# SHELLS AND SEA LIFE

**A monthly publication since 1969.**
ISSN 0747-6078
1701 Hyland St.
Bayside, CA 95524

**$2.50 — September, 1985 — Vol. 17, No. 9**

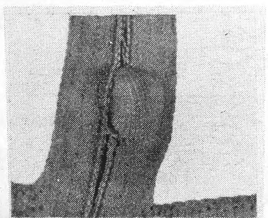


*Hydatina vesicaria* (Lightfoot, 1786)
Drawing by Scooter Beers

## Notes on some species of the genus Thyca: (Eulimidae)

**Donald R. Shasky**
834 W. Highland Avenue, Redlands, CA 92373

Photo at right: Thyca callista Berry, 1958
Pta. Diablo, Baja California, Mexico
August 31, 1960



In recent months papers by Bertsch, Bratcher and DuShane have discussed *Thyca* (*Bessomia*) *callista* Berry, 1959. The purpose of this paper is to present some historical information about this species as well as additional geographic and taxanomic data. I also call attention to Waren's work on *Thyca* which has been overlooked by previous authors.

I had just finished medical school (June, 1958) and had three weeks before my intern year began. In those days, if I had free time, I was in Guaymas, Mexico, and this period was no exception.

During that trip I was collecting shells, starfish and sea urchins. A single starfish that I found, *Phataria unifasciatus* (Gray), had a small shell attached that I had never seen before.

A few days after finding this shell a stranger approached as I was working on my shells. I was between dives and was happy for someone who wanted to talk about shells. This was my first encounter with the late Dr. S. Stillman Berry.

He was returning to Redlands after collecting in Mazatlan. He inquired about what I had found, and among other things, I showed him my parasitized starfish. He was elated as he immediately recognized this as a new species of *Thyca.*

I told him that I knew someone who had previously collected great quantities of starfish, for commercial purposes, in Guaymas. I thought that perhaps he might have some specimens that had *Thyca* on them.

After returning to my home in Glendale, California, I called Leonard Bessom and, yes, he thought he did have starfish with shells attached. There was one problem — he had spray-painted all his starfish with blue paint! He carefully removed the paint and subsequently sent three specimens of the shell to Dr. Berry which later became the holotype and the two paratypes. Because my specimen came from across the bay from where Bessom collected, Dr. Berry did not include mine as a paratype when he described *Thyca* (*Bessomia*) *calista* the following year.

In 1961 I published (**Veliger**), that Bessom and I estimated that we found one *Thyca callista* parasitized *Phataria unifasciatus* for each 1,000 - 1,500 that we examined in the Guaymas area. That paper also included the first photograph of *T. callista.*

In 1976 while diving in one of the many bays around Isla Espiritu Santo and Isla Partida in the Gulf of California, I found that the ratio was one parasitized *P. unifasciatus* for each three I examined. These were taken snorkling in from one to three meters.

In Isla Maria Madre in the Tres Marias Islands group I also found a fairly high density of *T. callista* on another starfish *Pharia pyramidata* (Gray).

In discussing *T. callista* in the February 14, 1985, **Festivus**, Dr. Bertsch failed to cite my recent paper on the shells of Manabi Province, Ecuador, where I reported having taken *T. callista* at Isla La Plata. In 1980, Warren transferred the genus *Thyca* from the family Capulidae to the family Eulimidae.

Incidentally, in my paper on the mollusks of Manabi Province, Ecuador, *Thyca callista* was inadvertently listed under both the Eulimidae and the Capulidae. I regret this oversight when I proof-read the manuscript.

In his paper, Waren assigned the following Indo-Pacific species of *Thyca* to Berry's subgenus *Bessomia*: *T. crystallina* Gould, 1846; *T. ectoconcha* Sarasin, 1887; and *T. hawaiiensis* Waren, 1980. I would like to add two additional bits of information concerning *Thyca* species.

Waren gives the range for *Thyca* (*Thyca*) *stellasteris* Koeler and Vaney, 1912, from the Gulf of Suez to West Australia. While collecting aboard a shrimp trawler between Dalrymple and Rennel Islands in the Torres Strait, N. Queensland, I took one specimen of *T. stellasteris* from an unidentified starfish. Thus the range is extended to northeastern Australia.

Lastly, I have two specimens of an undescribed *Thyca* that I collected in siftings at Isla La Plata, Ecuador. It is in manuscript and is the third known species of *Thyca ss.*

### Literature cited

Berry, S.S. 1959. Notices of new eastern Pacific Mollusca — III. Leaflets in Malacology 1(18):107-113.

Shasky, D.R. 1961. Notes on rare and little known Panamic mollusks. Veliger 4(1):22-24; 16 text figs.

Shasky, D.R. 1984. A preliminary checklist of marine mollusks from Manabi Province, Ecuador. Western Society of Malacologists Annual Report 16(for 1983). p. 25-32

Waren, A. 1980. Revision of the genera Thyca, Stylifer, Scalenostoma, Mucronalia, and Echinuelima (Mollusca, Prosobranchia, Eulimidae). Zoologica Scripta 9:187-210; fig. 107.

# LIVING CLOCKSPRINGS, part 4.

*Chris Illert, 2 Tern Place, Semaphore Park, South Australia 5019*

Most conchologists are pleased with themselves if they become knowledgeable about living molluscan species. Yet the vast majority of all shell forms are extinct; existing only in the fossil record. All of the early "tetrabranch" nautiloids, and the entire family of ammonoids - numbering tens of thousands of species - are gone. But, before these shelled cephalopods became extinct, the ammonites of the Late Cretaceous era (in particular) coiled in such unconstrained wild shapes (with looping bodywhorls) that paläontologists had given up and considered these "heteromorphs" to be a lost cause.

This is where elastic clocksprings play an important role not only in classification of "heteromorphic" geometries, but also they serve the purpose of uniting disparate geometrical shapes into a coherent and sensible whole body of evidence. Ammonite spirals can be visualised in terms of a single elastic spiral spring being wound about a spindle whilst the outermost end of the coil is held fixed at an anchor point - as in Figure 5. The individual static shell spirals can now be seen in terms of a continuous dynamic winding process. Individual shell shapes relate to the dynamic process of spring winding in much the same way that single snapshots relate to a continuous movie picture.

Previously there was no known upper limit to what shell shapes were geometrically possible in nature. How could conchologists study variations on a theme if the theme was itself unknown? Tensile clockspring curves, first suggested by T.A. Cook (1908), supply the neccessary geometrical theme enabling us to study not only those fossil shell shapes that exist but also those which for some reason or another never occurred.

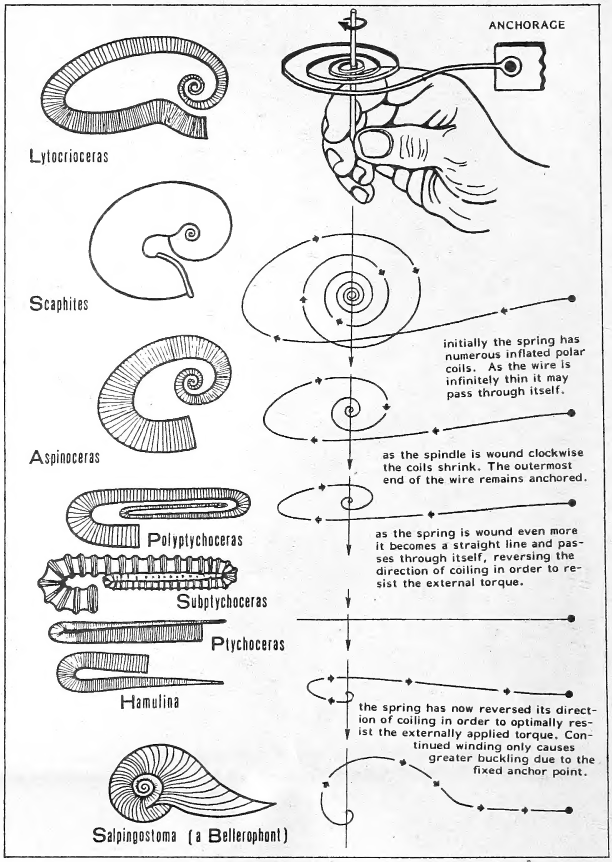



Figure 5. *If we take an elastic spring with an anchored outer end, and wind it continuously (clockwise) then it goes through a variety of shapes - all of which were discovered and widely used in ages past by Ammonites.*

