numerous expanses of its distribution range (Lajonchere, 2013). The same source cited noted consistency for *C. vignalensis* on its smaller shell size, sculpture features and creamy base coloration in the ranges west of Sierra del Infierno hills, and noted larger shells with a wide range of color morphs eastward. As is generally the case with any *Chondropometes* species, the specimens occurring on small mogotes are smaller than the ones occurring at higher altitudes and in larger Sierra areas. Smaller and higher spire shells were found by the senior author in Pico Grande and Colmillo de la Vieja, East San Andres hills system, while in the west portion of the main range, larger specimens showing more color morphs were found. Additionally, one can find a “*flammlabre*” typical peristome coloration in *minaense* locality where it was believed to harbor only “pale yellow peristome shells”.

Chondropometes latilabre can be found displaying many different color morphs in the same locality that perhaps was the reason why those morphs weren’t described as different subspecies. Curiously, Torre & Bartsch didn’t mention all the color range of *latilabre* or the scarce banding present in darker morphs.

Other taxa such as *C. scopulorum* seem to be more supported by geographic distance. For example, *C. s. cumbrense* actually inhabits Sierra del Rosario, east of San Diego River.

Most of the *C. concolor* subspecies are similar and smaller in size as a general rule because

they occur in small mogote formations very near to each other (the larger taxa is *C. c. concolor* which inhabits the Pico Chico range). It is the author’s opinion that the geographic distance and phenotypic variation didn’t support that many species in the area. The sculpture and operculum of *C. exquisitum* is the most similar to *C. concolor*, which perhaps is a sister species, alternatively *C. concolor* may be a subspecies of *C. exquisitum*.

Despite Jacobson’s assumption in 1949, *C. magnum signae* could represent a valid subspecies because it inhabits a different geographic range (the Cabezas hills) in addition to having dissimilar shell features from the other subspecies.

C. sagebieni sagebieni and *C. s. portalesense* are also separated geographically, and it is possible that the other northern and southern subspecies under *sagebieni* are just smaller in size due to living on small isolated mogotes.

A similar scenario of minor variations occurs with *C. sacharinum* subspecies, which occur on a continuous mountain range from Sierra de Pan de Azúcar (*C. s. sacharinum*) to Sierra del Martillo (*C. s. rubicollum*).

The nucleus area for *C. segregatum* are very close geographically (Hoyo del Guama, Kilómetro 14 and Cayos de San Felipe), with very similar shells and are considered the largest of the species. Populations from Herradura and south Mogote of Pico Chico are smaller in size, however it could be concluded that they belong to the same species. It appears from the geographic distances and proximity of the localities that there are only two subspecies.

An anti-predator strategy mentioned for these annularids is hanging from mucus threads. (González-Guillén, 2008) Abraham S. H.

Breure collected data and photographs from some authors (including field observations and photographs by González-Guillén), and wrote about malacophagy and dangling snails mentioning among those annularids the genus *Chondropometes* (Breure, 2011).

CONCLUSIONS

The subspecies of *Chondropometes* predominantly described by Torre and Bartsch are based on shell features and topographic data, which are dubious or unreliable. Nevertheless, the staggering amount of work done by these authors in compiling all the known Cuban Annulariidae is something that no other malacologist since has replicated, and is an invaluable source of information about incipient speciation processes. (Watters, 2006). Shell size and coloration is not sufficient alone to name taxa of sympatric populations of these snails, and separate taxa should be based upon stronger criteria and must include both morphological features as well as geographic isolation.

In-print Taxa 1842-1951.

Family: **Annulariidae** (Henderson & Bartsch, 1920)

Subfamily: **Chondropomatinae** (Henderson & Bartsch, 1920)

Genus: ***Chondropometes*** (Henderson & Bartsch, 1920)

Distribution: Sierra de los Órganos, Guaniguanico mountain range, Pinar del Río province.

