



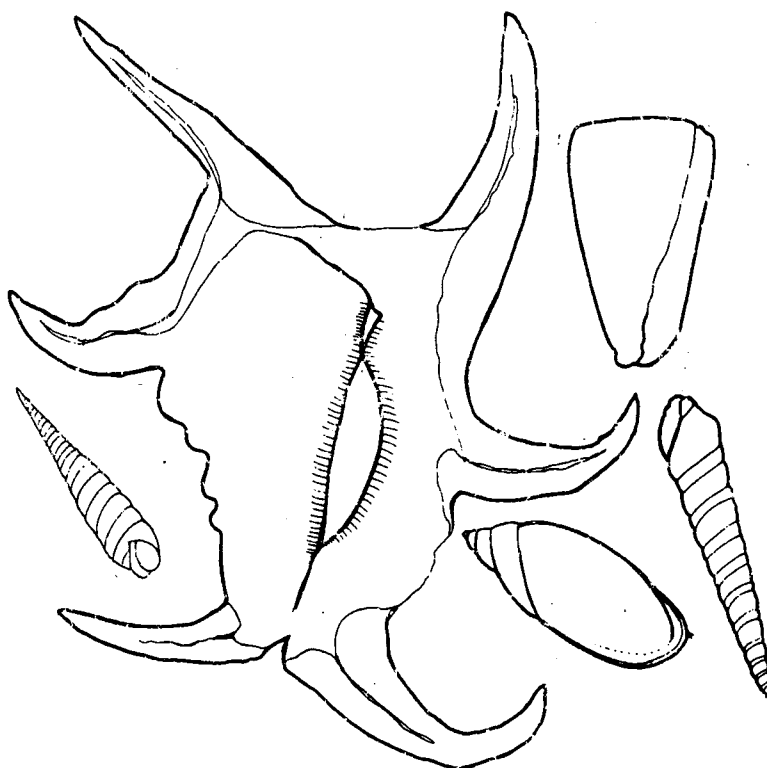
SOUTH PACIFIC COMMISSION

THE SPECIMEN SHELL RESOURCES OF FIJI

**Report prepared for the South Pacific Commission
and the Government of Fiji**

by

**Brian J. Parkinson
Conchologist**



**South Pacific Commission
Noumea, New Caledonia
August 1982**

ERRATUM

The specimen shell resources of Fiji by Brian J. Parkinson

Page 6 - The photographs should be transposed.

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PREFACE

This study was undertaken in response to a request from the Government of Fiji for the services of an expert in specimen shells to advise on the feasibility of establishing a small-scale specimen shell industry in Fiji. The consultant, Mr Brian Parkinson, is Shell Project Officer with the Department of Commerce in Papua New Guinea, where his efforts to promote the collection and export of marine and terrestrial shells have been instrumental in the establishment of a viable village-level shell industry. It is anticipated that the information and advice contained in this report will be relevant, in part at least, to many other Pacific Island countries.

The South Pacific Commission would like to record its appreciation for the co-operation and assistance of the Papua New Guinea Government, who generously made Mr Parkinson's services available for the duration of the consultancy.

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INTRODUCTION

Fijian Fisheries authorities have for some time been interested in the possibility of establishing a small-scale specimen shell industry in Fiji, and have looked to the successful Papua New Guinea Shell Project as an appropriate development model to follow, as many of the aims and objectives of both countries are similar. This project was initiated with the primary objective of bringing supplementary revenue into coastal villages through the utilisation of an unexploited resource. Since shells are a non-perishable commodity, collecting shells is an activity which can be carried out even in the most remote rural areas. From the collection of a few of the more spectacular species of shells for sale to tourists, the shell industry in Papua New Guinea has now progressed to the stage where several hundred species of shells, formerly neglected, are marketed to the benefit of remote villages in many parts of the country.

The present survey (9 June - 12 July 1981) was undertaken to determine whether the establishment of a similar village shell project would be feasible in Fiji, where conditions are in many respects similar to Papua New Guinea.

The specific terms of reference for the survey were as follows:

- (i) To report on the potential for the development of a small-scale specimen shell industry in Fiji.
- (ii) To advise on suitable collection techniques and methods of shell preparation.
- (iii) To identify and advise on possible marketing problems.
- (iv) To advise on options for the promotion of a shell industry in Fiji with recommendations for Government action.

SURVEY RESULTS

To ascertain if specimen shells were present in sufficient numbers to support an industry, three areas in Fiji (Figure 1) were visited by a team of divers during the period 11 June to 8 July 1981. Results are summarised below:

<u>Survey area</u>	<u>No. stations surveyed</u>	<u>No. shells species recorded</u>
1. Suva Harbour (Figure 2)	14	29
2. Suva-Sigatoka Coastal strip (Figure 3)	8	82
3. Yasawa Is. (Figure 4)	6	50