REFERENCES

*Abbott, R.T. 1982. Kingdom of the Seashell, Bonanza Books N.Y.*

*Colton, H.S. 1908. Proc. Acad. nat. Sci. Philad. 60: 1-30 & pl.*

*Cook, T.A. 1914. The Curves of Life. Constable & Co., London.*

*Nielsen, C. 1975. Ophelia (Int. J. Mar. Sci.) 13: 87-108.*

*Schmidt, H. 1930. Palaont. 12: 194-208.*

*Illert, C.R. 1976. Seashell Mathematics, Griffin Press Adel.*

*Illert, C.R. 1983. Mathematical Biosciences 63(1): 21-56.*

*Illert, C.R. 1985. Journal of Inferential & Deductive Biology 1(2) in press.*

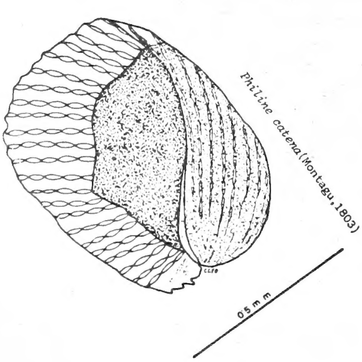
*Illert, C.R. 1980. Of Sea & Shore 11(3): 141-142.*

*Illert, C.R. 1981. Of Sea & Shore 12(1): 8-10.*

*Illert, C.R. 1985. Underwater (divers journal) 15, 16, 17, 18.*

*Wainwright, S.A. 1969. Nature 224: 777.*

*Warren, S. 1913. Nautilus 30: 66-68.*




*Philine catena* (Montagu, 1803)
Drawing by Casto L. Fernández-Ovies



SHELLS and SEA LIFE was formerly known as the OPISTHOBRANCH NEWSLETTER. The magazine is open to articles and notes on any aspect of malacology, fossils or related marine life. Technical articles submitted for publication are subject to editorial board review. Articles should be submitted typed and double-spaced. Authors receive 10 reprints of their article. Additional reprints are available for purchase. For additional information send for free booklet "Suggestions for Preparing Manuscripts for SHELLS and SEA LIFE."

We undertake no responsibility for unsolicited material sent for possible inclusion in the publication. No material submited will be returned unless accompanied by return postage and packing.

Display advertising is $26 per column inch, minimum, with discounts for larger ads & multiple insertions. Send for rate card.

SHELLS and SEA LIFE ISSN 0747-6078 is published monthly for $24 per year by Steven J. Long & Sally Bennett, 1701 Hyland, Bayside, CA 95524. Second-Class Postage Paid at Bayside, CA. POSTMASTER: Send address changes to: SHELLS and SEA LIFE, 1701 Hyland, Bayside, CA 95524. Charge on MasterCard or VISA — telephone (707) 822-1024. Outside U.S. postal ZIP code areas — $30 surface or $40 air mail. Send change of address 6 weeks in advance. The publisher reserves the right to change subscription rates during the term of a subscription upon 30 days' notice. This notice may be by mail to the subscriber, by notice contained in the publication itself, or otherwise. Subscription rate changes may be implemented by changing the duration of the subscription.

# Bivalve Molluscan paleoecology of northern exposures of the marine Neogene Imperial Formation in Riverside County, California

**Charles L. Powell, II**
U.S. Geological Survey, Menlo Park, California 94025

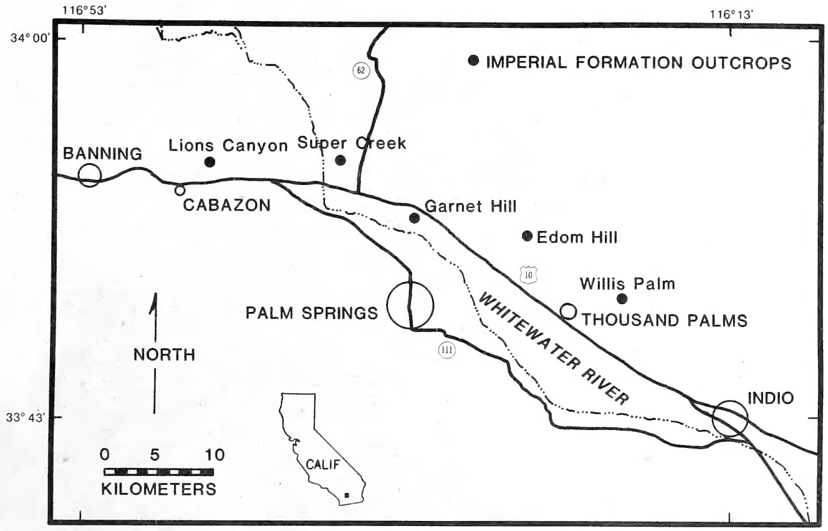



Figure 1. Index map showing localities of the Imperial Formation in the study area.

## INTRODUCTION

The marine Imperial Formation was deposited at the head of the proto-Gulf of California during the latest Miocene through late (?) Pliocene time. The formation crops out discontinuously northward from just south of the California-Mexico border to San Gorgonio Pass, Riverside County, California. Exposures of the Imperial Formation in Riverside County occur along the San Andreas-Banning fault zone. Important exposures occur at Lions Canyon, Super Creek, Garnet Hill, Edom Hill and Willis Palm (fig. 1). The faunas from Super Creek, Garnet Hill and Willis Palm each represent different environments and form the basis for this note. The Imperial Formation in Riverside County attains a maximum thickness of 105 m and is divided into two members separated by a time transgressive boundary from north to south.

The lower, Latrania Sand Member (Keen and Bentson, 1944), whose type section is in Imperial County, is generally composed of coarse- to medium-grained sandstone with scattered conglomeratic beds; it attains a maximum thickness of 30 m in Riverside County. The mollucan assemblage from the Latrania Sand Member in Riverside County is characterized by species that lived in a euhaline, moderate- to high-energy, intertidal (?) to inner shelf, rocky to sandy habitat. Taxa that commonly occur in Riverside County include *Spondylus victoriae* (Sowerby), *Pycnodonte heermanni* (Conrad) [= "*Ostrea" heermanni* Conrad], *Dendostrea angelica* (Rocheburne), and *Argopecten* spp.

The unnamed, upper member of the Imperial Formation is about 75 m thick in Riverside County. In this area it represents a low- to moderate-energy, outer shelf facies and is composed of medium- to fine-grained sandstone and siltstone. Characteristic bivalve mollusks in this member in Riverside County include *Cyclopecten* sp. cf. *C. pernomus* (Hertlein), *Dendrostrea? vespertina* (Conrad), and *Anomia peruviana* d'Orbigny.

## PALEOECOLOGY

### Super Creek area

Both members of the Imperial Formation are exposed along Super Creek. The Latrania Sand Member occurs in small discontinuous synclines (fig. 2), and appears to have been deposited in small pocket beaches in rocky headlands. The outcrops are characterized by abundant *Spondylus victoriae* and *Dendostrea angelica* that are found attached to large clasts in conglomeratic stringers. Bernard (1983) reports *D. angelica* in water depths of 1 to 5 m and *S. victoriae* from 10 to 40 m. Thus the Latrania Sand Member along Super Creek was probably deposited in shallow subtidal depths that deepened upsection to between 10 and 40 m at the top of the member. These beds are overlain by a 70-cm thick "worm tube" marl at the top of the Latrania Sand Member. The environment of deposition of the marl was not determined because of the poor preservation of its fossils.

