

STUDYING EASTER ISLAND'S MOLLUSCAN FAUNA

Bret K. Raines*

Research Associate, Natural History Museum of Los Angeles County

INTRODUCTION

The intent of this paper is to briefly enlighten readers of the RNJ to an area of research which is often overlooked. Malacology, or the study of mollusks, is not Easter Island's most notable subject, yet more advancements in this area have taken place during the last six years than ever before. At the same time, there seems to be a misconception regarding the island even among those in this field of study. I am often asked, 'Why do you study Easter Island mollusks? Hasn't that been done already?' The truth is, while the anthropological and archaeological mysteries of Easter Island have been studied for decades, we still know relatively little regarding the island's molluscan fauna.

HISTORICAL REVIEW

Despite the fact that early voyages of the 1700s and 1800s made biological collections during their trips, there were only 2 species of mollusks recorded from Easter Island prior to 1908. *Nerita (Heminerita) morio* (Sowerby I, 1833) and *Erosaria caputdraconis* (Melvill, 1888), two of the most common intertidal species and are known to the native people as 'pure uriuri' and 'pure vahine' respectively.

The first published list of mollusks was that of William H. Dall in 1908 where he identified 29 species which had been collected by the U.S. Fisheries Steamer *Albatross* during its six day visit in December 1904. In 1914, Francisco Fuentes reported 12 species of mollusks, however only two species had not been previously reported by Dall. Nils Odhner was much more successful and reported 21 species in 1922, of which seven were previously listed. Fourteen years later, Eduardo Lamy reported 35 species, which were collected during the 1934 Franco-Belgian expedition, with eighteen species being previously listed by Dall and Odhner. During the next thirty or so years, a small handful of new species were described from the island. In 1957, Paul Steele compiled another list consisting of 73 species, however some species were reported only to genus level and many were synonyms. It was not until 1980 that the first major work on Easter Island mollusks was published, wherein Harald Rehder reported an additional 65 species bringing the total number of marine mollusks to 133, 115 of which he identified to species level.

It should be noted, that many recent publications often cite Rehder's work and only his work, when referring to the island's molluscan fauna. And while it is indeed an outstanding effort, it is by no means a definitive document on the subject. In fact, anyone who has studied his monograph knows that Rehder himself realized it was only the beginning.

Rehder provided a solid foundation for others to follow, however, his work was more or less limited to the island's littoral zone. In more recent years, separate ongoing efforts by both Luis DiSalvo [DiSalvo *et al.* (1988), DiSalvo (1999)] and

Cecilia Osorio-Ruiz [Osorio (1989, 91, 92, 95, 96); Osorio *et al.* (1989, 92, 93, 96, 2000)] have continued to expand our knowledge regarding the littoral and sub-littoral zones down to about 60 meters. From 1981 to 2001, an additional 60 species have been identified by various researchers. In addition, we can not overlook the effort made by Christopher Boyko & James Cordeiro (2001), where they identified nearly all of the terrestrial species.

CURRENT INVESTIGATION

My ongoing research of the island's marine mollusks started in 1997 while working on another passion of mine, the systematic taxonomy of Pectinidae (better known as scallops to non-malacologists). Since Easter Island is home to a small endemic species, *Paschinnites pasca* (Dall, 1908) (Figure 1), which was known from only a single valve for nearly 70 years, I had no choice but to find one of my own. After my first visit to the island, I found it impossible to stay focused on just Pectinidae. And although I was thoroughly familiar with all the relevant literature, I was not prepared for what lay ahead.

In early 1998, my wife and I spent more than a month on the island collecting mollusks and studying the marine habitat. In late 2000, I returned to the island and repeated the same process. As a result, we were successful in collecting examples of nearly all the species previously reported as well as many that were new. Once the goal of finding the little pecti-



Figure 1. *Paschinnites pasca* (Dall, 1908), height: 12.5 mm.
Photo by B. Raines.

mid was accomplished, I began to expand my interest. I started first by looking at the species which Rehder mentioned as needing more data or material in order to determine the correct taxonomic placement. To date, I have been able to address 9 of those 18 problem species, however, I have unfortunately discovered more than 20 problem species of my own.

Since being bitten by the Easter Island bug, nearly all of my research has now been on the marine mollusks and foraminifera of the island. Because there are a number of researchers already working on the littoral and sub-littoral zones, the majority of my effort has been focused on the deeper epipelagic zone (50 to 400 meters), with only an occasional overlap into the shallower waters. This decision has proven prudent as it has maximized my chances of making a real contribution rather than simply duplicating previous efforts.

