THE NAUTILUS 101(2):80–85, 1987

Transfer of *Cerithiopsis crystallina* Dall to the Genus *Varicopeza* Gründel, Family Cerithiidae (Prosobranchia: Gastropoda)

Richard S. Houbrick
Department of Invertebrate Zoology
National Museum of Natural History
Smithsonian Institution
Washington, DC 20560, USA

ABSTRACT

The small cerithiid, formerly known as *Cerithiopsis crystallina* Dall, is transferred from the family Cerithiopsidae to the family Cerithiidae, genus *Varicopeza*, on the basis of conchological, radular, and anatomical characters. *Varicopeza crystallina* is the first Atlantic species of a previously monotypic, Indo-Pacific genus. It has an extensive, offshore, geographic distribution throughout the Antilles, Florida, and the Gulf of Mexico.

Key words: Prosobranchia; Cerithiidae; *Cerithiopsis*; *Varicopeza*; systematics; Caribbean.

INTRODUCTION

Examination of numerous lots of a small enigmatic cerithiid-like prosobranch, given the specific name *crystallina* and assigned by Dall (1881:89) with a query to the genus *Cerithiopsis* Forbes and Hanley, 1851, has prompted this paper. "*Cerithiopsis*" *crystallina* Dall, 1881 has been dredged in numerous localities throughout the Antilles, off Florida, and in the Gulf of Mexico. Although common in some museum collections, it is not a well-known species and rarely listed in popular shell books. Dall (1881:89), although initially uncertain of the generic assignment of this species, later (1889:254) allocated it to *Cerithiopsis* with more certitude, and his allocation has been followed by subsequent authors. Despite Dall's (1881:90) final referral of this species to *Cerithiopsis*, he appears to have been uncomfortable with this assignment, as he compared *C. crystallina* with other small dredged cerithiids assigned by Watson (1885) to *Bittium* Gray, 1847. Dall apparently examined some live-collected material, because he described alcohol-preserved animals as having well developed eyes and long tentacles, and a short rounded foot with a circular operculum. He noted that "the opercular lobe appears to have several short processes on each side". To my knowledge, no other published information about this species exists.

A study of conchological features of "*Cerithiopsis*" *crystallina* indicates that this species does not fit the criteria defining *Cerithiopsis* species. Moreover, recent examination of preserved animals and a study of the radula with scanning electron microscopy have provided substantial evidence that *C. crystallina* should not be considered a member of the Cerithiopsidae. The following account presents this evidence and provides a new description and generic assignment.