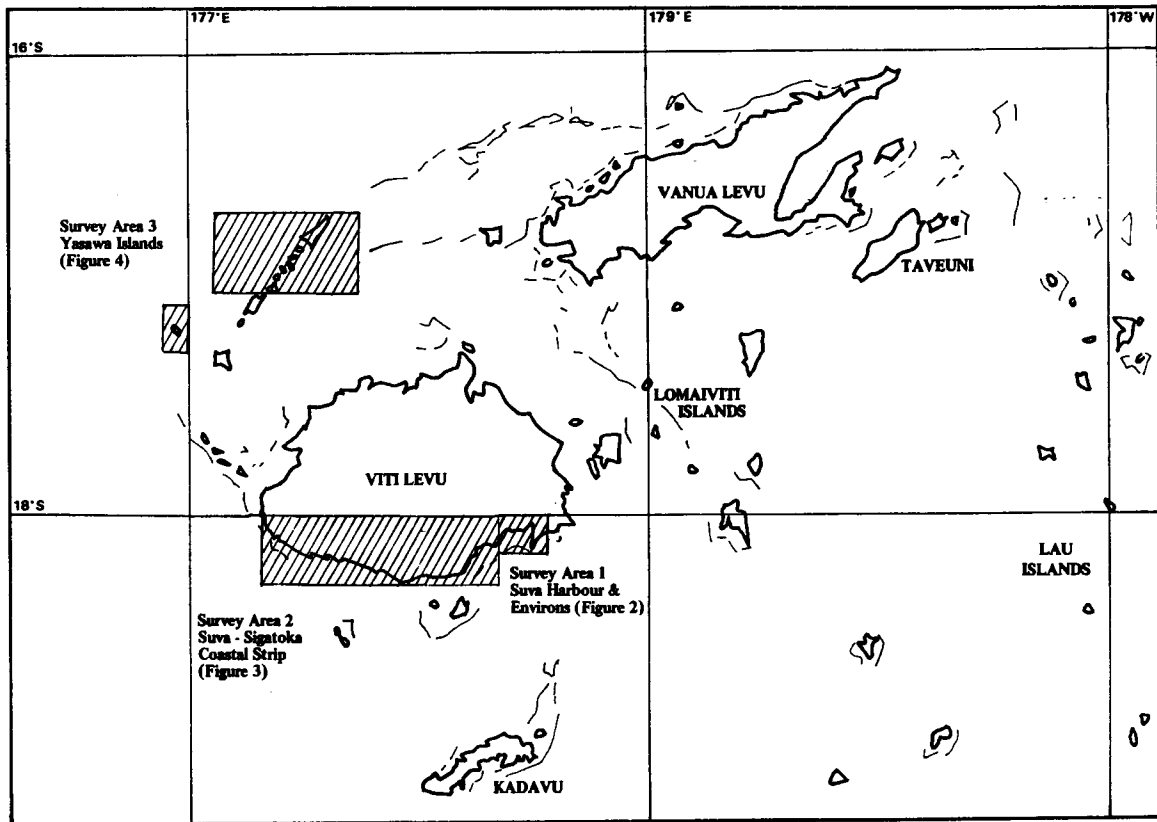


Figure 1: Map of Fiji Islands showing survey areas

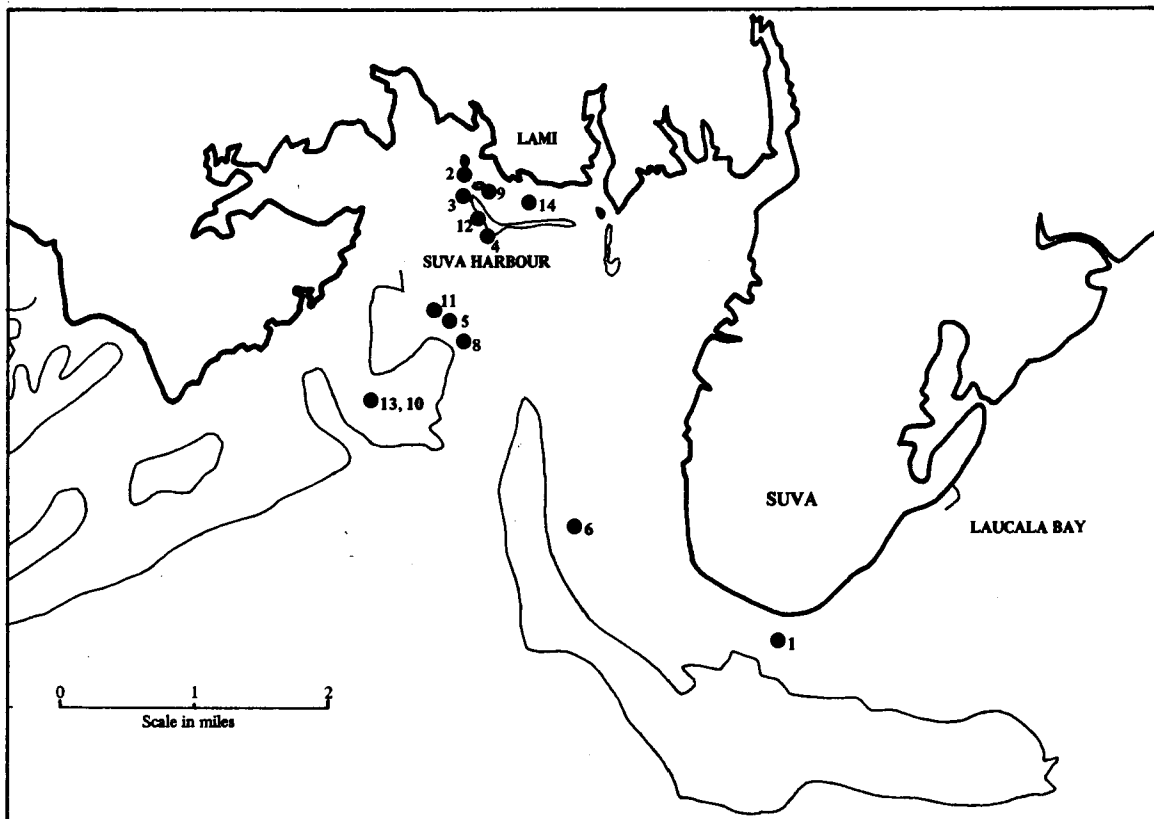


Figure 2: Survey Area 1, Suva Harbour and environs.