Over the years, I have either read or been told that Easter Island tends to have a low diversity of species. This statement has always bothered me, especially considering the limited number of investigations which have been conducted. In the mid-1980s, Luis DiSalvo lead a team to conduct a comprehensive ecological survey of the island's marine environment.

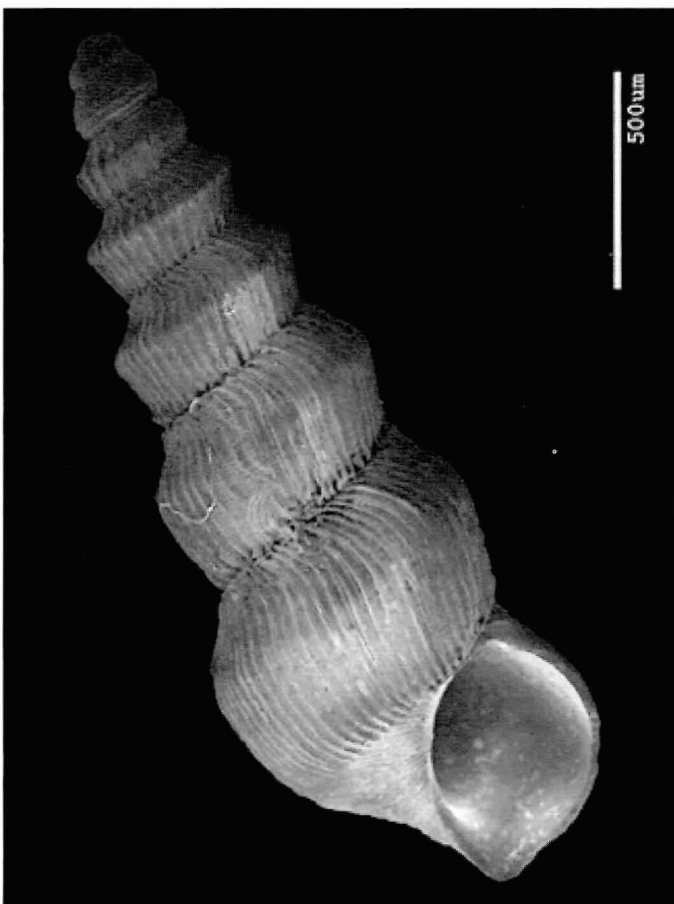


Figure 2. Undescribed mollusk species, height: 2.75 mm. SEM imaging by D. Geiger.

The publication which followed, DiSalvo *et al.* (1988), is one of the most widely referenced documents regarding the island's natural history. However, I wonder how many re-

searchers have truly taken the time to read the paper and to understand what is written between the lines. In addition to reporting many new records (37 species of mollusks alone), DiSalvo *et al.* (1988) provides a road map of where to look for additional species. The habitat information provided is invaluable. I believe many researchers have come to the island with great hopes, but become discouraged due to the island's hostile environment, the weather, or they were looking in the wrong place.

Collecting methods and equipment can vary from simple to complex depending on location, depth and the species you hope to find. The depth of water that I have chosen for my research also presents additional challenges which need to be met. Because I have self financed all of my research to date, my equipment can sometimes look a bit odd, and is typically fabricated from unrelated or recycled materials. One of my favorite collecting devices in my arsenal is an industrial strength hand sieve, which is constructed out of an old racquetball racquet, a large metal colander and a telescoping handle. This tool has proven itself to be invaluable while working along the island's rugged shoreline. Another favorite of mine is a modified Ponar grab dredge, used in the collection of deep water sediments, and it was nearly lost on it's first day out to sea because it became snagged on rocks at 400 meters. Because the dredge has been rebuilt several times and seemingly operates better after each rebuild than the time before, my good friend, Michel Garcia has dubbed it, 'The Terminator'.

When to collect mollusks is also an important issue. Many species, especially those which live in shallow water, hide during the day and come out only at night to feed. This means that it is not uncommon to find me wading in the sand flats or tide pools at 2:00 AM during a low tide hoping to find a critter or two. The activity of mollusks is also influenced by tidal changes and moon phases, and can affect each species in a different way.

The real work of studying Easter Island mollusks, however, does not start until I return home. A successful three week collecting trip typically equates to about two years worth of research. Because 90 percent of the island's known molluscan fauna are less than 10 mm in size, the segregation and identification is a slow and tedious process. The examination of sediments under a microscope is completed at a rate of less than a quarter teaspoon at a time. After my third visit to the island in late 2002, I brought back nearly 80 kilos of sediment and I am still sorting through that material. The discovery of an unreported species however, can be quite exciting and makes it all worth while. This is especially true, when you consider that up to 42 percent of island's marine mollusks have been found to be endemic. This also means, if the species has not been previously reported, there is a 42 percent chance it's an un-described species and new to science as well.