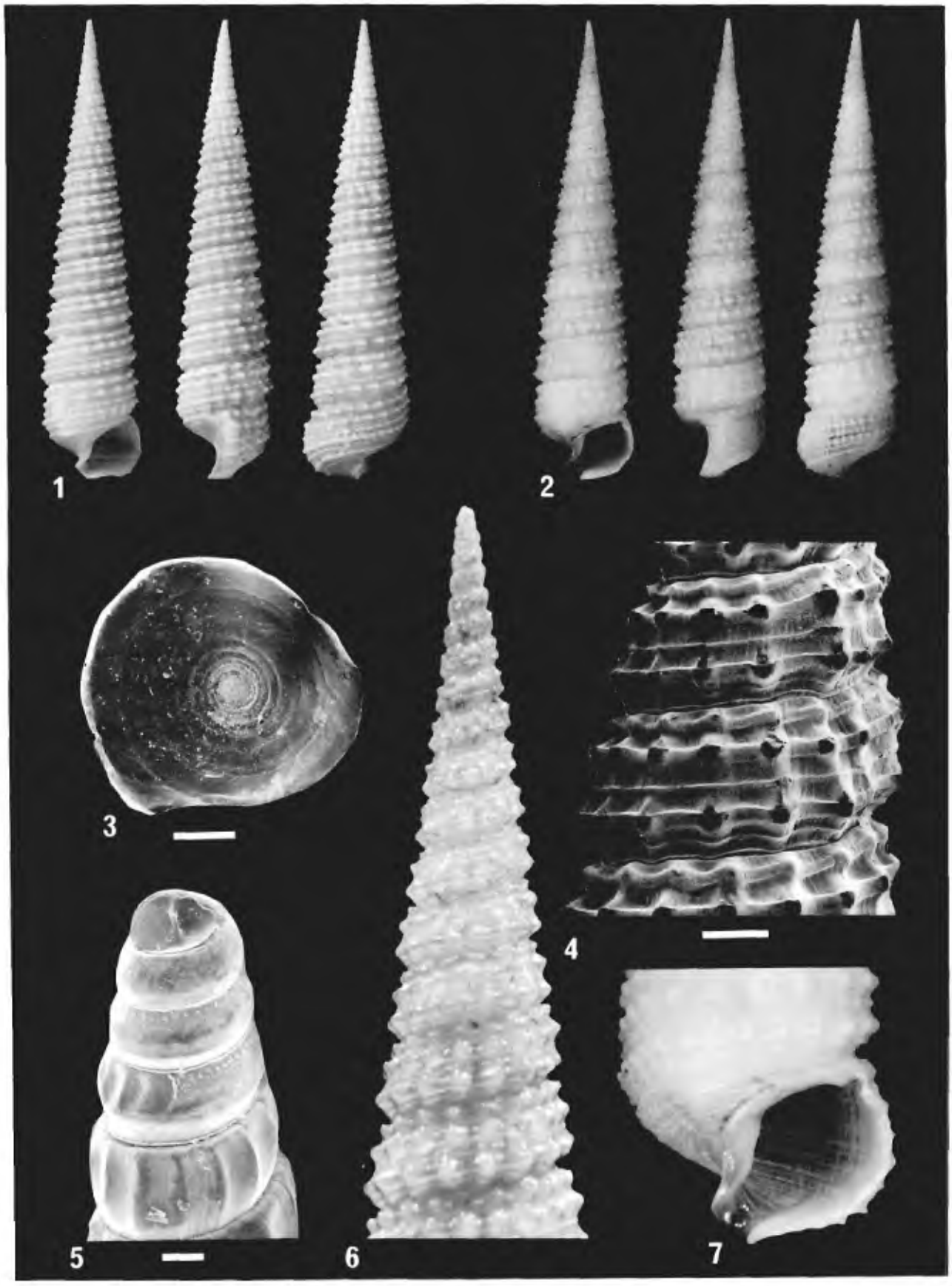
MATERIALS AND METHODS

Preserved specimens from Spanish Wells, Eleuthera, obtained from the gut of the starfish *Astropecten*, were dissected under a binocular dissecting microscope to study the operculum, radula, and anatomy. Scanning electron micrographs (SEM) were made of the radula, operculum, and shell on a Zeiss-Novascan-30 instrument.

The following abbreviations appear in the text: IRCZM, Indian River Coastal Zone Museum, Harbor Branch Oceanographic Institution, Ft. Pierce, Florida; MCZ, Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts; MNHNP, Muséum National

→

Figures 1–7. *Varicopeza crystallina* (Dall). **1.** Dead collected specimen from 116 fm, off St. Lucia (USNM 810888), 14.41 mm. **2.** Live-collected specimen from 85 fm, Gulf of Mexico, between Mississippi delta and Cedar Keys, Florida (USNM 93763), 17.5 mm. **3.** Scanning electron micrograph (SEM) of operculum from specimen off Spanish Wells, Eleuthera, Bahamas (IRCZM 065: 02228), bar = 200 μm. **4.** SEM detail of midwhorl sculpture on specimen from Spanish Wells, Eleuthera, Bahamas (IRCZM 065: 02228), bar = 300 μm. **5.** SEM of protoconch and early whorls of specimen from 100 fm off Barbados (USNM 87295), bar = 80 μm. **6.** Closeup of early and midwhorls showing sculptural details on specimen depicted in figure 2 (USNM 93763). **7.** Detail of body whorl and aperture from specimen depicted in figure 2 (USNM 93763).