The Latrania Sand Member is overlain by medium- to fine-grained sandstone and siltstone of the unnamed upper member. About 10 m above the top of the Latrania Sand is a bed of *Atrina* n. sp. preserved in life position. *Atrina* is found in water depths from 1 to 125 m in the eastern Pacific, but only *A. texta* Hertlein & Strong, is reported to occur below 30 m. Benthic foraminifers from this bed suggest inner neritic water depths (0-50 m) (K. A. McDougall, written commun., 1981). Together these data suggest water depths of less than 50 m for the lower part of the unnamed upper member of the Imperial Formation. Near the top of the upper member, *Cyclopecten* sp. cf. *C. pernomus* and many shell fragments have been concentrated into small shell lag deposits, possibly by currents. Water depth during deposition of this unit is unclear, but the occurrence of *C.* sp. cf. *C. pernomus* limits the depth to 355 m (Bernard, 1983). Benthic foraminifers throughout the upper member indicate that water depths increase to middle and outer neritic depths (50-150 m) near the top of the formation (K. A. McDougall, written commun., 1981).

In the Super Creek area, the Imperial Formation is overlain by medium- to coarse-grained sands and conglomeratic beds of the Painted Hill Formation, previously interpreted as alluvial fan deposits by Allen (1957). The interfingering of the Painted Hill Formation with neritic silts of the Imperial Formation indicates that the base of the Painted Hill Formation probably is not of alluvial fan origin.

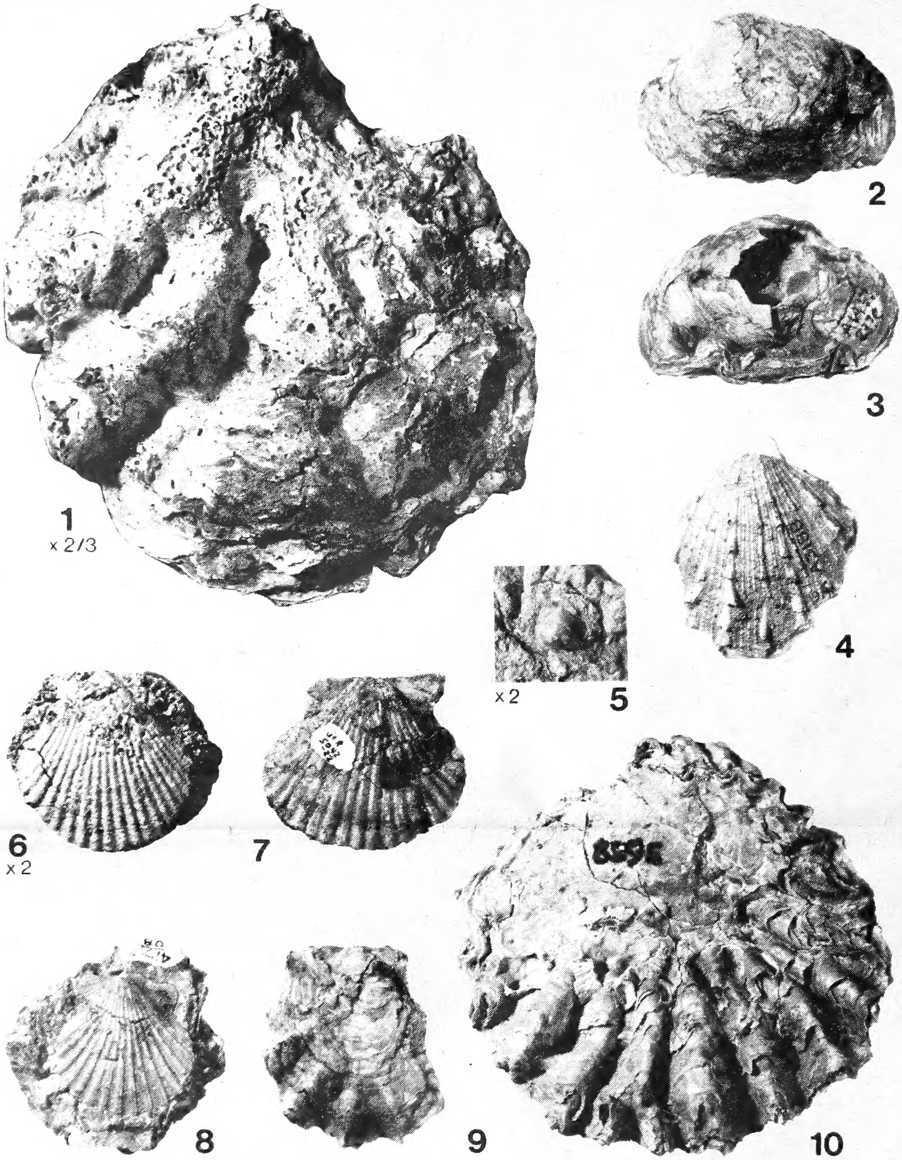



**PLATE 1**
(All figures x 1 except as indicated)

Figure 1. *Pycnodonte (Pycnodonte?) heermanni* (Conrad 1855). Left valve. LACMIP 7162; length 131 mm, height 148 mm. CIT loc. 192

Figures 2 and 3. *Anomia peruviana* d'Orbigny, 1846. Articulated valves. UCMP 37531; length 49.9 mm, height 35.1 mm. UCMP loc. A-1417.

Figure 4. *Spondylus victoriae* Sowerby, 1859. Right valve. UCMP 37532; length 35.4 mm. height 39.6 mm. UCMP locality A-3188.

Figure 5. *Cyclopecten* sp. cf. *C. pernomus* (Hertlein, 1935). Right valve. UCMP 37533; length 4.4 mm, height 4.8 mm. UCMP loc A-1407.

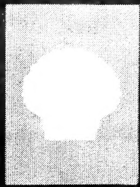
Figure 6. *Argopecten* sp. cf. *A. mendenhalli* (Arnold, 1906). Left valve?. UCR5035/11; length 17.1 mm, height 18.1 mm. UCR loc 5035

Figure 7. *Argopecten sverdrupi* (Durham, 1950). Right valve. UCR 5042/23; length 39.1 mm, height 34.6 mm. UCR loc 5042.

Figure 8. *Leptopecten (Leptopecten) palmeri* (Dall, 1897). Left valve. UCR 4777/11; length 26.3 mm, height 27.6 mm. UCR loc 4777.

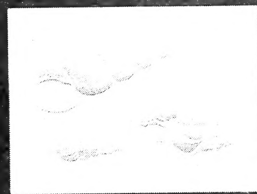
Figure 9. *Dendostrea? vespertina* (Conrad, 1854). Right valve. LACMIP 7163; length 31.1 mm, height 38.1 mm CIT loc 187.

Figure 10. *Dendostrea angelica* (Rocheburne, 1895). Left valve. LACMIP 7164; length 79.5 mm, 80.5 mm. UCR loc 8595.

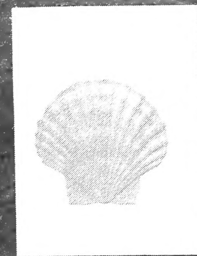

HB 602
Congratulations on your Birthday!

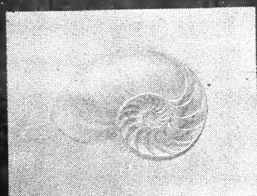
Congratulations on your Birthday, (HB) $1.00; white shell on pale purple background.

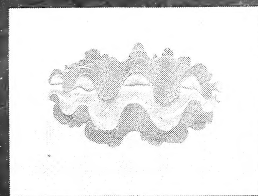
# PASTELS


P 207 (Pink)

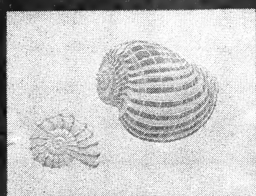

P 208 (Lavender)


P 201 (Yellow)


P 216 (Blue)


P 202 (Peach)


P 217 (Pink)


P 203 (Peach)


P 218 (Peach)

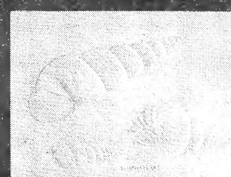

P 150 (Peach)

PASTELS blank notes $1.00 each; colored shells on cream background.