But all is not fortune and glory, because finding an unreported species can also be very frustrating. A perfect example of this can be seen with the recent discovery of an un-described species (Figure 2), found in sediments taken from a depth of 200 meters. And although there is no doubt that it is a new species and possibly even a new genus, it belongs to a family group which requires the examination of the soft ani-

mal tissue for taxonomic placement. Since all the material currently found has been dead collected (shells only) the species can not be described.

Fortunately, the aforementioned scenario does not happen very often. I will now take this opportunity to report the following new record:

Family: **EPITONIIDAE** Berry, 1910

Genus: *Epitonium* Röding, 1798

Type Species: *T. scalaris* Linnaeus, 1758

Epitonium replicatum (Sowerby II, 1844) Figure 3

Description: Shell small, up to 18 mm in size, body glassy; protoconch consisting of 3 to 4 whorls, teleoconch consisting of 6 to 8 whorls, which are convex and rapidly enlarge; costae thin, spanning above the suture, strongly reflected covering umbilicus; aperture oval with broad margin; creamy white in color, sometimes with light brown mottling between costae; operculum dark and corneous.

Discussion: Although *E. replicatum* is a widespread species, known throughout the Indo-Pacific, from the Hawaiian Islands to the Indian Ocean, as well as from western Panama, this is the first time it has been reported from Easter Island. *Epitonium replicatum* is often mistaken for *E. alatum* (Sowerby II, 1844), but can be easily distinguished from the *E. alatum* by its enclosed umbilicus. *Epitonium replicatum* is represented by one complete and two partial specimens, which were sorted from sediments collected just south of Mataverí Bay at a depth of 28 meters.

Remarks: This new record follows just six months after the publication of Brown & Raines (2004), where two other species of Epitoniidae were first reported. This now brings the total number of Easter Island epitoniids to four species: *E. replicatum*, *E. (Parviscala) deificum* Melville & Standen, *Gyroscaia lamellosa* Lamarck, and *Opalia (O.) sumatrensis* Thiele.

CONCLUSION

As seen within other areas of study, Easter Island does not divulge her secrets willingly. However, if one is diligent and has patience, the time and effort will pay off. During the past six years, I have spent nearly three months on the island collecting material and studying the marine habitat, as well as thousands of hours looking through a microscope. As a direct result, more than 120 species not previously reported from Easter Island have been identified to include, but not limited to, the descriptions of 36 new species, 3 new genera, and 1 new subfamily. And while these numbers sound impressive, the work is far from being complete. I hope to return to the island within the next 18 to 24 months to continue my research.

ACKNOWLEDGEMENTS

I wish to thank Harold Jackson (Honolulu, Hawai'i) for providing several examples of *Epitonium replicatum* from Hawaii for comparison; Leonard Brown (Wallingford, Connecticut)

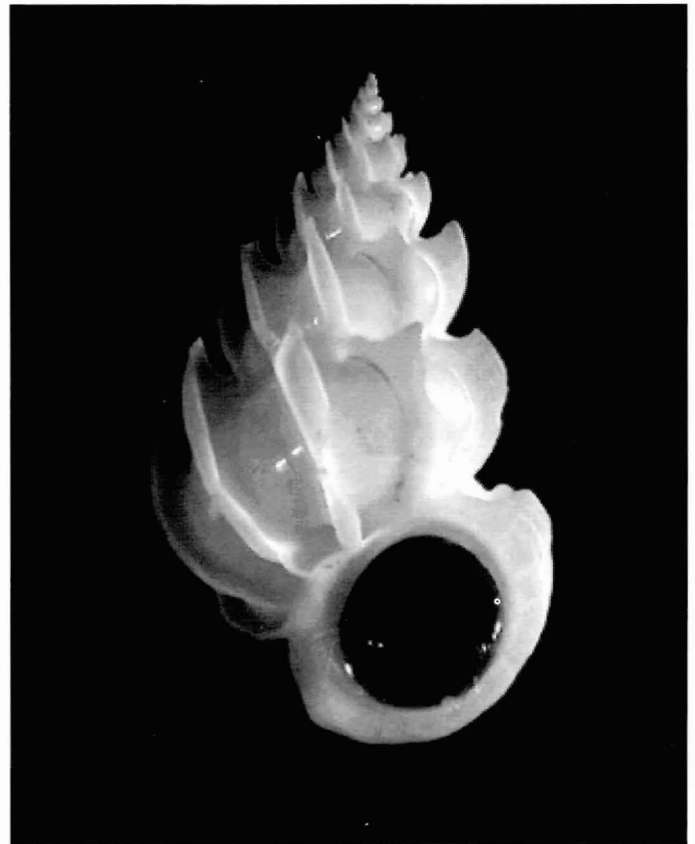


Figure 3. *Epitonium replicatum* (Sowerby II, 1844), height: 16.2 mm. Photo by B. Raines.