Subgenus: ***Chondropometes*** (Henderson & Bartsch, 1920)

Species (denoted hereinafter by “•”):

• ***latilabre*** (d’Orbigny, 1842) (Figure 4F)

Distribution: From San Juan de Sagua at the Western end of Pan de Guajabón, to the middle of its northern slope.



Figure 2. Live specimen of *C. latilabre* from Pan de Guajabón.

• ***torrei*** (Bartsch, 1937)

Subspecies:

Chondropometes torrei torrei (Bartsch, 1937)

Distribution: Abra de Bejarano, Mogote Canalete, sur de la Sierra de San Andrés, Consolación del Norte. (Figure 5H)

Chondropometes torrei affine (Torre & Bartsch, 1938)

Distribution: Second Mogote south of the west end of Sierra de Guacamayas, Consolación del Norte.

Chondropometes torrei alveare (Torre & Bartsch, 1938)

Distribution: Mogote Colmena de Piedra, southwest of Sierra Galalón, Consolación del Norte.

Chondropometes torrei antonitense (Torre & Bartsch, 1938)

Distribution: Hoyo Corto de San Antonio, southwest of Sierra de San Andrés, Consolación del Norte.

Chondropometes torrei antoniense (Torre & Bartsch, 1938)

Distribution: Mogote de la Jagua, La Palma, Consolación del Norte.

Chondropometes torrei cingulatum (Torre & Bartsch, 1938) (Figure 5I)

Distribution: Ensenada de la Ayúa and Ensenada del Zumbido, Sierra de San Andrés, Consolación del Norte.

Chondropometes torrei collumelare (Torre & Bartsch, 1938) (Figure 6A)

Distribution: Colmillo de la Vieja, northeast side of Sierra Guacamayas, Consolación del Norte.

Chondropometes torrei colmenaris (Sánchez Roig, 1951)

Distribution: Colmena de Piedra, east of Hoyo Negro, southwest Galalón, Consolación del Norte.

Chondropometes torrei flammilabre (Torre & Bartsch, 1938) (Figure 5D)

Distribution: From Pico Grande to west of Ensenada del Zumbido, Sierra de San Andrés, Consolación del Norte.

Chondropometes torrei flavidum (Torre & Bartsch, 1938) (Figure 5F)

Distribution: Mogote located on the southeast end of Sierra Guacamayas and Mogote Largo, to the south of this, Consolación del Norte.

Chondropometes torrei gratiosum (Torre & Bartsch, 1938) (Figure 5G)

Distribution: Pinalito, southwestern part of Sierra de Galalón, Consolación del Norte.

Chondropometes torrei iosaturatum (Torre & Bartsch, 1938)

Distribution: Sitio de la Sierra de San Andrés, northeast San Andrés hills, Consolación del Norte.

Chondropometes torrei jaguaense (Torre & Bartsch, 1938)

Distribution: La Jagua, La Palma, Consolación del Norte.

Chondropometes torrei luteilabre (Torre & Bartsch, 1938)

Distribution: Puerto de San Andrés, extreme eastern end of Sierra de San Andrés, Consolación del Norte.

Chondropometes torrei minaense (Torre & Bartsch, 1938)

Distribution: Mogote de la Mina, extreme western of San Andrés hills, Consolación del Norte.

Chondropometes torrei pallidulum (Torre & Bartsch, 1938)

Distribution: Mogote Largo, which is the second Mogote southwest of Pico Chico, in Sierra Guacamayas, Consolación del Norte.

Chondropometes torrei rinconadense (Torre & Bartsch, 1938)

Distribution: Mogote Rinconada, close to east of Mogote de la Mina, Consolación del Norte.

• ***vignalense*** (Wright *in* Pfeiffer, 1863)

Subspecies:

Chondropometes vignalense vignalense (Wright *in* Pfeiffer, 1863)

Distribution: Southeastern end of Sierra de la Chorrera, Viñales.

Chondropometes vignalense azucarellum (Torre & Bartsch, 1938)

Distribution: Mogote Pan de Azúcar, Minas de Matahambre.