BL 645

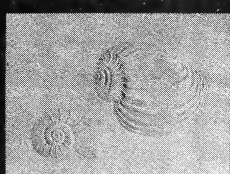

BL 644


BL 640


BL 646

# BLIND EMBOSSED Blank Notes


BL 643


BL 637

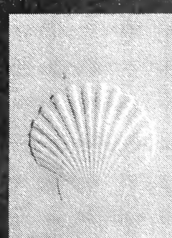

BL 636

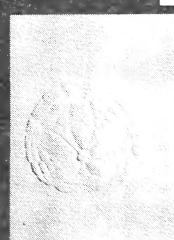

BL 639

BLIND EMBOSSED blank notes $0.70 each; embossed shells on cream colored card

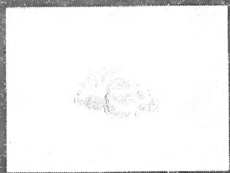

BL 638


BL 635

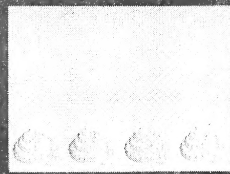

BL 642


BL 641

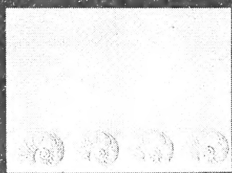
# PREMIER PASTELS Blank Notes



PP 634 (Pink)

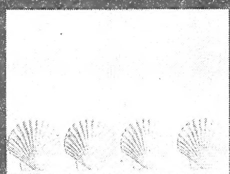


PP 632 (Peach)



PP 626 (Pink)

PREMIER PASTELS blank notes (PP) $1.25 each; pastel embossed shells on cream background.



PP 631 (Lavender)

PP 627 (Pink)

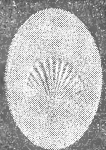
# NEW PASTELS Blank Notes

NP 56

NP 53

NEW PASTELS blank notes (NP) $1.00 each; pastel embossed shells on blue background.

# GOLD FOIL STICKERS



90 Scallop

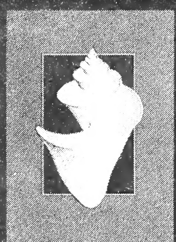
85 Imperial Harp

84 Wentletrap

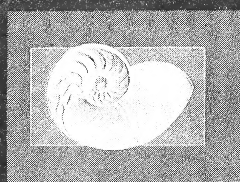
GOLD FOIL STICKERS $0.25 cents each, 5 for $1.00, roll of 200 $30.00.

NAUTICALS blank notes (N) $1.00 each; pastel colored shells on blue backgrounds.

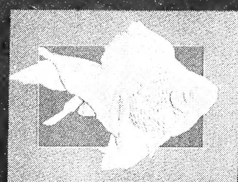
# NAUTICALS Blank Notes



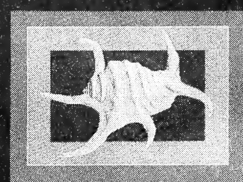
N 76



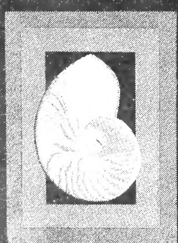
N 66



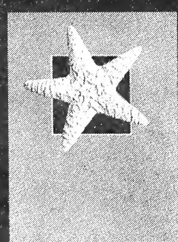
N 63



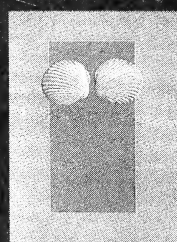
N 61



N 75

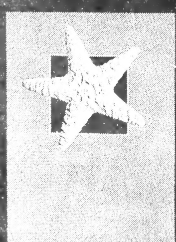


N 62

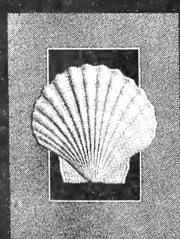


N 68

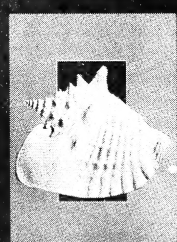
N 69



N 62



N 70



N 67

N 64

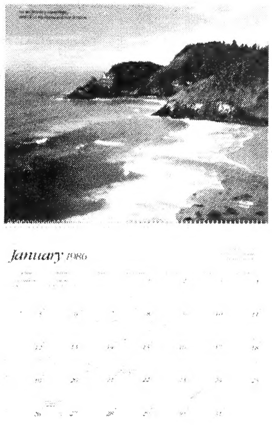
# *Seascapes*

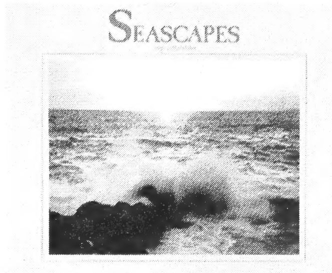
1986 CALENDAR

Man has always been drawn to the sea—awed by the roaring rush of the surf, soothed by the haunting hush of the tide. The very nip of salt air is here, in a full year of photo and verse celebrating the power and peace of the ocean. Available with or without scripture verses.

**Product #14510**
ISBN 0-89505-300-4

12″ x 10″
$6.95



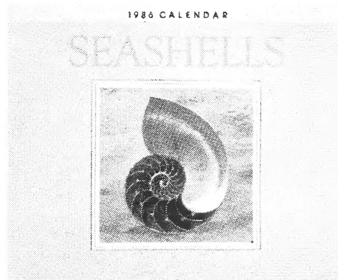



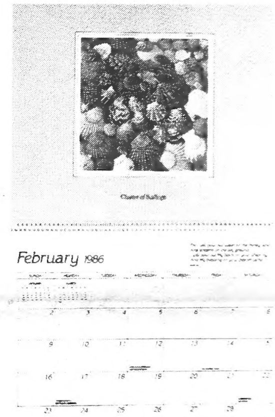

# *Seashells*

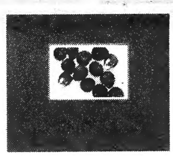
1986 CALENDAR

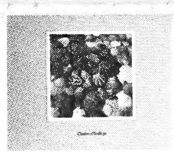
Colorful treasures plucked from the sand and sea adorn each page of this charming calendar. Accompanying each photograph taken by Pete Carmichael is a legend of the shell: its name, description, and where it can be found. A unique collection for armchair beachcombers!

**Product #14620**
ISBN 0-89505-312-8
12″ x 10″
$6.95



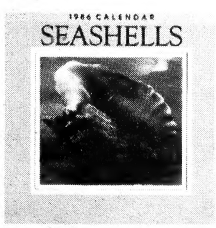


# *Seashells*

1986 PERSONAL-SIZE CALENDAR

Carry your seashell collection everywhere—it's easy to do with this convenient personal-size calendar with photographs by Pete Carmichael. Each month features a different sea-treasure—like the tropical Purple Sea Snail, the delicately beaded Strawberry Top Shell, and the glistening , iridescent Abalone. The calendar's handy size makes it small enough to fit in purse or drawer, yet roomy enough to record all sorts of reminders.

**Product #14700**
ISBN 0-89505-322-5
5¾″ x 5¾″
$3.25




SEASHELL TREASURES BOOKS

Shells and Sea Life Publications
1701 Hyland, Bayside, CA 95524 U.S.A
Sally Bennett and Steven J. Long
(707) 822-1024

## ORDER FORM

NAME __________
STREET __________
CITY/STATE __________ ZIP ______

| QTY | NUMBER | | PRICE |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | TOTAL COST ............... | |
| | | SALES TAX– ........ | |
| | | SHIPPING WITHIN USA– ............. | |
| | | SHIPPING OUTSIDE USA – | |
| | | TOTAL AMOUNT—Enclose payment in U.S. Dollars ONLY ........... | |

Please Print Clearly

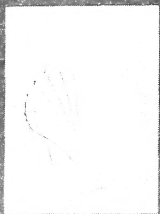
☐ Total Payment Enclosed ☐ ☐ VISA

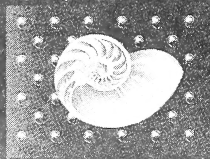
Card # __________

Exp. Date ______ Signature ______ (Required for Charge Orders Only)

# GRAPHIC PATTERNS

CURTIS SWANN


GP 17


GP 119

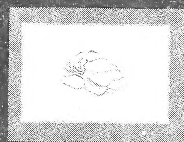

GP 125

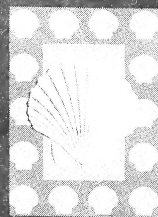

GP 24


GP 154


GP 155


GP 33

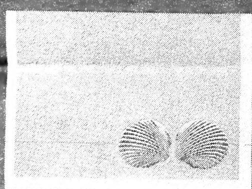

GP 35

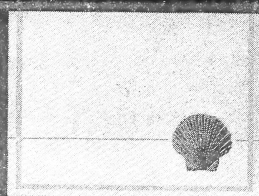

GP 25


GP 169

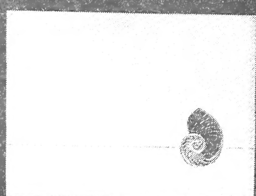
GRAPHIC PATTERNS note cards (GP) $1.00; white embossed shells and sea life on pastel colored backgrounds.