for sharing his expertise regarding the family Epitoniidae; Michel Garcia (Sociedad de Explotación y Exploración Marítima Orca, Ltda., Isla de Pascua) for his continued support; and Daniel Geiger (Santa Barbara Museum of Natural History) for performing the SEM imaging.

REFERENCES AND RELEVANT LITERATURE

- Boyko, C. B. and J. R. Cordeiro. 2001. The Terrestrial Mollusca of Easter Island (Gastropoda, Pulmonata). *Basteria* 65:17-25.
- Brown, L. and B. Raines. 2004. Two New Records of *Epitoniidae* from Easter Island, Chile. *Zootaxa* 402:1-7.
- Dall, W. H. 1908. Reports on the Dredging Operations off the West Coast of Central America to the Galapagos, to the West Coast of Mexico and in the Gulf of California, [...]. The Mollusca and the Brachiopoda. *Bulletin of the Museum of Comparative Zoology, Harvard College*. 43(6): 205-487.
- Dell'Angelo, B., Raines, B. and A. Bonfitto. 2004. The Polyplacophora of Easter Island. *The Veliger* 47(2):130-140.
- Dijkstra, H. H. and B. K. Raines. 1999. *Paschinnites* n. gen. for "*Pecten (Chalmys)*" [sic] *pasca* Dall, 1908, a Cemented Easter Island Scallop (Bivalvia: Pectinidae). *Basteria* 63:199-203.
- Di Salvo, L. H., Randall, J. E. and A. Cea. 1988. Ecological Reconnaissance of Easter Island Sublittoral Marine Environment. *National Geographic Research* 4:451-473.