Chondropometes vignalense azucarensis (Torre & Bartsch, 1938)

Distribution: Pan de Azúcar, Minas de Matahambre [it should be Sierra de Pan de Azúcar].

Chondropometes vignalense bruneocinctum (Torre & Bartsch, 1938) (Figure 6B)

Distribution: Sierra Tumbadero (also known as El Queque), Viñales.

Chondropometes vignalense caponense (Torre & Bartsch, 1938)

Distribution: Mogote Capón, south of Chorrera, Viñales.

Chondropometes vignalense clappi (Torre & Bartsch, 1938) (Figure 6C)

Distribution: North end of Sierra de la Chorrera, Viñales.

Chondropometes vignalense celadense (Torre & Bartsch, 1938)

Distribution: Sierra de Celadas, west of Viñales.

Chondropometes vignalense fogonense (Torre & Bartsch, 1938)

Distribution: Mogote Fogón de los Negros, northeastern end of Sierra de la Chorrera, Viñales.

Chondropometes vignalense ignicolor (Torre & Bartsch, 1938)

Distribution: Hoyo Magdalena in Costanera de San Vicente, north Viñales.

Chondropometes vignalense infernale (Torre & Bartsch, 1938)

Distribution: Sitio del Infierno, southwest Viñales.

Chondropometes vignalense jarucense (Torre & Bartsch, 1938) (Figure 6D)

Distribution: Hoyo de Jaruco, a sink located on the high parts of the east side of Sierra de la Chorrera, Viñales.

Chondropometes vignalense lucifer (Torre & Bartsch, 1938)

Distribution: Sierra del Infierno, Viñales.

Chondropometes vignalense martillense (Torre & Bartsch, 1938)

Distribution: Cueva del Martillo, in the ridge that connects Sierra de Chichones and Sierra de Celadas-Sierra del Infierno, west of Viñales.

Chondropometes vignalense palmaritense (Torre & Bartsch, 1938)

Distribution: Mogote Palmarito, Viñales.

Chondropometes vignalense piadae (Torre & Bartsch, 1938) (Figure 6E)

Distribution: El Ancón, north of Sierra de Viñales.

Chondropometes vignalense poenitentis (Torre & Bartsch, 1938) (Figure 6F)

Distribution: From Mogote Dos Hermanos to Cuajani and from there to La Penitencia, Viñales.

Chondropometes vignalense puertecitense (Torre & Bartsch, 1938) (Figure 6G)

Distribution: Mogote Puertecitas, off the southeast end of Sierra de la Chorrera, Viñales.

Chondropometes vignalense venerabile (Torre & Bartsch, 1938)

Distribution: Hoyo de los Santos in Mogote El Queque, Viñales.

Subgenus ***Chondrothyroma*** (Henderson & Bartsch, 1920)

Species:

• ***bellisimum*** (Torre & Bartsch, 1938)

Distribution: Mogote del Bosque de Galalón.

• ***concolor*** (Torre & Bartsch, 1938)

Subspecies:

Chondropometes concolor concolor (Torre & Bartsch, 1938) (Figure 4B)

Distribution: Lowlands in the eastern part of Sierra Guacamayas, Consolación del Norte.

Chondropometes concolor carnicolor (Torre & Bartsch, 1938)

Distribution: Mogote located south-slightly southeast of Sierra Guacamayas, Consolación del Norte.

Chondropometes concolor fontei (Torre & Bartsch, 1938)

Distribution: Mogote de Fonte, southeast of Sierra Guacamayas, Consolación del Norte.

Chondropometes concolor magister (Torre & Bartsch, 1938)

Distribution: Between Galalón and Caiguanabo, Consolación del Norte.

Chondropometes concolor spe (Torre & Bartsch, 1938)

Distribution: South part of the hills collectively known as Mogotes de Fonte and Finca La Esperanza, southeast of Sierra San Andrés, Consolación del Norte.