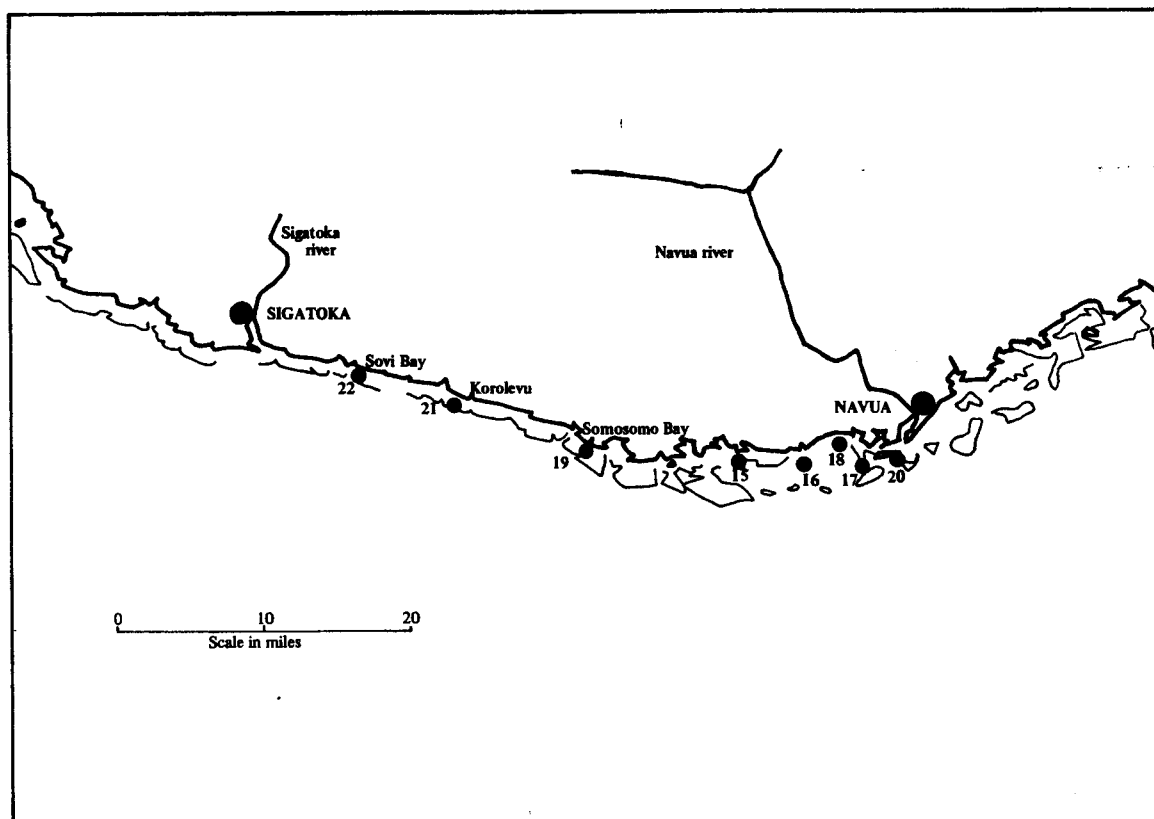


Figure 3: Survey Area 2, Suva - Sigatoka coastal strip

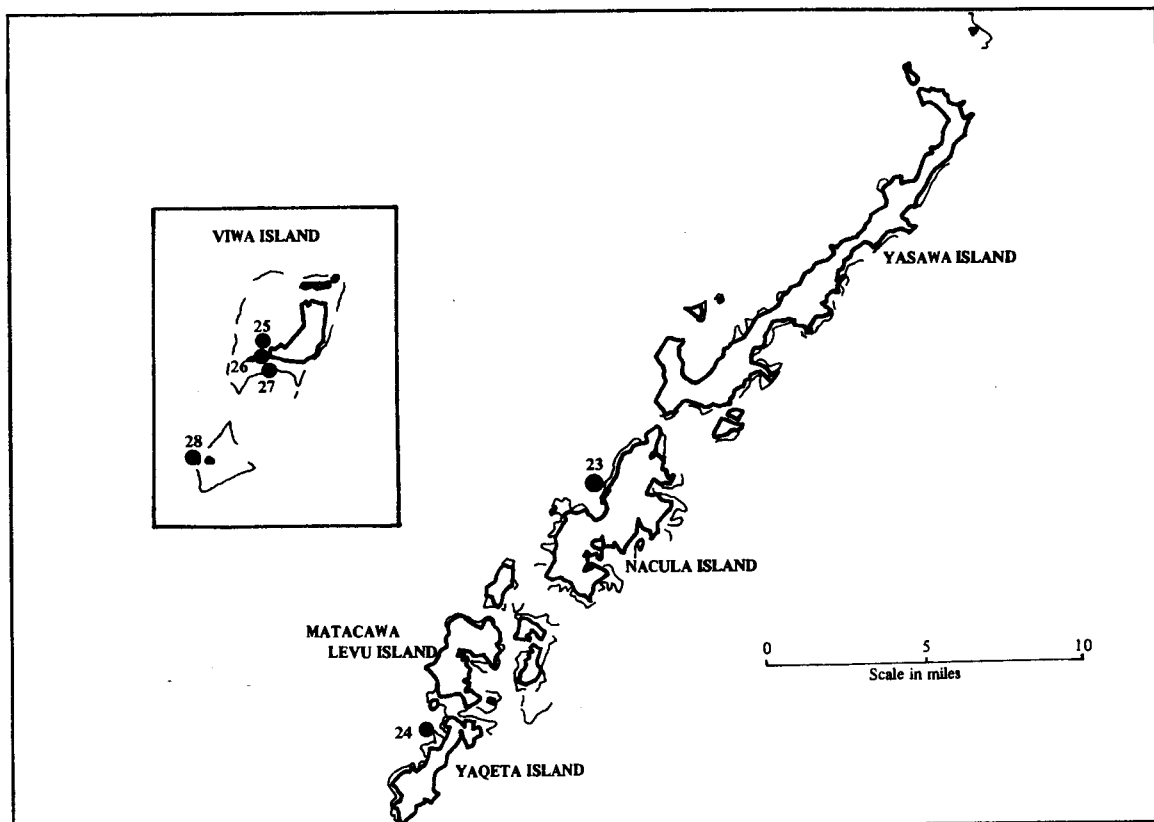


Figure 4: Survey Area 3, Yasawa Islands

Twenty-eight stations were surveyed during this period, with encouraging results. A total of 123 species from 13 families were found, all of which have commercial value. Table 1 lists the number of species recorded by family or group.

Table 1 - Distribution of species recorded by family or family grouping

<u>Group</u>	<u>Number of species found</u>
Cones (<i>F. Conidae</i>)	28
Augers (<i>F. Terebridae</i>)	26
Mitres (<i>F. Mitridae/Costellariidae</i>)	22
Olives (<i>F. Olividae</i>)	11
Cowries (<i>F. Cypraeidae</i>)	11
Dog whelks (<i>F. Nassariidae</i>)	8
Ceriths or horn shells (<i>F. Cerithiidae</i>)	8
Strombs (<i>F. Strombidae</i>)	4
Turrids (<i>F. Turridae</i>)	2
Murexes (<i>F. Muricidae</i>)	1
Tritons (<i>F. Cymatiidae</i>)	1
Turbans (<i>F. Turbinidae</i>)	<u>1</u>
Total	123

Brief field notes including habitat description, major shell groups recorded, etc. are given for each station in Appendix 1, and a complete list of species recorded for each of the three zones in Appendix 2.

DISCUSSION

Fiji's shell resources

Although Fiji lies to the south and east of the main centre of shell distribution in the Papua New Guinea - Indonesia - Philippine triangle, it still supports an extensive range of those families of shells popular with shell collectors, being particularly rich in cones (*Conus* spp), cowries (*Cypraea* spp), mitres (*Mitra* spp), and augers (*Terebra* spp). Some striking examples of specimen shells found in Fiji are shown in plates 1-3, while plate 4 depicts Fiji's most valuable shell, *Cypraea valentia*. The Fiji area supports a large number of other shell families which also have market potential. These include such groups as olives (*Oliva* spp), ceriths (*Cerithium* spp), strombs (*Strombus* spp), and murexes (*Murex* spp).

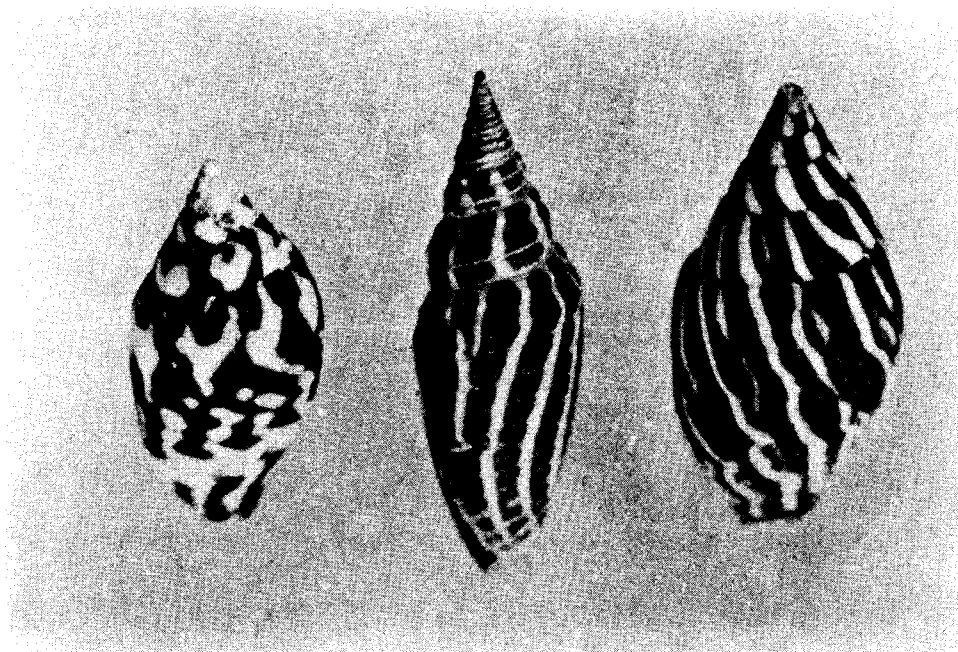


Plate 1: Three mitres from the Yasawa Group.
These species are all sand dwellers.