- DiSalvo, L. H. 1999. Comentario Sobre Moluscos de la Isla de Pascua: Listado de Especies Encontradas 1984-1986. *Sociedad Malacológica de Chile. Boletín Amici Molluscarum*. 7:17-24.
- Fuentes, F. 1914. Contribucion al Estudio de la Fauna de la Isla de Pascua. *Boletín del Museo Nacional de Chile*. 7 (1):285-317.
- Geiger, D. L. 2003. Phylogenetic Assessment of Characters Proposed for the Generic Classification of Recent Scisuresellidae (Gastropoda: Vetigastropoda) With a Description of One New Genus and Six New Species from Easter Island and Australia. *Molluscan Research* 23:21-83.
- Lamy, E. 1936. Liste des Mollusques Recueillies par la Mission Franco-Belge à l'Isle de Pâques (1934). *Bulletin du Museum National d'Histoire naturelle*. 2:267-268. Paris.
- Lorenz, F. and B. K. Raines. 2001. A New Species of *Cribrarula* (Gastropoda: Cypraeidae) from Easter Island. *La Conchiglia* 299:27-29.
- Melville, J. C. 1888. A Survey of the Genus *Cypraea* (Linne), Its Nomenclature, Geographical Distribution, and Distinctive Affinities: A Catalogue of the Species and Varieties of *Cypraea*. *Memoirs and Proceedings of the Manchester Literary and Philosophical Society* (Ser. 4), 1: 184-252.
- Odhner, N. H. 1922. Mollusca from Juan Fernandez and Easter Island. Skottsberg, C., ed., *The Natural History of Juan Fernandez and Easter Island*. Vol. III. Zoology. :219-254, Uppsala: Almqvist and Wiksells.
- Osorio, C. 1989. La Radula de *Cypraea caputdraconis* Melville, 1888 (Mollusca: Gastropoda). *Revista de Biología Marina*. 24(2):149-153.
- Osorio, C. 1991. *Charonia tritonis* (Linne, 1758) en Isla de Pascua (Mollusca: Gastropoda: Cymatiidae). *Revista de Biología Marina*. 26(1):75-79.
- Osorio, C. 1992. Endemism and Mollusks in Easter Island. *Unitas Malacologica. Abstracts of the Eleventh International Malacological Congress*, Siena, Italy. F. Guisti and G. Manganelli, eds, :472-475.
- Osorio, C. 1995. Dos Nuevos Registros de Isognomiidae (Mollusca: Bivalvia) para Isla de Pascua. *Revista de Biología Marina*. 30(2):199-205.
- Osorio, C. 1996. Note on First Records of *Isognomon* from Easter Island. *Pacific Science*. 50(2):234-235.
- Osorio, C. and H. Atan. 1993. Biological Relationships Between *Luetzenia goodingi* Rehder 1980 (Gastropoda, Stiliferidae) Parasite of *Echinometra insularis* Clark 1972 (Echinoidea) of Easter Island. *Revista de Biología Marina*. 28(1):99-109.
- Osorio, C., D. Brown, D. Ligia and H. Atan. 1999. Aspects of the Reproductive Activity of *Cypraea caputdraconis* from Easter Island (Mollusca: Gastropoda: Cypraeidae). *Pacific Science*. 53(1):15-23.
- Osorio, C. and V. Cantuarias. 1989. Vertical Distribution of Molluscs on the Rocky Intertidal of Easter Island. *Pacific Science*. 43(4):302-315.
- Osorio, C., C. Gallardo and H. Atan. 1992. Egg Mass and Intracapsular Development of *Cypraea caputdraconis* Melville, 1888, from Easter Island (Gastropoda: Cypraeidae). *The Veliger*. 35(4):316-322.
- Osorio, C., F. Jara and M. E. Ramirez. 1993. Diet of *Cypraea caputdraconis* (Mollusca: Gastropoda) as it Relates to Food Availability in Easter Island. *Pacific Science*. 47 (1):34-42.
- Osorio, C., M. E. Ramirez Casali, Mora Tapia, A. M. and M. Vega Petokvic. 2000. *Plaxiphora mercatoris* Leloup, 1936 (Polyplacophora : Mopaliidae) de Isla de Pascua, Chile. *Iberus*. 18(2):41-50.
- Raines, B. K. 2002. Contributions to the Knowledge of Easter Island Mollusca. *La Conchiglia* 304:11-40.
- Raines, B. K. 2002. Contributions to the Knowledge of Easter Island Mollusca, Part II. *La Conchiglia* 305:41-50.
- Raines, B. K. 2002. *Pupa pascuana*: A New Species of Acteonidae from Easter Island. *La Conchiglia* 305:51-53.
- Raines, B. K. (Under review) Contributions to the Knowledge of Easter Island Mollusca, Part III.
- Raines, B. K. (In prep.) Contributions to the Knowledge of Easter Island Mollusca, Part IV.
- Raines, B. K. and M. Pizzini. (Under review) Contribution to the Knowledge of the Family Caecidae: 16. Revision of the Caecidae of Easter Island. - (Caenogastropoda: Rissooidea Gray J. E., 1847).
- Rehder, H. A. 1980. The Marine Mollusks of Easter Island (Isla de Pascua) and Sala y Gomez. *Smithsonian Contribution to Zoology* 289:1-167.
- Scott, P. V., Lamprell, K., and B. K. Raines (In prep.) Twenty-four New Bivalve Records from Easter Island, with the Descriptions of Eight New Species.
- Sowerby, G. B., I. 1833. Collection of Shells Formed by Mr. Cuming on the Western Coast of South America, and Among the Islands of the South Pacific Ocean. *Proceedings of the Zoological Society of London*. 1833:194-202.
- Sowerby, G. B., II. 1844. *Thesaurus Conchyliorum, or Monographs of Genera of Shells*. Monograph on the Genus *Scalaria*. 1, 83-108. London: Sowerby, Bloomsbury.
- Steele, P. H. 1957. Easter Island Shells. *The Nautilus*. 70(4): 111-113

*P.O. Box 612, Victorville, CA 92393 USA
rainesbk@cybertime.net

SOUTH AMERICAN EXPLORERS
http://www.saexplorers.org

"THE BEST SOURCE OF INFORMATION ON S.A. TRAVEL!"

Join now and receive trip planning advice; discounts on maps, guidebooks, trips and schools; fax, e-mail and storage at our...

CLUBHOUSES IN LIMA AND CUSCO, PERU, AND QUITO, ECUADOR!

U.S. HEADQUARTERS: 126 Indian Creek Rd, Ithaca, NY 14850, Tel: (607) 277-0488, Fax: (607) 277-6122
explorer@saexplorers.org

CUSCO: saec@amauta.rcp.net, LIMA: limaclub@terra.com.pe, QUITO: explorer@saec.org.ec