- *eximium* (Torre & Bartsch, 1938)

Subspecies:

Chondropometes eximium eximium (Torre & Bartsch, 1938) (Figure 6H)

Distribution: Isabel María, southeast Sierra del Quemado.

Chondropometes eximium angusticulum (Torre & Bartsch, 1938)

Distribution: East side of Sierra de San Carlos, in front of southern end of Sierra de los Acostas.

Chondropometes eximium malleatum (Torre & Bartsch, 1938) (Figure 4D)

Distribution: West side of La Estrechadura, eastern Wall of southern end of Sierra de los Acostas.

- *exquisitum* (Torre & Bartsch, 1938)

Subspecies:

Chondropometes exquisitum exquisitum (Torre & Bartsch, 1938) (Figure 4C)

Distribution: From Sierra la Güira in San Diego de los Baños to Abra de Caiguanabo.

Chondropometes exquisitum cereum (Torre & Bartsch, 1938)

Distribution: East end of Sierra Guacamayas, Consolación del Norte.

Chondropometes exquisitum notatum (Torre & Bartsch, 1938) (Figures 4A, 4E)

Distribution: Near Cueva Oscura del Río Caiguanabo at Los Portales, San Diego de los Baños.

Chondropometes exquisitum punctolineatum (Torre & Bartsch, 1938)

Distribution: Mogote Grande, southwestern end of Sierra Guacamayas, Consolación del Norte.

- *magnum* (Torre & Bartsch, 1938)

Subspecies:

Chondropometes magnum elisabethae (Torre & Bartsch, 1938)

Distribution: Isabel María, northeast of Sumidero.

Chondropometes magnum magnum (Torre & Bartsch, 1938) (Figure 4G)

Distribution: Inner rim of Potrero de Luis Lazo, Sierra de los Acostas, Sierra de San Carlos and Sierra de Sumidero.

Chondropometes magnum signae (Torre & Bartsch, 1938) (Figure 4H)

Distribution: Mogotes east of Cabezas hills vicinity.



Figure 3. Live specimen of *C. magnum magnum* from San Carlos.

- *saccharinum* (Torre & Bartsch, 1938)

Subspecies:

Chondropometes saccharinum saccharinum (Torre & Bartsch, 1938) (Figure 5A)

Distribution: Sierra de Pan de Azúcar, Minas de Matahambre.

Chondropometes saccharinum rubicollum (Torre & Bartsch, 1938)

Distribution: Sierra del Martillo, west Viñales.

- *sagebieni* (Poey, 1858)

Subspecies:

Chondropometes sagebieni sagebieni (Poey, 1858) (Figure 5B)

Distribution: Sierra de Guane.

Chondropometes sagebieni disjunctum (Torre & Bartsch, 1938)

Distribution: Mogote from Punta de la Sierra, north of Guane.

Chondropometes sagebieni mendozense (Torre & Bartsch, 1938)

Distribution: Mendoza (today known as Isabel Rubio), Guane.

Chondropometes sagebieni parvum (Torre & Bartsch, 1938)

Distribution: Tenerife and La Muralla, north of Los Portales, Guane.

Chondropometes sagebieni portalesense (Torre & Bartsch, 1938)

Distribution: Los Portales, Guane.

• ***scopulorum*** (Torre & Bartsch, 1938)

Subspecies:

Chondropometes scopulorum scopulorum (Torre & Bartsch, 1938)

Distribution: Southern part of Sierra de la Güira, San Diego de los Baños.

Chondropometes scopulorum cumbrense (Torre & Bartsch, 1938)

Distribution: south side of the west end of Sierra La Cumbre, San Diego de los Baños.

Chondropometes scopulorum perplexum (Torre & Bartsch, 1938)

Distribution: Mogote Colorado, on the east side of San Diego River, near San Diego de los Baños.