1
2
3
4
5
6
7

d'Histoire Naturelle, Paris; USBF, United States Bureau of Fisheries; USNM, United States National Museum, National Museum of Natural History, Smithsonian Institution, Washington, DC.

Records and specimens examined: LESSER ANTILLES, BARBADOS: MCZ 7406, 133 m, RV *Blake*, Sta. 290; MCZ 7394, 182 m, RV *Hassler*, Sta. 1; MCZ 238240, 229 m, West Coast, Barbados; USNM 434158, 434164, 419146, 419147, 419149, 419150, 434167, 434153, 434154, 419148, 430161, 434168, 434159, 434160, 434163, 430162, 810910, 810917, all 150–182 m, RV *Blake*, Sta. 300; GUADELOUPE: USNM 434155, 1,605 m, RV *Blake*, Sta. 14; ST. LUCIA: MCZ 7405, 212 m, RV *Blake*, Sta. 220; USNM 810888, 212 m, RV *Blake*, Sta. 270, 13°50′15″N, 61°03′45″W; MARTINIQUE: MCZ 7404, 715 m, RV *Blake*, Sta. 210; DOMINICA: MCZ 7402, 583 m, Sta. 176; MCZ 7403, 252 m, Sta. 36; ST. CROIX: MCZ 7399, 7400, 7401, 210–453 m, RV *Blake*, Sta. 128, 132, 134, all off St. Croix. GREATER ANTILLES, CUBA: MCZ 7395, 1,472 m, RV *Blake*, Sta. 2, off Morro Light, Havana (holotype); MCZ 7398, 823 m, RV *Blake*, Sta. 51, off Havana; MCZ (no number), 344 m, RV *Blake*, Sta. 5, off Santiago; MCZ (no number), 457 m, RV *Atlantis*, Sta. 3490, off Havana (23°11′N, 81°55′W); USNM 93832, 369 m, RV *Blake*, Sta. 2131, S of Cuba; USNM 94109, 366 m, RV *Blake*, Sta. 2135, S of Cuba; PUERTO RICO: USNM 161327, Aqadilla. BAHAMAS: USNM 87304, 618 m, RV *Blake*, Sta. 2655, Little Bahama Bank; USNM 216670, RV *Albatross*, "Bahamas"; IRCZM 065:02228 472 m, RV *Johnson*, Sta. JSL-11, 24°52.2′N, 77°15.5′W, off Spanish Wells, Eleuthera; IRCZM 065:00892, 256 m, RV *Gerda*, Sta. 638, 26°05′N, 79°12′W, Bimini Banks. FLORIDA: USNM 434151, 219 m, RV *Eolis*, Sta. 330, off Sambo Reef; USNM 516445, 686 m, RV *Eolis*, Tortugas; USNM 419006, 119 m, RV *Eolis*, Sta. 100, Sand Key; USNM 419007, 382 m, *Eolis*, Sta. 340, off Fowley Light; USNM 419014, 174 m, *Eolis*, Sta. 325, off Sand Key; USNM 419010, 155 m, *Eolis*, Sta. 163, off Sand Key; USNM 419012, 165 m, *Eolis*, Sta. 319, off Western Dry Rocks; USNM 419008, 155 m, *Eolis*, Sta. 338, off Sand Key; USNM 419009, 155 m, *Eolis*, Sta. 327, off Sand Key; USNM 434152, 139 m, *Eolis*, Sta. 161, Sand Key; USNM 419011, 143 m, *Eolis*, Sta. 63, off Key West; USNM 419013, 146 m, *Eolis*, Sta. 320, off Western Dry Rocks. GULF OF MEXICO, USA: USNM 323844, 309 m, USBF Sta. 2400, off Cape San Blas, Florida; USNM 323977, 110 m, USBF Sta. 2402, off Cape San Blas, Florida; USNM 87297, 91 m, RV *Blake*, W of Florida; USNM 93998, 309 m, USBF Sta. 2400, between Mississippi Delta and Cedar Key, Florida; USNM 608531, 121 m, 100 mi off Ft. Myers, Florida; USNM 83532, Cedar Keys, Florida; USNM 323834, 309 m, USBF Sta. 2400, off Cape San Blas, Florida; USNM 323906, 203 m, USBF, off Cape San Blas, Florida; USNM 93763, 161 m, US Fish Commission Sta. 2403, between Mississippi Delta and Cedar Keys, Florida; MNHNP, 344–346 m, 28°19′N, 85°44′W; MCZ 145819, 24–35 m, 15–35 mi off Ft. Walton, Florida; MEXICO: USNM 667771, 168 m, Sta. 1253, Campeche Banks, off Yucatan.