# PRESTIGE Blank Notes

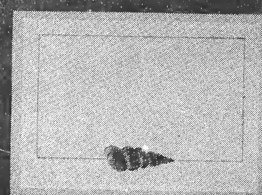

PR 331


PR 329

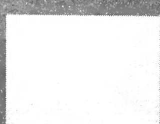

PR 334

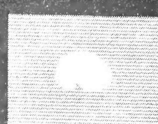

PR 330

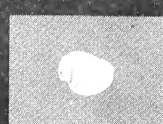
PRESTIGE blank notes (PR) $1.50 each; gold and silver embossed shells on heavy pastel colored card.


PR 333

# GIFT ENCLOSURES


GE 1016


GE 1017


GE 1013


GE 1009

GIFT ENCLOSURES (GE) $0.40 each; White shells on a blue (GP 1009, 1013) or purple (GE 1017, 1016) backgrounds.

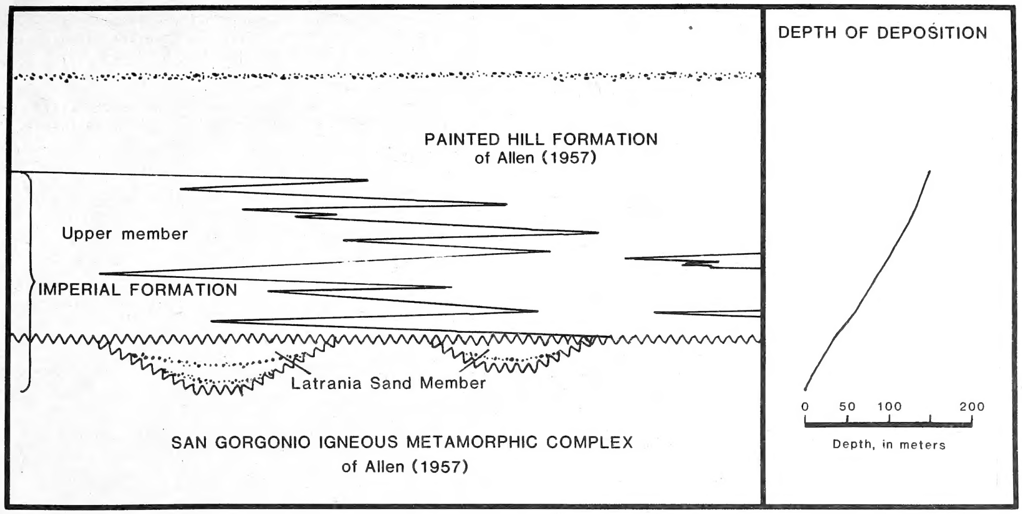



Figure 2. Stratigraphic relationships of the unnamed upper member and the Latrania Sand Member of the Imperial Formation, and their inferred depths of deposition along Super Creek, Riverside County, California.

### Garnet Hill Area

About 17 m of the Latrania Sand Member are poorly exposed on Garnet Hill. These beds are composed of coarse- to fine-grained sandstone with abundant gneissic and marble clasts as much as 2 m in diameter. Some of these clasts have been bored by lithophagid bivalves (identified by G. L. Kennedy, oral commun., 1984). Also present on some of the clasts are poorly preserved specimens of *Spondylus* sp. and *Dendostrea* sp. cf. *D. angelica. Pycnodonte heermanni* is abundant as float on the south slope of Garnet Hill. These species, although inconclusive as to their environmental parameters, suggest shallow water depths with at least some areas of exposed rocks.

### Willis Palm Area

The Imperial Formation at Willis Palm consists of about 53 m of generally fine-grained sandstone and siltstone. Three shell beds are exposed in this section. The first contains unidentifiable mollusk fragments, crab chelipeds, and the gastropod *Melampus* sp., which suggests a salt marsh environment. About 2 m above this bed is a 2-m-thick oyster bioherm composed of flat to slightly plicate *Dendostrea? vespertina.* This bioherm suggests a moderately shallow bay or lagoonal environment. The third shell bed, about 15 m above the base of the formation, is 20 cm thick and composed of abundant well preserved shells. This bed is characterized by the bivalve mollusks *Leptopecten palmeri* (Dall), *Cyclopecten* sp. cf. *C. pernomus*, *Cyrtopleura costata* (Linnaeus), and abundant corbulids. These species suggest shallow water depths between 1 and 90 m. Benthic foraminifers from this section indicate shallow water (K. A. McDougall, written commun., 1984). Fossils from throughout the Willis Palm section indicate that water depths increased from very shallow inner neritic (< 10 m) at the first shell bed to a maximum depth of inner neretic (10 - 50 m) just above the top shell bed, and then shallowed to less than 10 m at the top of the formation.

## CONCLUSIONS

Other exposures of the Imperial Formation are present in Riverside County but were either inaccessible during the present study (Lions Canyon) or contained such a meager fauna that paleoecological analysis was impossible (Edom Hill).

The sections at Super Creek and Garnet Hill appear to be older than those exposed at Willis Palm. These relative-age estimates are based on biostratigraphic data and on an unpublished K/Ar date on a basalt flow in the Painted Hill Formation along Super Creek (J. C. Matti, personal commun., 1984). The Super Creek section seems to represent a deepening basin: the intertidal or shallow subtidal rocky shore facies of the Latrania Sand Member at the base of the formation grades into middle and outer neritic, fine-grained, continental-shelf facies of the upper member at the top of the formation. Sediments exposed at Garnet Hill appear to represent the same environment as represented by the Latrania Sand Member at Super Creek. The Willis Palm section represents a transgressive-regressive sequence starting with a salt marsh environment, which grades upsection into a shallow lagoon or bay, characterized by an oyster bioherm. This is followed further upsection by 2 slightly deeper, possibly open marine environment, which again changed to shallow or possibly intertidal depths at the top of the formation.

### Literature Cited


Allen, C. R., 1957, San Andreas fault zone in San Gorgonio Pass, southern California. Bulletin of the Geological Society of America, 68 (3):315-350, figs. 1-3, pls. 1-6.

Bernard, F. R.,1983, Catalogue of the Living Bivalvia of the eastern Pacific Ocean: Bering Strait to Cape Horn. Canadian Special Publication of Fisheries and Aquatic Sciences, 61: 1-102.

Keen, A. M., and Bentson, Herdis, 1944, Checklist of California Tertiary marine mollusks. Geological Society of America, Special Paper 56: 1-280.


* * * * *

# Bibliography

Gary McDonald

Farley, J., W. Richards, & D. L. Alkon. 1983.
Evidence for an increased voltage-dependent calcium current in *Hermissenda* B photoreceptors during retention of associative learning. Biophysical J 41(2 part 2):294a.

Gal'perin, M. V. 1983.
A simulation study of a fouling community: mathematical formalization of interspecific interaction processes. Okeanologiya 23(3):469-477.

Gardner, N. W. 1979.
*Pseudovermis hancocki* Challis. Poirieria 10(4):66.