• ***segregatum*** (Torre & Bartsch, 1938)

Subspecies:

Chondropometes segregatum segregatum (Torre & Bartsch, 1938) (Figure 5C)

Distribution: Mogote east side of Kilómetro 14, between Pinar del Río and Viñales.

Chondropometes segregatum arangoi (Torre & Bartsch, 1938)

Distribution: Hoyo de Guamá, south Viñales.

Chondropometes segregatum felipense (Torre & Bartsch, 1938)

Distribution: Small Mogote ½ west of Kilómetro 14, also seems to inhabit on Cayos de San Felipe, south of Viñales.

Chondropometes segregatum lagunitasense (Torre & Bartsch, 1938)

Distribution: Las Lagunitas (we think is located on San Juan and Martínez vicinity).

Chondropometes segregatum laureani (Torre & Bartsch, 1938)

Distribution: Mogote de la Caja, west of Pinar del Río city.

Chondropometes segregatum mameyi (Torre & Bartsch, 1938)

Distribution: Mogote Mamey, the northern one of the two large limestone peaks off southwestern end of Sierra Guacamayas, Consolación del Norte.

Chondropometes segregatum palmae (Sánchez Roig, 1951)

Distribution: La Palma in Sumidero, Consolación del Norte.

Chondropometes segregatum sporadicum (Torre & Bartsch, 1938) (Figure 5E)

Distribution: Mogote de Quilla, Finca El Descanso, Entronque Herradura.

Chondropometes segregatum vallei (Torre & Bartsch, 1938)

Distribution: Tall Mogote located southwest of Kilómetro 14, between Pinar del Río city and Viñales area.

Important note on the taxa distribution areas given by Torre & Bartsch:

The true Sierra Guacamayas geographically speaking is on the southern face of Sierra de San Andrés. The area that Torre and Bartsch called “Guacamayas” in their book is in fact what is known today as Sierra de Pico Chico in Consolación del Norte.

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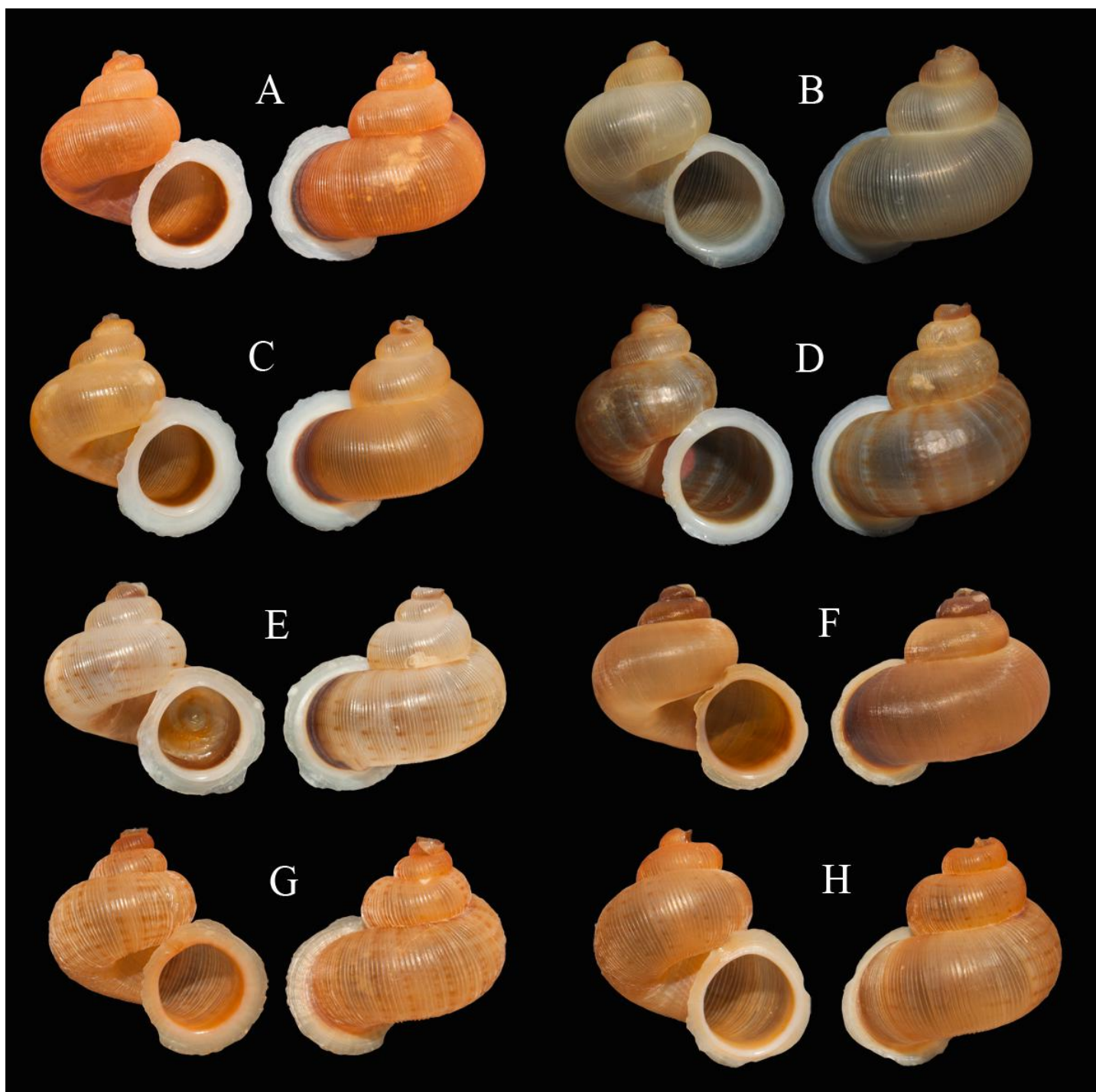