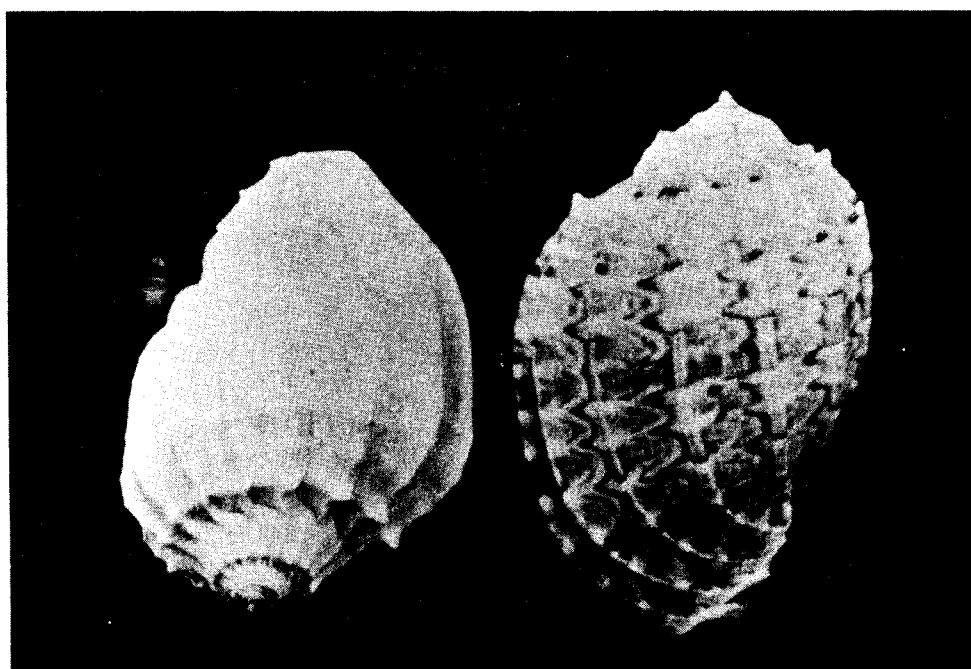


Plate 2: Two harps from Fiji. The whiter the sand
the shell is collected on, the paler the
shell.

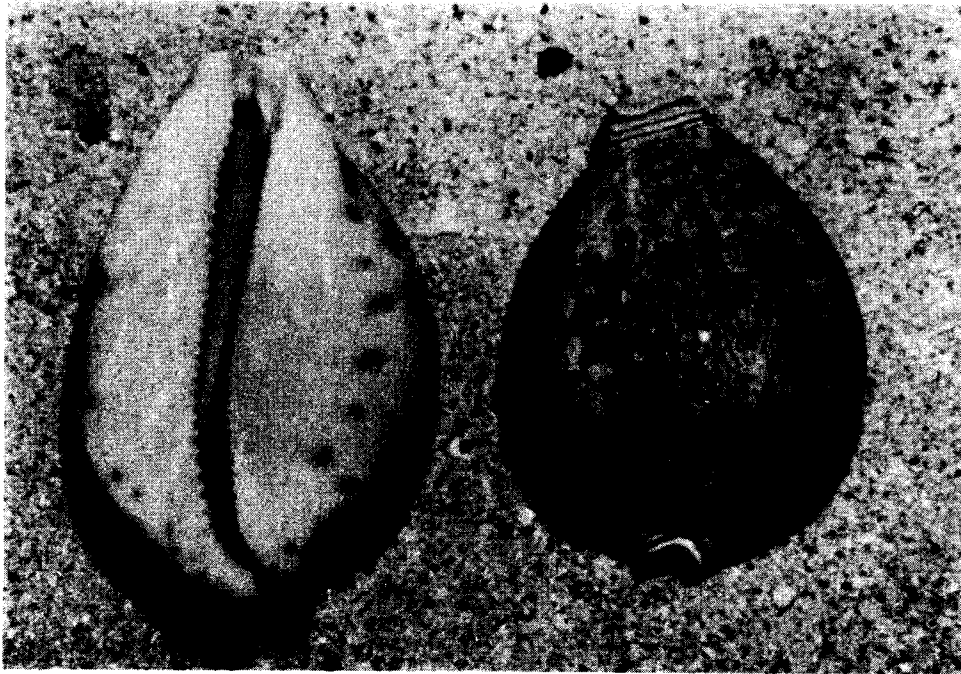


Plate 3: Conus ammiralis. This cone, although uncommon, has been collected in considerable numbers at times in Suva Harbour.

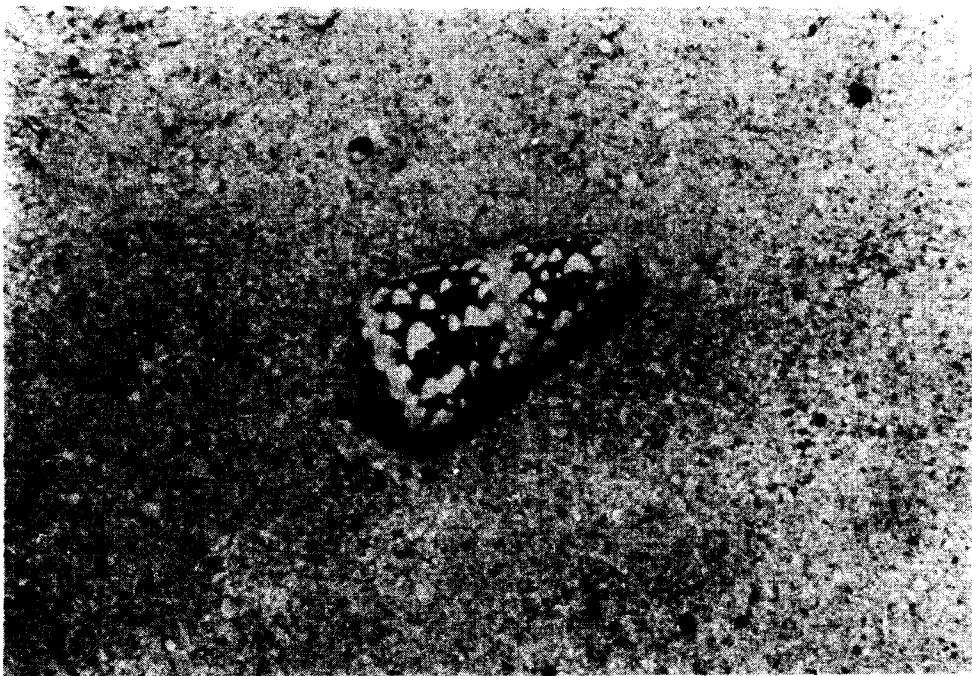


Plate 4. Cypraea valentia, Fiji's most valuable shell. One collected in 1980 in Kadavu fetched almost \$F2,000.