RESULTS

Description: Shell small, reaching 19 mm in length and 4 mm in width [length measurements of random sample from throughout geographic range: $\bar{x} = 14.64$; sd = 2.49; range = 10.81–18.04 (n = 13)]. Shell translucent white, turreted, elongated, comprising up to 25 straight-sided whorls (figures 1, 2). Shell sculptured with 3 major, nodulose, spiral cords and 14 axial ribs per whorl (figure 4). Suture deeply impressed. Protoconch-one not seen; protoconch-two large, comprising about 3 whorls (figure 5). Protoconch-two lacking sculpture except for spiral row of minute pustules adjacent to suture and 2 very weak, spiral cords (figure 5). Pronounced sinusigeral notch present. Four to 6 juvenile whorls beneath protoconch sculptured with axial ribs only (figure 5). Subsequent early whorls with 2 beaded spiral cords per whorl that become 3 major spiral cords in later whorls (figure 6). Of these 3, first spiral cord adapical, other 2 cords separated by weaker, less nodulose spiral cord (figure 4). Body whorl constricted at siphonal canal and sculptured with 4 raised, nodulose, spiral cords and 5 or 6 smooth cords on base (figure 7). Outer lip convex and slightly pinched into posterior anal notch where it joins penultimate whorl. Aperture ovate with wide, distinct anterior canal and well-developed anal canal (figure 7).

Operculum thin, corneous, circular, externally concave, and with central nucleus; early whorls multispiral, becoming paucispiral later (figure 3).

Animal with short, wide, bilobed snout and pair of very long cephalic tentacles. Cephalic eyes large, black. Mantle edge wavy, edged with tiny papillae strongly developed at inhalant siphon. Buccal mass relatively large, bearing small pair of jaws and short taenioglossate radula.

Radula (figure 8) with about 18 rows of teeth. Rachidian tooth (figure 10) with hourglass-shaped basal plate and cutting edge of 1 large central cusp flanked on each side by 3 small denticles. Lateral tooth (figures 9, 10) wide, rhomboidal, with long lateral extension, and cutting edge comprising one sharp, tiny, inner denticle, a large pointed cusp and 4 or 5 sharp, outer denticles. Marginal teeth (figure 9) long, hook-like, with sharp tips comprising central cusp and 3 sharp, inner denticles. Inner marginal tooth with 2 small denticles on outer side; outer marginal with smooth outer edge.

Discussion: Although many authors have placed "*Cerithiopsis*" *crystallina* in the Cerithiopsidae, this classification has not really been satisfactory. Cerithiopsids are characterized by small turreted shells having well-developed, beaded, spiral sculpture, an aperture with a slight to flaring anterior notch, and a flattened, excavated shell base. They have a pleurembolic proboscis and a distinctive radula (Marshall, 1978:59–60, figs. 3, 4).