Figure 4. *Chondropometes* species. **A** = *C. exquisitum* cf. *notatum* (orange morph), NE Sierra de la Güira; **B** = *C. concolor concolor* E. Pico Chico ; **C** = *C. exquisitum exquisitum*, Pico Chino; **D** = *C. eximium malleatum*, La Estrechura in Luis Lazo; **E** = *C. exquisitum notatum*, Los Portales, W Sierra de la Güira; **F** = *C. latilabre* (brown morph), W. Pan de Guajabón; **G** = *C. magnum magnum*, San Carlos; **H** = *C. magnum signae*, Mogote de Cabezas.

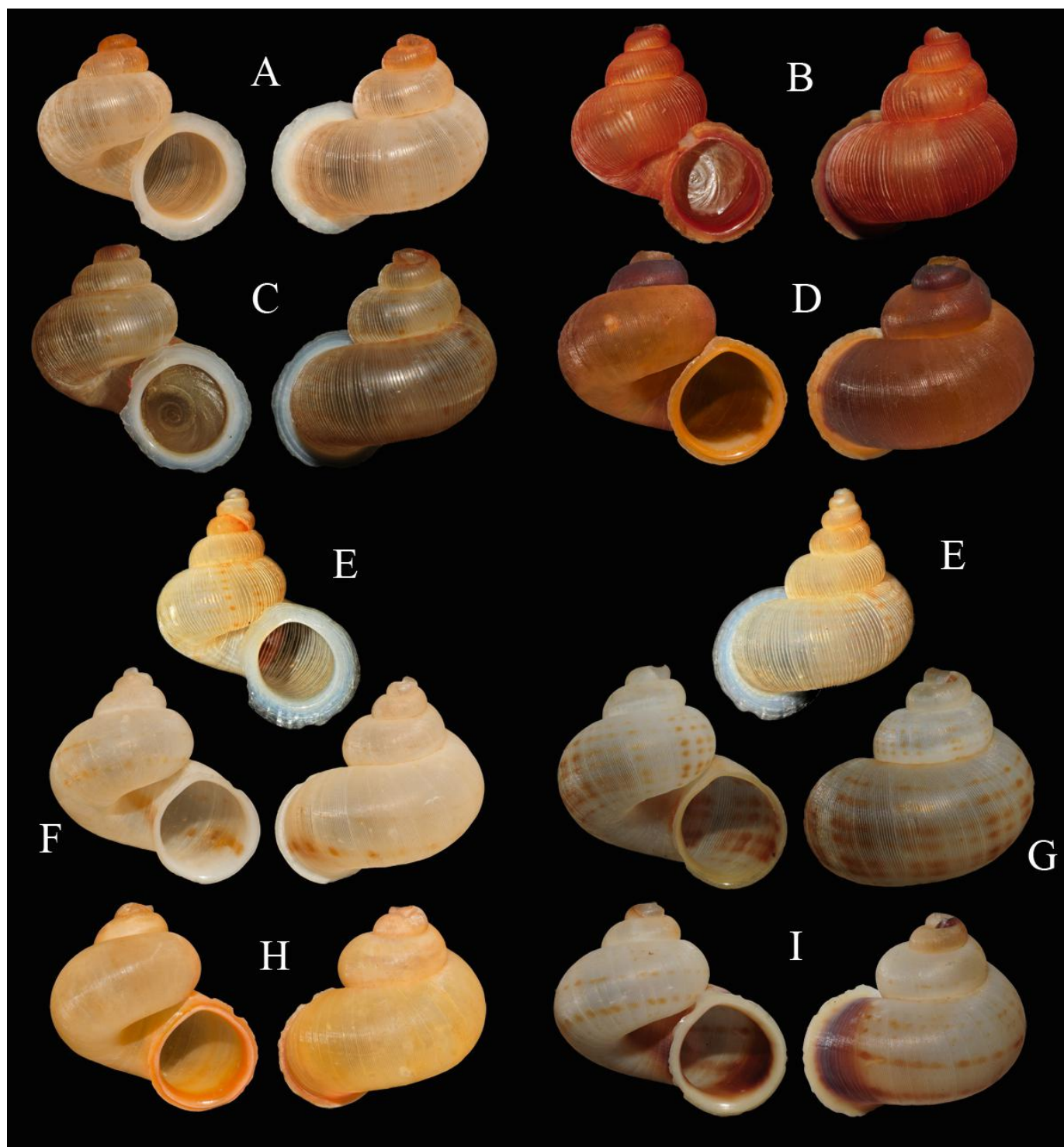


Figure 5. *Chondropometes* species. **A** = *C. saccharinum saccharinum*, Sierra de Pan de Azúcar; **B** = *C. sagebieni sagebieni*, Sierra de Guane; **C** = *C. segregatum segregatum*, Hoyo del Guamá; **D** = *C. torrei flammilabre*, Pico Grande; **E** = *C. segregatum sporadicum*, Mogote de Quilla; **F** = *C. torrei flavidum*, S. Pico Chico; **G** = *C. torrei gratiosum*, between Pico Chico and Galalón; **H** = *C. torrei torrei*, Canalete, S. San Andrés; **I** = *C. torrei cingulatum*, Ensenada de la Ayúa, San Andrés.