Although only a limited area was covered during this survey, 123 species of shells were collected, all of which have a market value. Of particular interest was the finding of two species previously undescribed (one *Oliva* and one *Terebra*) and the collection of a number of species not previously recorded from Fiji. The collection of so many new or unrecorded species during such a restricted survey is very encouraging and extensive collecting, particularly in the remoter areas, should prove most rewarding.

The author was fortunate in being able to view the shell collection of Dr Ken Gilchrist of Lami. This is an extensive and well-documented collection built up over many years and was a great help in ascertaining the number of species available in Fiji. Some time was also spent examining the shells on sale in the markets at Suva, Sigatoka, Nadi and Lautoka, as well as the selection of shells being sold to tourists by people of the Yasawa group. It was obvious that a sizeable number of those shells at present being sold in Fiji are imported from India and the Philippines. Many of these imported shells are available from Fiji, and efforts should be made to ensure that, where possible, native shells are made available in sufficient quantities to eliminate the need for continued imports.

Harvesting

As already pointed out, many of the smaller valuable species are at present neglected by village collectors, who concentrate on the more spectacular species which are readily saleable to tourists. Education in the value of these smaller species is necessary. Issuing a booklet in Fijian and English similar to the sample attached (Appendix 3) would be well worthwhile, as this simple publication points out the best way for villagers to collect shells for sale. It also stresses measures to preserve the quality of shells being marketed, as many of those shells at present offered for sale have chipped apertures, broken points or spires, wormholes, or other defects. These points are not so important to the average tourist but would make these shells unsaleable to the specialist collector. Leaving these shells uncollected is also a good policy in that it acts as a conservation measure. Damaged shells act as a breeding nucleus to enable future harvesting.

Many of the higher-value shells dwell in deeper water and require more sophisticated collection techniques. These are discussed briefly below:

(i) Scuba

This equipment is used successfully in Papua New Guinea by Melanesian and Polynesian divers. During these dives, shells worth up to US\$1,000 in value have been collected; however, because of the risks inherent in this type of activity, strict supervision is necessary initially to ensure that safety rules are rigidly adhered to.

Although many species can be collected during daylight dives, night diving has proved more effective in Papua New Guinea than in most other places, as this is the time when shells are most active, emerging from cover as they search for food. Night diving, however, has extra risks, necessitating extra supervision. Various diving courses are run by diving associations and any intending diver should be certified by one of these associations.

(ii) Netting

Another collection technique with potential for use in Fiji is netting. These sunk nets are made from fine monofilament nylon with a small mesh and are widely used in the Philippines for the collection of shells (Figure 5). Over the past decade this method has evolved until it is now the most commonly used system of collecting rare shells in the Philippines, employing several thousand people. The nets are set out in areas of dead coral rubble and left out permanently. They are not baited and shells are caught by accidental entrapment as they move along the bottom at night. The nets are checked every morning around dawn.

(iii) Dredging

Bivalves are a group of shells rapidly increasing in demand with collectors. Fiji is very rich in these shells and looking through museum and private collections I have located over 100 species that are native to the Fiji group (see Appendix 4). These shells are easily collected either by fanning the sand or by the use of a simple hand or boat dredge as illustrated in Figures 6a and 6b respectively. The hand dredge is used simply by wading in shallow water, pulling the dredge behind. The boat dredge is pulled along behind a boat running at low speed (1-2 knots) and can only be used in areas free of coral or rocks.

Dr Zann at the University of the South Pacific has collected shells of interest as a by-product of his research using dredges. Several of these shells retail for prices in excess of US\$50.00 each, so the same collecting techniques directed towards their commercial recovery would be well worthwhile.

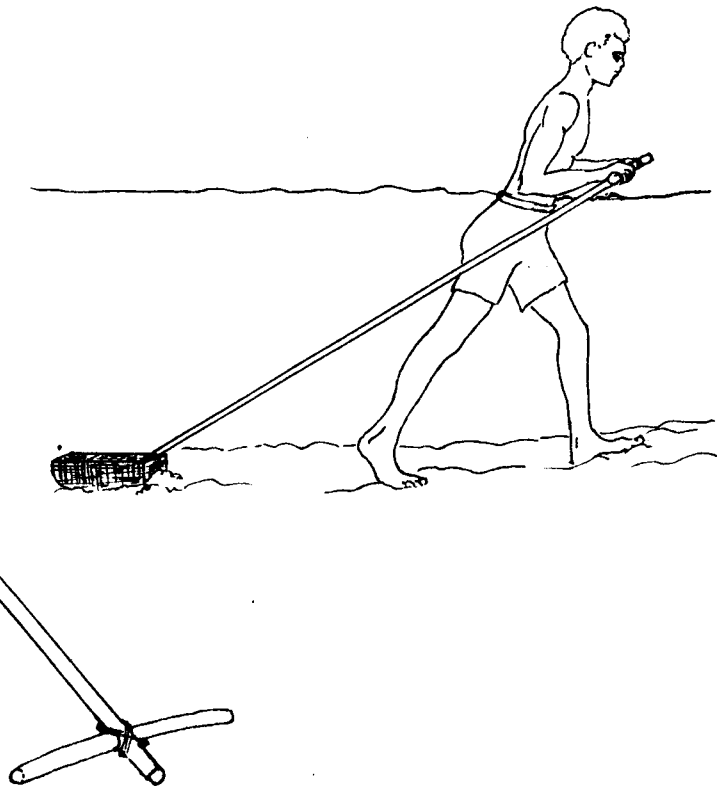
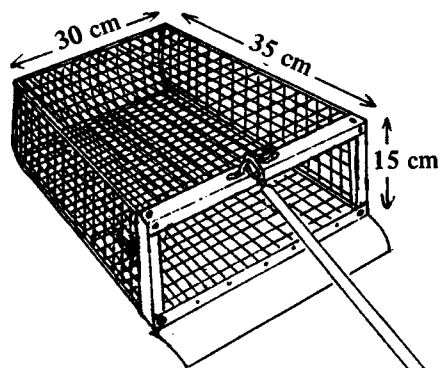
Land shells

Land shells also have a potential for collection in Fiji. Although there are only a limited number of species, some of these are very attractive and would prove of interest to collectors. These shells are members of the *Placostylus* group and are found on Viti Levu, Vanua Levu and Kadavu (Appendix 5). Some of the more attractive species will be illustrated in the author's forthcoming book on land shells, which could increase the demand for these shells.