The shell of "*Cerithiopsis*" *crystallina* is not really comparable with those of cerithiopsid species. The sculpture is more nodular than beaded and more strongly spiral in composition. The base of the shell is not flattened or excavated and has a longer, wider anterior canal than those of cerithopsid species; moreover, the aperture has

a distinct anal canal and the upper lip flares into a weak notch where it joins the penultimate whorl.

The short, wide snout does not have the pleurembolic proboscis of *Cerithiopsis* species. The tiny taenioglossate radula of *C. crystallina* is close to those of members of the Cerithiidae in overall morphology (see Houbrick, 1978, 1980, 1985).

Dall (1889:254) noted the long cephalic tentacles and large, black eyes. His description of the external features of the animal agrees with my observations, but I did not find the "opercular lobe" with "several short processes on each side", which he mentioned. Dall's words seem to indicate epipodial tentacles, such as found on *Litiopa* Rang and *Alaba* H. and A. Adams species, but I found no trace of these structures. The material I examined appeared to be in good condition; consequently, I cannot explain this discrepancy.

The soft anatomy, radula, and shell of "*Cerithiopsis*" *crystallina* indicate that this species should be removed from the Cerithiopsidae, superfamily Cerithiopsacea, and transferred to the Cerithiidae, superfamily Cerithiacea. Cerithiopsids, although traditionally grouped with the cerithiids on the basis of shell morphology, are now considered as a separate superfamily (Kosuge, 1966; Marshall, 1978, 1983). They have been placed in the superorder Heterogastropoda by Kosuge (1966:297) and more recently in a new suborder, Heteroglossa, by Haszprunar (1985). Further evidence separating cerithiopsids from cerithiaceans has been presented by Healy (1983:212, 1986:195) who has discovered that their euspermatozoan morphology is quite different from that of other cerithiaceans.

Comparison of the shell and radula of *Cerithiopsis crystallina* with those of other small-shelled taxa within the Cerithiidae shows that it most closely resembles those of species in the genera *Bittium* Gray, *Argyropeza* Melvill and Standen, and *Varicopeza* Gründel. Of these three taxa, the shell shape and sculpture typical of *Bittium* species (Houbrick, 1977) does not closely match the overall morphology of *C. crystallina*, although there is some resemblance. Protoconch-two of *Argyropeza* species, as depicted by Houbrick (1979:8, fig. 2), is different from that of *C. crystallina*, as is the sculpture of the adult whorls and the aperture. Thus, *Bittium* and *Argyropeza* are best excluded as proper generic assignments. Shell characters such as the strong, nodulose spiral sculpture, deeply impressed suture, and aperture with a well-defined anal canal and posterior apertural notch all indicate a morphological resemblance to *Varicopeza*, a monotypic taxon previously known only from the Indo-Pacific and represented by *V. pauxilla* (A. Adams, 1854) (see Houbrick, 1980:528–529, figs. 1, 2). The radula of *C.*

→

Figures 8–10. Radula of *Varicopeza crystallina* (Dall) from Spanish Wells, Eleuthera, Bahamas (IRCZM 065:02228). **8.** General view of radular ribbon, bar = 43 μm. **9.** Detail of half row of teeth, bar = 25 μm. **10.** Detail of rachidian and lateral teeth, bar = 10 μm.