Golikov, A. N., & Ya. I. Starobogatov. 1972.
Mollusca - Gastropoda Cuvier, 1797, pp. 65-166. In: V. A. Vodyanitzkii (Ed.). Identification keys to the fauna of Black & Azov Seas, vol. 3, free living invertebrates, arthropods (besides Crustacea), Mollusca, Echinodermata, Chaetognatha, 340 pp. Naukova Dumka, Kiev. [in Russian].

Gorzula, S., & K. Cameron. 1976.
A population explosion of *Aeolidia papillosa* at Keppel Pier, Millport, Island of Cumbrae. Western Nat. 5:67-69.

Grode, Stephen H., & John H. Cardellina II. 1984.
Sesquiterpenes from the sponge *Dysidea etheria* and the nudibranch *Hypselodoris zebra*. J Natural Products 47(1):76-83.

Gulliksen, B. 1977.
Studies from the 'UWL Helgoland' on the macrobenthic fauna of rocks and boulders in Lubeck Bay (western Baltic Sea). Helgolander wissenschaftliche Meeresuntersuchungen 30(1-4):519-526.

Hadfield, M. G. 1977.
Chemical interactions in larval settling of a marine gastropod. NATO Conf. Ser. (Mar. Sci.) 1:403-414.

Hadfield, M. G., & L. S. Ciereszko. 1978.
Action of cembranolides derived from octocorals on larvae of the nudibranch *Phestilla sibogae*, pp. 145-150. In: P. N. Kaul & C. J. Sindermann (Eds.). Drugs and food from the sea. Myth or reality. 488 pp. Univ. Oklahoma Press.

Hagiwara, S., & N. Saito. 1959.
Voltage current relations in nerve cell membrane of *Onchidium verruculatum*. J Physiology 148:161-179.

Harris, L. G. 1978.
Visual predation and the co-evolution of nudibranch associations. Haliotis 9(2):53.

Hedley, C. 1909.
Mollusca from the Hope Islands, North Queensland. Proceedings Linnean Society New South Wales 34:420-466.

Hochlowski, Jill E., D. John Faulkner, Gayle K. Matsumoto, & Jon Clardy. 1983.
Norrisolide, a novel diterpene from the dorid nudibranch, *Chromodoris norrisi*. J Organic Chemistry 48(7):1141-1142.

Hopkins, T. S., D. R. Blizzard, & D. K. Gilbert. 1977.
The molluscan fauna of the Florida Middle Grounds with comments on its zoogeographical affinities. Northeast Gulf Science 1(1):39-47.

Hume, R. I. 1980.
Organization and generation of motoneuron bursts during escape swimming in *Tritonia*. Dissertation Abstracts International (B) 40(1):5155.

Humes, A. G. 1975.
Cyclopoid copepods associated with marine invertebrates in Mauritius. Zoological J Linnean Society 56(2):171-181.

I.C.Z.N. 1969.
Opinion 883. *Cavolinia* Abildgaard, 1791 (Gastropda); grant under the plenary powers of precedence over *Cavolinia* Bruguiere, 1791. Bulletin Zoological Nomenclature 26:28-31.

Jaeckle, W. B. 1983.
Additions to the opisthobranch mollusk fauna of Marin county, California, with notes on the biology of certain species. Veliger 26(2):93-95.

Johnson, S. 1978.
Observations -- the nudibranchs. Hawaiian Shell News 26(8):6.

Johnson, S. 1978a.
Observations -- the nudibranchs. Hawaiian Shell News 26(7):4.

Johnson, Scott, & Lisa M. Boucher. 1983.
Notes on some Opisthobranchia (Mollusca: Gastropoda) from the Marshall Islands, including 57 new records. Pacific Science 37(3):251-291.

Kempf, Stephen C. 1984.
Symbiosis between the zooxanthella *Symbiodinium (=Gymnodinium) microadriaticum* (Freudenthal) and four species of nudibranchs. Biological Bulletin 166(1):110-126.

Kuzirian, A. M. 1978.
The New England Coryphellidae, the genus *Chlamylla* Bergh, 1886 and their phylogenetic relationship to the higher Aeolidacea. Haliotis 9(2):89.

Kuzirian, A. M. 1978a.
A monographic study of the New England Coryphellidae (Gastropoda: Opisthobranchia). Dissertation Abstracts International (B) 39(2):598-599.

Lauckner, G. 1980.
Diseases of Mollusca: Gastropoda, pp. 311-424. In: O. Kinne (Ed.). Diseases of marine animals, vol. 1, general aspects, Protozoa to Gastropoda, 466 pp. J. Wiley & Sons.

Lewis, N. S. 1976.
Dynamics of periodic neural systems. Dissertation Abstracts International (B) 36(10):4815.

Longley, R. D. 1977.
Analysis of the feeding mechanism in the mollusc *Tritonia*. Dissertation Abstracts International (B) 37(9):4279.

Luque, Angel A. 1983.
Contribucion al conocimiento de los gasteropodos de las costas de Malaga y Granada. I. Opistobranquios (I). Iberus 3:51-74

Marcus, E. 1983.
The western Atlantic Tritoniidae. Boletim de Zoologia 6:177-214.

Melville, R. V. 1978.
Tethyidae in gastropods, sponges and ascidians: proposals to remove the homonymy. Z.N.(S.) 1780. Bulletin Zoological Nomenclature 34(4):247-251.

Mienis, H. K. 1980.
Additional remarks on the Erythraean molluscs mentioned in the catalogue of the collection of della Chiesa di Cervignasco. Levantina No. 26, pp. 296-297.

Nestler, Eric J., & Paul Greengard. 1983.
Protein phosphorylation in the brain. Nature 305(5935):583-588.

Nordsieck, F. 1972.
Die europaischen Meeresschnecken (Opisthobranchia mit Pyramidellidae; Rissoacea), xiii + 327. Gustav Fischer Verlag, Stuttgart.

Norris, A. 1977.
Report of the conchological section of 1975-76. Naturalist, Leeds, 102(940):32-33.

Nybakken, J. W. 1981.
Nudibranchs. Monterey Life 2(3):79.

Okuda, Roy K., Paul J. Scheuer, Jill E. Hochlowski, Roger P. Walker, & D. John Faulkner. 1983.
Sesquiterpenoid constituents of eight porostome nudibranchs. J Organic Chemistry 48(11):1866-1869.

Orr, J. 1980.
Annotated checklist of Hong Kong nudibranchs, pp. 109-117. In: B. Morton (Ed.). The malacofauna of Hong Kong and southern China, vi + 345 pp. Hong Kong Univ. Press.

Ortea, J. A. 1976a.
Catalogo brevemente comentado de la fauna de moluscos marinos gasteropodos y bivalvos existentes in el estuaria de villaviciosa. Asturnatura 3:109-120.

Partaly, E. M. 1979.
The fouling molluscs in the Sea of Azov, pp. 116-117. In: I. M. Likharev (Ed.). Sixth meeting on the investigation of mollusca. Molluscs. Main results of their study. Abstracts of communications. Nauka, Leningrad, 261 pp. [In Russian]

Picton, B. E. 1978.
Some aspects of the taxonomy and biology of *Coryphella* species in the British Isles. Haliotis 9(2):88.

Picton, B. E., & G. H. Brown. 1978.
A new species of *Cuthona* (Gastropoda: Opisthobranchia) from the British Isles. J Conchology 29(6):345-348.

Poizat, C. 1978.
Gasteropodes mesopsammiques de la mer d'Irlande (Portaferry, Northern Ireland) ecologie & distribution. Haliotis 9(2):11-20.

Pruvot-Fol, A. 1938.
Addition bibliographique a la contribution IV. Opisthobranchia. Memoires l'Institut d'Egypte 37:289.

Rao, K. V., & L. Krishna Kumari. 1973.
Structure and early development of an opisthobranch mollusc,

*Caloria militaris* (Alder & Hancock). Indian J Marine Science 2(1):32-37.

**Rao, K. V., & L. Krishna Kumari.** 1977.
On some aspects of taxonomy, structure and early development of the nudibranchiate gastropod, *Discodoris fragilis* (Alder and Hancock). J Marine Biological Association India 16(3):689-699.