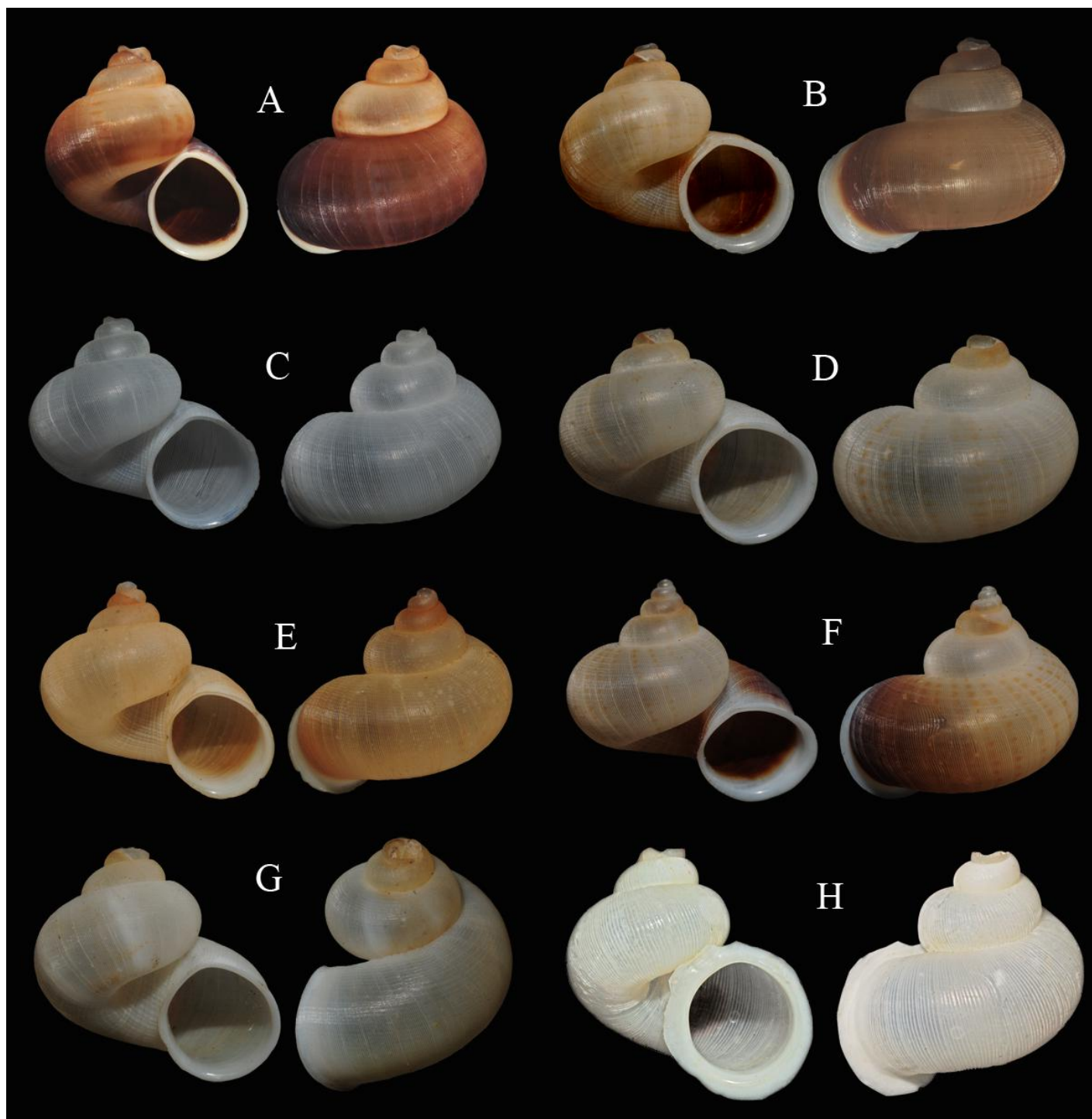


Figure 6. *Chondropometes* species. **A** = *C. torrei collumelare*, NE Sierra de las Guacamayas; **B** = *C. vignalense brunneocinctum*, Sierra de Tumbadero (Queque), Viñales; **C** = *C. vignalense clappi*, N Sierra de la Chorrera, Viñales; **D** = *C. vignalense jarucense*, Hoyo de Jaruco, Sierra de la Chorrera, Viñales; **E** = *C. vignalense piadae*, Palmarito, Viñales; **F** = *C. vignalense poenitensis*, Sierra de la Penitencia, Viñales; **G** = *C. vignalense puertecitense*, Mogote Puertecitas, Viñales; **H** = *C. eximium eximium*, Sur de Sa Acostas.