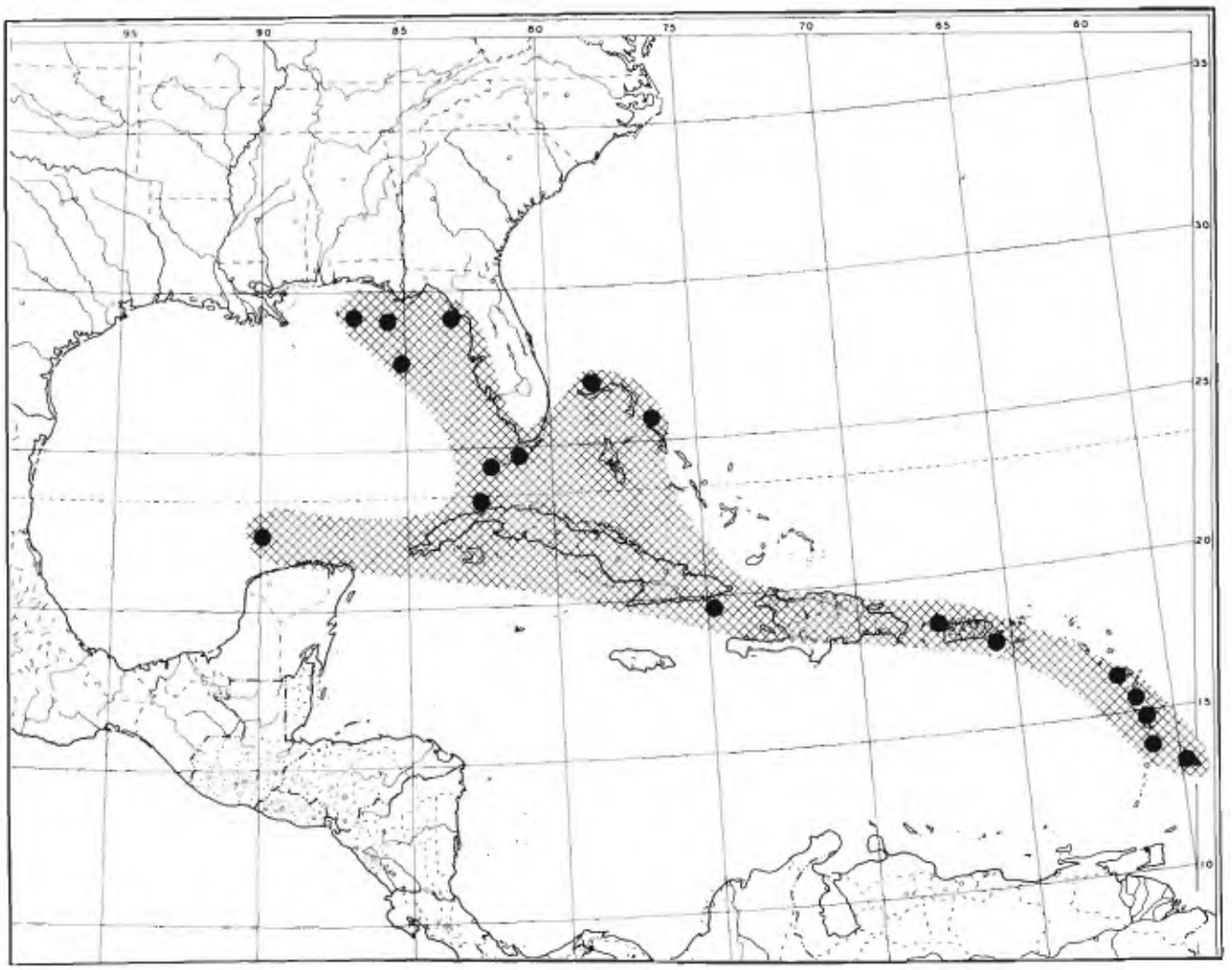


Figure 11. Geographic distribution of *Varicopeza crystallina* (Dall) based on collection data.

crystallina, particularly the hourglass-shaped rachidian tooth and the dentition and overall shape of the other teeth, is also similar to that of *Varicopeza pauxilla*. The shell of *Varicopeza pauxilla* is not as large or elongate as that of *C. crystallina* and has a more strongly defined posterior apertural notch. The operculum of the two species differs: that of *V. pauxilla* has a more eccentric nucleus and is more ovate than the operculum of *V. crystallina*. It appears that *C. crystallina* most closely resembles *Varicopeza*, and as I consider the conchological and opercular differences between the two taxa noted above to be specific ones, proposal of a new genus to accommodate *C. crystallina* is not justified. I think it best to assign this Western Atlantic species to the genus *Varicopeza*.