Marketing

Fiji has a decided advantage over most other island nations, with its thriving tourist industry. The tourist market provides a ready outlet for well-presented and cleaned specimens of such shells as *Murex ramosus*, *Lambis chiragra* and the various larger cowries. However, to really succeed commercially it is necessary to enter the export market. A comprehensive and well-prepared catalogue should be prepared listing those shells that are found locally. Appendix 6 lists those shells of commercial value which could be readily collected in Fiji. This list, which includes details of current market value, could be used as the basis for a commercial catalogue. As new species turn up they could be included on supplementary listings. Fiji was a popular stop-off point for early collectors, so much of the shallow-water material easily accessible to these people is fairly well documented. Three of the most comprehensive books on shells of the Pacific

6a: Hand dredge



6b: Boat dredge

Length of rope must be 3 times depth of water

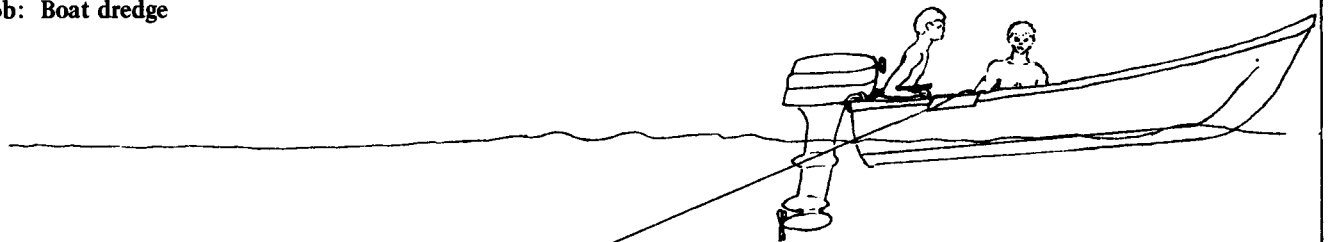
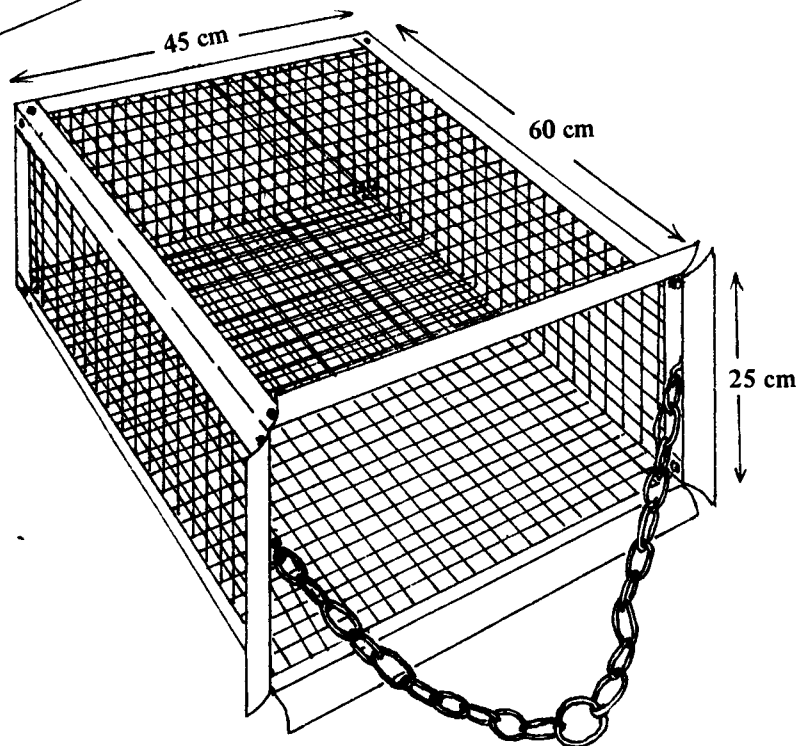


Figure 6: Dredges for collecting shells

were written by the present Curator of Molluscs at the Auckland Museum, Mr Walter Cernohorsky, who lived in Fiji for some time, and a large part of the material he used comes from the group. Although fairly technical, they are valuable in identifying material, and accurate identifications are essential when catering to the export market. A list of the more useful reference books is given in Appendix 7. Any shells that are not readily identifiable can be sent to a specialist.

Quality control is also very important in the marketing of shells, and as mentioned earlier this also serves as a conservation measure. If only perfect adult specimens are collected then those immature shells or shells with breaks or perforations caused by predators can continue to serve as brood stock. Those with only slight imperfections can often be sold in selections to tourists.

An advertising campaign should be carried out through shell magazines catering to the trade, such as *Hawaiian Shell News*, and the Italian periodical *La Conchiglia*. Other magazines published by shellclubs in Britain, France and West Germany also have a wide circulation, and advertising should stress the regional origins of the Fijian shells, as many collectors are now trying to build up a collection from as many different areas as possible. This also serves as another outlet for very common material which can be marketed in groups under such captions as "10 Fijian Mitra" and "10 Terebra from Fiji". A handbook on the shells of Fiji should also be published at an early stage in any Fijian Shell Project. This would serve two purposes. Firstly, it would help village people to be more aware of the shells found in their areas - both terrestrial and marine, and secondly, it would promote tourist interest in the shell potential of Fiji. Desai Bookshops seem interested in promoting such a publication, should it eventuate.

Conservation

Any effort to promote a shell industry must emphasise conservation aspects. Simple conservation measures are outlined in the sample booklet for distribution to village collectors (Appendix 3). Such measures include the following:

1. Where possible, only perfect adult specimens should be collected. This aspect has been covered previously in this report.
2. Coral should not be destroyed by people collecting shells. Much evidence was seen in the regions around Suva Harbour and at places visited on the Coral Coast of considerable reef damage caused by shell collectors. Large patches of branching corals had been smashed, and many coral boulders shattered. Not all this damage had been caused by village collectors. One area was visited shortly after a group of Europeans from Suva had been collecting in the area, and the damage caused by this group was as extensive as that caused by any villagers, who at least have the excuse of economic necessity.
3. All boulders should be replaced in their original positions. Leaving boulders overturned will destroy both the shells' eggs (many molluscs lay their eggs on the underside of rocks) as well as the delicate organisms which make up the shells' food. In the area devastated by the aforementioned Suva group, not even the rudimentary conservation rules that common sense dictate had been observed. Large boulders requiring the effort of two adults to move were overturned and left overturned. Consequently this area of reef has been destroyed for shell collecting for many years to come.

4. All specimens that are unsuitable for sale should be replaced in the same habitat in which they were collected. They should not be discarded around the village, nor should sand-dwelling species such as *Oliva*, *Strombus*, or *Terebra* be thrown away on reef. There is no truth in the belief that the offspring of damaged shells will also be defective, as these defects are due only to the effects of harsh environmental pressures. It should be stressed that the potential for perfection exists in the majority of molluscan offspring. It should be noted that pollution (chemical, metallic or otherwise) can cause deformities that are inheritable.