**Rikmenspoel, R.** 1975.
Contractile model for cilia, pp. 273-288. In: T. Y.-T. Wu, C. J. Brokow, & C. Brennen :(Eds.). Swimming and flying in nature, vol. 1, xv + 421 pp.

**Riva, A., & N. Vicente.** 1978. [for 1976]
Etude de gasteropodes nudibranches de la lagune du Brusc (Var). 1. Influence des facteurs du milieu sur la biologie de trois especies de nudibranches: *Aeolidiella alderi, Spurilla neapolitana, Favorinus branchialis*. Haliotis 7:39-43.

**Riva, A., & N. Vicente.** 1978a. [for 1976]
Etude de gasteropodes nudibranches de la lagune du Brusc (Var). 2. Rapports trophiques entre les nudibranches *Aeolidiella alderi, Spurilla neapolitana* et un anthozoaire *Parastephanauge pauxi*. Haliotis 7:112-115.

**Riva, A., & N. Vicente.** 1978b. [for 1976]
Etude de gasteropodes nudibranches de la lagune du Brusc (Var). 3. Observations d'algues symbiotiques dans l'organisme de *Aeolidiella alderi, Spurilla neapolitana* et *Favorinus branchialis*. Haliotis 7:116-119.

**Roginskaya, I. S.** 1978.
First deep-sea records and range extensions of the nudibranchiate mollusc *Coryphella stimpsoni* (Verrill) (Gastropoda, Opisthobranchia). Trudy Instituta Okeanologii, Akademiia Nauk SSSR 113:169-177. [In Russian]

**Rose, R. A.** 1983.
Lecithotrophic development of *Hoplodoris nodulosa* (Opisthobranchia, Gastropoda). J Malacological Society Australia 6(1/2):63-70.

**Rossouw, G. J.** 1978.
Contributions to the morphology and histology of the genital system of *Glossodoris capensis* Barnard (Nudibranchiata: Glossodorididae). Annale Universiteit Stellenbosch (Ser. A2) 1(2):1-30.

**Russell, H. D.** 1977.
A glimpse of Bermuda nudibranchs. Newsletter Bermuda Biol. Stn. Res. 6(2):1 p.

**Ryland, J. S.** 1976.
Physiology and ecology of marine bryozoans. Advances Marine Biology 14:285-443.

**Salvini-Plawen, L, & G. Chandrasekhara Rao.** 1973.
On three new mesopsammobiotic representatives from the Bay of Bengal: species of *Anthohydra* gen. nov. (Hydrozoa) and of *Pseudovermis* (Gastropoda). Zeitschrift fur Morphologie der Tiere 74(3):231-240.

**Schreiber, G.** 1931.
Studi sul pigmento cromolipoide, l'apparats fenestrato e la respirazione di supplements del sistema nervoso. Pubblicacioni della Stazione Zoologica di Napoli 10:151-195, pls. 1-6.

**Sebens, Kenneth P.** 1983.
The larval and juvenile ecology of the temperate octocoral *Alcyonium siderium*: 2. Fecundity, survival and juvenile growth. J Experimental Marine Biology & Ecology 72(3):263-286.

**Shoukimas, J. J., & D. L. Alkon.** 1983.
Effect of voltage dependent potassium conductances upon initital generator response in B photoreceptor of *Hermissenda crassicornis*. Biophysical J 41(2 part 2):37a.

**Slawsky, M. T.** 1980.
Presynaptic inhibition in the marine mollusk *Tritonia diomedea*. Dissertation Abstracts International (B) 40(1):5160.

**Smith, David A., & Kenneth P. Sebens.** 1983.
The physiological ecology of growth and reproduction in *Onchidoris aspera* (Gastropoda: Nudibranchia). J Experimental Marine Biology & Ecology 72(3):287-304.

**Smith, S. M.** 1973.
Progress report on census area 7, 30, 31 and 32. Conchologist's Newsletter No. 46, pp. 326-330.

**Snow, R. W.** 1979.
Synaptic physiology and pharmacology of an identified command interneuron in *Tritonia diomedea*. Dissertation Abstracts International (B) 40(3):10-83.

**Sordi,. M.** 1976.
Catture occasionali e reperti di specie animali finora non segnalate nell Alto Tirreno. Atti della Societa Toscana di Scienze Naturali Processi Verbali e Memorie (Serie B) 83:138-145.

**Subba Rao, N. V., & K. V. Surya Rao.** 1980.
On a rare nudibranch, *Thordisa crosslandi* Eliot (Mollusca: Dorididae) from the west coast of India. Bulletin Zool. Surv. India 2(2-3):219.

**Tardy, J., & M. Bordes.** 1978.
Regime, preferendum et ethologie predatrice des Aeolidiidae des cotes de France. Haliotis 9(2):43-52.

**Tardy, J., & M. Dufrenne.** 1978. [for 1976]
Effets du groupement et du volume disponible sur la sexualite du mollusque nudibranche *Eubranchus doriae* (Trinchese 1879). Haliotis 7:66-68.

**Thompson, S. H.** 1976.
Membrane currents underlying bursting in molluscan pacemaker neurons. Dissertation Abstracts International (B) 37(3):1089-1090.

**Treece, G. D.** 1979.
Living marine mollusks from the south Texas continental shelf. Texas J Science 31(3):271-283.

**Tsikhon-Lukanina, E. A., I. N. Soldatova, I. A. Kuzentsova, & I. N. Il'in.** 1977.
Macrofouling community in the Strait of Tunisia (Sicily). Oceanology 16(5):519-522.

**Urgorri, V., & C. Besteiro.** 1983.
A checklist of the opisthobranch mollusks from Galicia. Investigacion Pesquera 47(1):3-28. [in Spanish]

**Vicente, N.** 1975.
Une nouvelle espece de gasteropode nudibranche en Mediterranee: *Facelina gabinierei* nov. sp. Travaux Scient. Parc Natn. Port-Cros 1:67-74.

**Wells, F.** 1979.
Surface nudibranchs. Australian Shell News, No. 25, p. 6.

**Willan, Richard C.** 1983.
Description of the aeolid nudibranch *Favorinus tsuruganus* from eastern Australia. J Malacological Society Australia 6(1/2):71-79.

**Williams, R. J., E. J. van der Wal, & J. Story.** 1978.
Draft inventory of introduced marine organisms. Australian Mar. Sci. Bull., No. 61, p. 12.

## CLASSIFIED ADS

Advertisers are solely responsible for their material. Rates: $2.50 per line. Payment must accompany ad copy. 30 characters and spaces per line. Partial lines count as full lines. Display ads within this section $17.50 per column inch. Current subscribers receive a 10% discount on their ads. No other discounts are available. All display copy must be camera-ready. We reserve the right to modify copy to fit paid lines. SPECIAL — 25 words or less for 3 months $25.00 prepaid.

### FOR SALE — RETAIL

SPECIMEN SHELLS including chitons from the Pacific Coast of Canada. Free list, G.B. Jeffrey, 3820 Bowen Drive, Richmond, B.C. Canada, V7C 4E1, (604) 271-1824 (8-85)

Conus granulatus — for sale or trade. Self collected specimens priced to fit any pocketbook. Good to live gem; $50-$500. Write or call for particulars. Tom Honker, Box 1011, Delray Beach, FL 33444. 305-276-9658 (8-85)

I am disposing of very fine Florida tree snails Liguus fasciatus and a few sets of Cuban Polymita from my personal collection. Write for free list. No dealers please. Archie L. Jones, 8025 SW 62 Court, Miami, FL 33143.

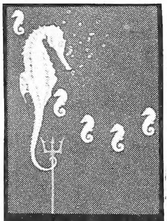
OUT-OF-PRINT BOOKS; major library acquisitions. Send for new list. Richard E. Petit, P.O. Box 30, North Myrtle Beach, SC 29582, U.S.A.