The genus *Varicopeza* was previously known only from a single Indo-Pacific species. The addition of *V. crystallina* to the genus adds a Western Atlantic component to the geographical distribution of this group. *Varicopeza crystallina* has a wide geographic distribution throughout the Lesser and Greater Antilles, the eastern Gulf of Mexico, and around the Florida peninsula (figure 11). Collection data indicate that it is a common offshore species having a wide bathymetric distribution ranging from 14.8 m to 1,605 m, with a mean depth of 272 m (n = 41). Nearly all lots comprised a great number of specimens. The deepest collected specimens are from the Lesser Antilles, while those from shallowest areas are from off the west coast of Florida. All specimens have come from sandy, silty bottoms and although many records are for empty shells, there were enough live-collected lots (dried animals in shells) to dismiss the possibility that this species occurs in significantly different bathymetric ranges than indicated. Specimens (empty shells) have been found on the beach at Cedar Keys, Florida.

CONCLUSIONS

Synonymy: The following synonymy summarizes the taxonomic decisions reached in this paper. A more complete definition of the genus *Varicopeza* is found in Houbrick (1980:525–526).

Family **Cerithiidae** Fleming, 1822
Genus *Varicopeza* Gründel, 1976

Varicopeza crystallina (Dall, 1881)

Cerithiopsis ? *crystallina* Dall, 1881:89. Holotype: MCZ 7395, figured type and one paratype; type-locality: RV *Blake*, Sta. 2, off Morro Light, N of Havana, Cuba—also Barbados; here restricted to off Morro Light, N of Havana, Cuba; 1889:254, pl. 20, fig. 3.

Cerithiopsis crystallinum Dall. Abbott, 1974:109, fig. 1049G; Dall and Simpson, 1901:424; Warmke and Abbott, 1962: 75; Rice and Kornicker, 1965:119, pl. 2, fig. 9; Boss *et al.*, 1968:95.

ACKNOWLEDGEMENTS

This is contribution No. 181 of the Smithsonian Marine Station at Link Port, Ft. Pierce, Florida, where most of this work was done. I thank Paula Mikkelsen, assistant curator, Indian River Coastal Zone Museum, Harbor Branch Oceanographic Institution, Ft. Pierce, Florida, for the loan of preserved specimens in her charge. Drs. Rudiger Bieler and M. G. Harasewych of the Smithsonian Institution critically read drafts of the manuscript. I thank Dr. Kenneth J. Boss, Museum of Comparative Zoology, Cambridge, Massachusetts, for sending data about type-material. I also thank Julianne Piraino for assistance on the SEM.

LITERATURE CITED

Abbott, R. T. 1974. American seashells, 2nd ed. New York, 663 p., 24 pls., 6405 figs.

Adams, A. 1854. A monograph of *Cerithidea*, a genus of Mollusca, with descriptions of several new species, from the collection of Hugh Cuming, Esq.: to which are added descriptions of two new species of *Colina*, and one of *Donax*. Proceedings of the Zoological Society of London 22:83–87.

Boss, K. J., J. Rosewater, and F. A. Ruhoff. 1968. The zoological taxa of William Healy Dall. Bulletin of the U.S. National Museum No. 287:427 p.

Dall, W. H. 1881. Reports on the results of dredging, under the supervision of Alexander Agassiz, in the Gulf of Mexico and in the Caribbean Sea, 1877–1879, by the U.S. Coast Steamer "Blake". Preliminary report on the Mollusca. Bulletin of the Museum of Comparative Zoology, Harvard 9: 33–144.