RECOMMENDATIONS FOR THE ESTABLISHMENT ON A SMALL-SCALE SPECIMEN SHELL INDUSTRY IN FIJI

1. That initially a group of young men from the Central Division be selected for training in the collection and marketing of shells. These men could either come from some existing small business or preferably from some form of co-operative. As they would need to undergo a diving course, some form of physical test should be a prerequisite.
2. That this group receive a year's training under the supervision of some qualified and competent person, and, after completing this course of instruction, act as a nucleus for the training of other similar groups.
3. That once the business gets under way, suitable literature be distributed to interested persons or village groups throughout Fiji, pointing out to them the value of the shells in their area and the potential for marketing.
4. That a vessel suitable for extension work on shells and related products be obtained or adapted from the existing Fisheries Division fleet. This vessel should be fitted with appropriate dredging equipment and diving gear (a list of essential diving gear is given in Appendix 8) and used for fieldwork among the islands. It could then be used for the dual purpose of instructing the trainees, while simultaneously demonstrating to villagers which shells are of value and techniques for their collection.

ACKNOWLEDGEMENTS

I would like to thank the staff of the Fisheries Division in Suva and Lautoka who assisted with logistics and information, and, in particular, Drs Peter Hunt and Tony Lewis who helped to make the survey successful.

Divers who were of great assistance in both day and night dives were Mr Emmanuel Olavides, Mr Josaia Navakalomana and Mr Suresh Chandra.

Dr Ken Gilchrist of Suva very kindly let me view his extensive collection of Fijian material which proved valuable in assessing the number of shell species to be found in the Group. I would like to thank Mr Ian Stockwell and Ms Jeni Brown of Suva for their generous hospitality and the many people of the Yasawa Group who made our work so enjoyable.

Appendix 1 Brief field notes for each station surveyed, including habitat description and a list of shell groups commonly encountered

SURVEY AREA 1: Suva Harbour and environs (Figure 2)

- Station 1 Central Suva Harbour. June 11.
Flat rubble covered area of dead reef with occasional patches of white coral sand. 30 mins. 3 - 6 m.
Divers - Parkinson, Olavides, Navakalomana.
Terebra, Mitra, Oliva, Cerithium.
- Station 2 Steep muddy slope near Mosquito Island. Visibility poor due to precipitation from nearby river. 30 mins. 6 - 20 m.
Divers - Parkinson, Olavides, Navakalomana.
Cypraea, Murex.
- Station 3 Seaward side of Mosquito Island. June 11.
Steep slope bottoming out on flat, very silty bottom. Area reported to harbour some rare *Mitra*. 25 mins. 12 m.
Divers - Parkinson, Olavides, Navakalomana.
Mitra, Cerithium.
- Station 4 Central Suva Harbour. June 12.
Steep sand slope with strong current - some silt contamination. 60 mins. 10 - 20 m.
Divers - Parkinson, Olavides, Navakalomana.
Conus, Terebra, Mitra.
- Station 5 Main shipping passage out of Suva. Third beacon from entrance on right side. White sand slope with scattered large boulders. 40 mins. 15 - 20 m.
Terebra, Mitra, Cerithium.
- Station 6 South Suva Harbour. June 12.
Gradual slope falling away from sea-grass patches. White coronous sand with isolated groups of large coral boulders.
Divers - Parkinson, Olavides, Navakalomana.
Terebra, Mitra, Turris.
- Station 7 Village 16 km from Suva on Pacific Harbour road. June 16.
Large stone-covered flat dropping gradually onto silty sand. Visibility - nil. 30 mins. 1 - 3 m.
Divers - Parkinson, Olavides, Navakalomana.
- Station 8 Central Suva Harbour. June 17.
Near first beacon near shipping passage entrance. Sand slope interspersed with boulders, moderate current. 40 mins. 2 - 20 m.
Divers - Parkinson, Olavides, Navakalomana.
Conus, Mitra, Oliva, Cypraea, Terebra.

- Station 9 Seaward side of Mosquito Island. June 17.
Near second beacon to left of passage. Silt-covered flats with minor sea grass cover dropping off sharply to rubble- and boulder-covered slope, bottoming out in 20 m. Visibility very poor. 20 mins. 3 - 20 m.
Divers - Parkinson, Olivades, Navakalomana.
Conus, Terebra, Cypraea, Mitra.
- Station 10 Night dive at Station 9.
30 mins. - 3 - 20 m.
Divers - Parkinson, Olavides, Navakalomana.
Conus, Terebra, Cypraea.
- Station 11 Central Suva Harbour. June 18.
Near first beacon in shipping passage entrance. Sand slope interspersed with boulders, strong current. 50 mins. 1 - 25 m.
Divers - Parkinson, Olavides, Navakalomana.
Conus, Mitra, Terebra, Cypraea.
- Station 12 Seaward side of Mosquito Island. June 18.
Near second beacon to left of passage. Silt-covered flats with minor seagrass cover dropping off sharply to rubble- and boulder-covered slope, bottoming out in 15 m. 30 mins. 3 - 15 m.
Divers - Parkinson, Olavides, Navakalomana.
Terebra, Cerithium.
- Station 13 Central Suva Harbour, Mermaid Pools. July 2.
Large sand-bottomed crater. Dive made in order to set net. 30 mins. 12 - 20 m.
Divers - Parkinson, Olavides, Navakalomana.
Mitra, Terebra, Cerithium, Oliva.
- Station 14 Seaward side of Mosquito Island. July 2.
Near second beacon to left of passage. Details as for Station 13. 30 mins. 3 - 15 m.
Divers - Parkinson, Olavides, Navakalomana.
Conus, Terebra, Mitra.

SURVEY AREA 2: Suva-Sigatoka Coastal Strip (Figure 3)

- Station 15 Lomari Village. June 14.
Flat, sand-covered plain edging gentle black sand slope with occasional patches of dead reef. 50 mins. 2 - 6 m.
Divers - Parkinson, Olavides.
Mitra, Terebra, Oliva.
- Station 16 Naboutini village - Pacific Harbour area. June 14.
White coronous sand, flat with patches of seagrass and coral. 65 mins. 1 - 3 m.
Divers - Parkinson, Olavides.
Mitra, Terebra, Oliva, Conus, Cerithium.