WORLD'S LARGEST ASSORTMENT FOR MEDITERRANEAN SHELL BOOKS, SEA SHELLS, LAND SNAILS, EXTINGUISHED FOSSIL SHELLS. 60 page price list free on request. Write to: OSTINI MAURIZIO — C.P. 42 — 00055 LADISPOLI RM — ITALY —

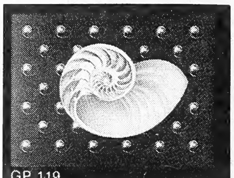
SHELLS ON STAMPS — A beautiful addition to your shell collection! Send your want list! Jack and Myrna Golden, Golden Associates Stamp Co., P.O. Box 484, Cedarhurst, NY 11516

WORLD WIDE SEA SHELLS for collectors. Free Price List. Sea Gems, 2002 Margaret Drive, Wichita Falls, Texas, 76306

NEW CURTIS SWANN NOTE CARDS — PRESTIGE blank notes (PR) $1.50 each; gold and silver embossed shells on heavy pastel colored card. GRAPHIC PATTERNS note cards (GP) $1.00; white embossed shells and sea life on pastel colored backgrounds. PREMIER PASTELS blank notes (PP) $1.25 each; pastel embossed shells on cream background. NAUTICALS blank notes (N) $1.00 each; pastel colored shells on blue backgrounds. Congratulations on your Birthday, (HB) $1.00; white shell on pale purple background. NEW PASTELS blank notes (NP) $1.00; colored shells on blue backgrounds. PASTELS blank notes (P) $1.00 each; colored shells on cream background.


GP 155

BLIND EMBOSSED blank notes (BL) $0.70 each; embossed shells on cream colored card. GIFT ENCLOSURES (GE) $0.40 each; White shells on a blue (GP 1009, 1013) or purple (GE 1017, 1016) backgrounds. GOLD FOIL STICKERS $0.25 cents each, 5 for $1.00, roll of 200 $30.00. Seashell Treasures Books, 1701 Hyland St., Bayside, CA 95524


GP 119

### RENTALS

SHELLING & FISHING from Marco Island. Reasonable rates and good accomodations — Bianchi's Pink House Efficiency Motel; 310 Pear Tree Ave.; Goodland, FL 33933. Telephone (813) 394-3498

### SERVICES

BOOK RESTORATION - Sandra Redmond, 1723 Myrtle, Eureka, CA 95501 (707) 445-8918

### WANTED TO BUY

LIBRARIES — Natural History and Fossils. Send list for quote. Seashell Treasures Books, 1701 Hyland, Bayside, CA 95524.

**TELL ADVERTISERS YOU SAW THEM IN S&SL!**

FOR BEAUTIFUL DISPLAY
USE ACRYLIC STANDS BY VENUS
Pleasing Customers Since 1973
WHOLESALE ONLY — WRITE
**VENUS DISPLAYS**
Box P, 10713 Ashby Ave., Los Angeles, Calif. 90064
*Special stands for shells.* Tel.: (213) 836-3177

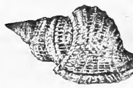
Tidepool Gallery
Phone (213) 456-2551
22762 Pacific Coast Hwy.
Malibu, California 90265
**RARE SHELLS OUR SPECIALTY**
Largest stock of worldwide specimens on the West Coast. Plus unique and beautiful fine art, carvings, handcrafted jewelry. Weavings — All related to the Sea.
RETAIL ONLY — No Lists of Catalogues
We do our best to answer specific requests sent by mail.
*Ask any collector!*
Specimen shells graded by the HMS-ISGS

Shells • Coral • Jewelry • Gifts

**THE SHELL STORE**
440 - 75th Avenue
St. Petersburg Beach, FL 33706
Between Blind Pass Road
and Gulf Boulevard
Phone 360-0586
WRITE FOR FREE PRICE LIST
CONUS spurius atlanticus
ROBERT LIPE
BETTY LIPE

**PHILLIP W. CLOVER**
COLLECTOR & DEALER IN WORLDWIDE SPECIMEN SEA SHELLS
CURRENT AND OUT OF PRINT SHELL BOOKS
FREE PRICE LISTS UPON REQUEST
**P.O. Box 83, Glen Ellen, CA 95442**

*The Abbey*
*Specimen Shells*
**P.O. Box 3010**
**Santa Barbara, CA 93130**
**(805) 963-3228**
**Over 3,000 species regularly in stock! We will select your shells as if they were for our own collection . . . and we're very, very picky!**
**Bob Foster & Charles Glass**



Tom Shepherd
*Specimen Sea Shells*
2222 Beech Street
Virginia Beach, VA 23451
**Free Price List Upon Request**

SHELLS and CORALS
THE SHELL GALLERY
77 UNION STREET
NEWTON CENTRE MASSACHUSETTS 02159
617 244-7018

**THE SHELL CONNECTION**

. . . Buys, Sells and Exchanges
Worldwide Specimen Shells
**FREE PRICE LIST**
P.O. Box 651
Bethel Park, PA 15102 USA
412-854-3148

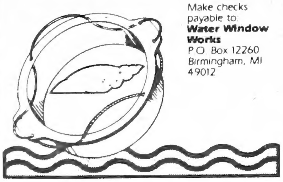
**TELL ADVERTISERS YOU SAW THEM IN S&SL!**

## The Water Window

Here's a **new** easy-to-use underwater viewer that makes finding shells, rocks and collectibles fun and profitable for waders of all ages. Discovering valuables is as simple as picking them out of a fishbowl with the Water Window's 20" diameter, scratch-resistant lens. Sturdy handles allow a flick of the wrist to put your window to the treasures of the ocean floor exactly where you want it. Order two or more and put dollars back in your pocket.

**NEW Water Window Accessories!**

Nylon mesh Shell Bag $1.50; 2-foot rigid acrylic Handle $3.50; Water Window acrylic Polish $3.75. Please enclose $39.95 plus $2.00 for shipping and handling per window. $70 for 2. Each additional - $35. Allow 2-4 weeks for delivery.



Make checks payable to:
**Water Window Works**
P.O. Box 12260
Birmingham, MI
49012

*Derry's*
SHELL SHELTER
**WORLD WIDE SHELLS**
Specimen Quality
P.O. Box 3519, Fullerton, CA 92634 U.S.A.
From Common to Ultra Rare
Telephone: 714-992-1030 "Cable Dershell"
No Lists-Please Send for *Wants.*

**House of Quality and Service**
**RICHARD M. KURZ, INC.**
1575 NORTH 118th STREET
WAUWATOSA, WI 53226 U.S.A.
*Dealer in Fine and Rare Specimen Shells of Superior Quality*
*The very best shells, at the very best prices*
WRITE FOR FREE PRICE LIST
**SHELLS BOUGHT, SOLD AND TRADED**
LARGEST MAIL ORDER SEASHELL DEALER IN THE U.S.A.

**THOMAS HONKER**
P.O. Box 1011 — 25 N.E. 10th Street
Delray Beach, Florida 33444
Phone: (305) 276-9658
Dealer in finest quality worldwide specimen shells for the discriminating collector. Caribbean specialist. Extensive stock both marine and land, uncommon to rare. Your want lists and inquiries invited. Send for Free Price List. HMS-ASGS

VISA
**EDWARD T. SCHELLING**
MasterCard
BUY SELL TRADE

Worldwide Specimen Shells
Marine Freshwater Fossils
I.S.G.S. Standards
Personalized Service
Free Monthly Price List
Shelling with Schelling
P.O. Box 68 Shalimar, Florida 32579 U.S.A. (904) 244-5646

*WORLDWIDE SPECIMEN SHELLS*
*Your ONE STOP Marine & Land Shell Connection*
*Wide Variety of Select Quality Specimens - "Knowledgeable & Courteous Service"*
*Write for Free Illustrated List*
*Richard Goldberg / Worldwide Specimen Shells*
*P.O. Box 137, Fresh Meadows, N.Y., 11365, U.S.A.*
NEW TELEPHONE — (718) 357-6467

*The Shell Cabinet*
12991 Bristow Road, Nokesville
Virginia 22123 U.S.A.
*Specimen Shells and Natural History Books*
Successor to
M.E. Young
Richard E. Petit
and John Q. Burch