Dall, W. H. 1889. Reports of the results of dredging, under the supervision of Alexander Agassiz, in the Gulf of Mexico (1877–78) and in the Caribbean Sea (1879–80), by the U.S. Coast Survey Steamer "Blake". Lieut.-Commander C. D. Sigsbee, U.S.N., and Commander J. R. Bartlett, U.S.N., commanding. Report on the Mollusca. Part 2. Gastropoda and Scaphopoda. Bulletin of the Museum of Comparative Zoology, Harvard 18:1–492, pls. 10–40.

Dall, W. H. and C. T. Simpson. 1901. The Mollusca of Porto Rico. Bulletin of U.S. Fish Commission for 1900 1:351–524, pls. 53–58.

Fleming, J. 1822. The philosophy of zoology or a general view of the structures, functions, and classifications of animals, etc., 2 vols. Edinburgh, no pagination.

Forbes, E. and S. Hanley. 1850–51. A history of British Mollusca and their shells, Vol. 3. Van Voorst, London, 616 p.

Gray, J. E. 1847. The classification of the British Mollusca by N. E. Leach, M.D. Annals and Magazine of Natural History 20:267–273.

Gründel, J. 1976. Zur Taxonomie und Phylogenie der *Bittium*-Gruppe (Gastropoda, Cerithiacea). Malakologische Abhandlungen Staatliches Museum für Tierkunde in Dresden 5(3):33–59, 2 pls., 17 figs.

Haszprunar, G. 1985. The Heterobranchia—a new concept of the phylogeny of the higher Gastropoda. Zeitschrift für Zoologische Systematik und Evolutionsforschung 23(1):15–37.

Healy, J. M. 1983. Ultrastructure of euspermatozoa of cerithiacean gastropods (Prosobranchia: Mesogastropoda). Journal of Morphology 178:57–75.

Healy, J. M. 1986. Ultrastructure of paraspermatozoa of cerithiacean gastropods (Prosobranchia: Mesogastropoda). Helgolander Meeresuntersuchungen 40:177–199.

Houbrick, R. S. 1977. Reevaluation and new description of the genus *Bittium* (Cerithiidae). The Veliger 20(2):101–106.

Houbrick, R. S. 1978. The family Cerithiidae in the Indo-Pacific, Part 1: the Genera *Rhinoclavis*, *Pseudovertagus*, *Longicerithium*, and *Clavocerithium*. Monographs of Marine Mollusca No. 1:130 p., 98 pls.

Houbrick, R. S. 1979. Review of the deep sea genus *Argyropeza* (Gastropoda: Prosobranchia: Cerithiidae). Smithsonian Contributions to Zoology No. 321:30 p., 12 pls.

Houbrick, R. S. 1980. Reappraisal of the gastropod genus *Varicopeza* Gründel (Cerithiidae: Prosobranchia). Proceedings of the Biological Society of Washington 93(3): 525–535.

Houbrick, R. S. 1985. Monograph of the genus *Clypeomorus* (Cerithiidae, Prosobranchia). Smithsonian Contributions to Zoology No. 403:131 p., 62 pls.

Kosuge, S. 1966. The family Triphoridae and its systematic position. Malacologia 4(2):297–324.

Marshall, B. A. 1978. Cerithiopsidae (Mollusca: Gastropoda) of New Zealand and a provisional classification of the family. New Zealand Journal of Zoology 5:47–120.

Marshall, B. A. 1983. A revision of the Recent Triphoridae of southern Australia. Records of the Australian Museum, Supplement 2:119 p., 33 figs.

Rice, W. H. and L. Kornicker. 1965. Mollusks from the deeper waters of the northwestern Campeche Bank, Mexico. Publications of the Institute of Marine Science, Texas 10:108–172.

Warmke, G. and R. T. Abbott. 1961. Caribbean seashells. Narberth, PA, 346 p., 44 pls.

Watson, R. B. 1884–86. Report on the Scaphopoda and Gasteropoda collected by H.M.S. *Challenger* during the years 1873–1876. *In:* Report on the scientific results of the voyage of the H.M.S. *Challenger* during the years 1873–76 15(42):756 p., 53 pls.