- Station 17 Rovodrau Bay, Pacific Harbour. June 15.
 Gradual volcanic sand slope with some reddish clay sediment cover. Approximately 200 m from river mouth. 40 mins. 3 - 6 m.
 Divers - Parkinson, Olavides.
Mitra, Terebra, Turris, Oliva, Conus.
- Station 18 Tropic Sands Beach, Pacific Harbour. June 15.
 Black volcanic sand gradually sloping off to 6 m. 45 mins.
 3 - 6 m.
 Divers - Parkinson, Olavides.
Terebra, Oliva, Mitra.
- Station 19 Channel 65 km from Suva on Sigatoka Road. Passage running out from beach through outer reef. 35 mins. 3 - 15 m.
 Divers - Parkinson, Olavides.
Terebra, Oliva, Conus.
- Station 20 1 km Sigatoka side of Pacific Harbour Bridge. July 6.
 Flat, black sand plain edging area of dead reef. 40 mins. 6 m.
 Divers - Parkinson, Olavides.
Terebra, Oliva, Turris, Cypraea, Mitra.
- Station 21 Small bay 10 km Sigatoka side of Korolevu. July 7.
 Coarse sand valley between two reefs. Sparse seagrass cover.
 50 mins. 3 - 10 m.
 Divers - Parkinson, Olavides.
Terebra, Oliva, Mitra.
- Station 22 Bay 4 km east of Hideaway Resort. July 8.
 Many wave pressure ridges, gradually sloping to 20 m. Generally fine blackish-grey sand with some large boulders. 50 mins.
 6 - 20 m.
 Divers - Parkinson, Olavides.
Terebra, Oliva, Mitra, Conus.

SURVEY AREA 3: Yasawa Islands (Figure 4)

- Station 23 Malakati Village, Nacula Island. June 24.
 White, coarse, coronous sand with some seagrass patches.
 120 mins. 3 - 15 m.
 Divers - Parkinson, Chandra.
Terebra, Oliva, Conus, Cerithium.
- Station 24 Yaqeta Village, Yaqeta Island. June 26.
 White, coronous sand flats edging on reef with scattered coral boulders and outcrops. 50 mins. 3 - 12 m.
 Divers - Parkinson, Chandra.
Terebra, Oliva, Conus, Cerithium.

- Station 25 Naibalebale Village, Viwa Island. June 27.
Gentle coronous sand slopes between coral ridges. 70 mins.
3 - 15 m.
Divers - Parkinson, Chandra, Olavides.
Oliva, *Terebra*, *Cypraea*, *Conus*, *Cerithium*.
- Station 26 Passage to west of Naibalebale Village. June 28.
Flat coral plateau with thin sand cover. Extensive areas of
dead algae-covered reef. 50 mins. 3 - 15 m.
Divers - Parkinson, Olavides.
Cerithium, *Terebra*, *Conus*, *Oliva*.
- Station 27 Naibalebale Village, Viwa Island. June 28.
Gentle coronous sand slopes between coral ridges. 45 mins.
3 - 15 m.
Diver - Parkinson.
- Station 28 Nuku Island to east of Viwa Island. June 29.
Large coral ridges with flat coral floors intervening.
45 mins. 6 - 20 m.
Divers - Parkinson, Olavides, Chandra.
Terebra, *Conus*, *Oliva*, *Mitra*, *Pecten*.

Appendix 2 Complete list of specimen shells recorded by the study team for each of the three zones surveyed

SURVEY AREA 1 - Suva harbour and environs

F. Conidae

Conus emaciatus
C. sponsalis
C. distans
C. mustelinus
C. litoglyphus
C. parius
C. coronatus
C. pulicarius
C. ochroleucus
C. circumcissus
C. textile
C. marmoreus bandanus

F. Cypraeidae

Cypraea isabella
C. carneola
C. eburnea
C. lynx

F. Strombidae

Strombus luhuanus
S. minimus
S. gibberulus
S. mutabilus

F. Mitridae/Costellariidae

Vexillum vulpecula
Cancilla circula
C. insculpta
C. bacillum

F. Olividae

Oliva carneola
O. bulbiformis
O. oliva

F. Terebridae

Terebra jenningsi
T. paucistriata

SURVEY AREA 2 - Suva - Sigatoka coastal stripF. Condiae

Conus distans
C. vitulinus
C. miles
C. arenatus
C. striatus
C. muriculatus
C. flavidus
C. textile
C. geographus

F. Mitridae/F. Costellariidae

Vexillum semisculptum
V. lyratum
V. michau
V. pacificum
Cancilla bacillum
Mitra ambigua
M. cucumerina
M. ferruginea
M. coronata
M. praestantissima
M. fulgetrum
Imbricaria punctata
I. olivaeformis
Neocancilla papilio

F. Olividae

Oliva miniacea
O. tremulina
O. textilina
O. annulata
O. carneola

F. Olividae(cont'd)

O. oliva
O. bulbiformis
O. paxillus
O. caldania

F. Cerithiidae

Cerithium asper
C. batillariaeformis
C. pharos
C. fasciatus
C. nodulosus
C. columna
C. sinensis
C. aluco

F. Terebridae

Terebra affinis
T. undulata
T. collumelaris
T. succincta
T. subulata
T. archimedes
T. guttata
T. dimidiata
T. amoena
T. felina
T. cingulifera
T. anilis
T. crenulata
T. babylonia
T. funiculata
T. livida
T. kilburni
T. swainsonii
T. roseata
T. paucistriata
T. textilis
T. conspersa

F. Terebridae*Hastula albula**H. lanceata**H. caliginosa**H. plumbea**Duplicaria sp.*F. Cypraeidae*Cypraea arabica**C. moneta**C. annulus**C. tigris*F. Strombidae*Strombus minimus**S. gibberulus**S. mutabilis*F. Muricidae*Chicoreus brunneus*F. Nassariidae*Nassarius graniferus**N. albulen**N. papillosus**N. arachnoides**N. vitiensis*F. Turridae*Turris spectabilis**T. acuta*

SURVEY AREA 3 - Yasawa IslandsF. Conidae

Conus sponsalis
C. quercinus
C. distans
C. eburneus
C. melancholicus
C. miliaris
C. acutangulus
C. imperialus
C. virgo
C. corletti
C. magus

F. Mitridae/F. Costellariidae

Vexillum zelotypum
V. assimilis
Pterygia necea
Strigatella telescopum
Mitra fulvescens
M. coronata

F. Olividae

Oliva textilina
O. annulata
O. episcopalis
O. carneola
O. sp.

F. Cerithidae

Cerithium asper
C. columna

F. Terebridae

Terebra affinis
T. columellaris
T. pertusa
T. guttata
T. dimidiata
T. amoena

F. Terebridae (cont'd)

T. maculata
T. felina
T. cingulifera
T. anilis
T. crenulata
T. babylonia
T. funiculata
T. livida

F. Cypraeidae

Cypraea annulus
C. moneta
C. caputserpentis
C. tigris
C. kieneri depriesti

F. Cymatiidae

Cymatium distortio-anus

F. Turbiniidae

Astraea calcar

F. Nassariidae

Nassarius graniferus
N. alapapilionis
N. euzonata
N. zonalis

F. Turridae

Turris acuta.

Appendix 3 Extension booklet draft - "Collecting shells as a business"

COLLECTING SHELLS AS A BUSINESS

TEXT BY B. PARKINSON

Further copies of this booklet
may be obtained by writing to:

The Chief Fisheries Officer
M.A.F.
P.O. Box 358
Suva

COLLECTING SHELLS AS A BUSINESS

People from all over the world collect sea shells. They collect them in their own country but find it difficult to get shells from other countries, so they are willing to buy shells.

Some people are interested in shell collecting as a hobby, others study shells as a science, while other people like the attractive ornaments and jewellery made from shells.

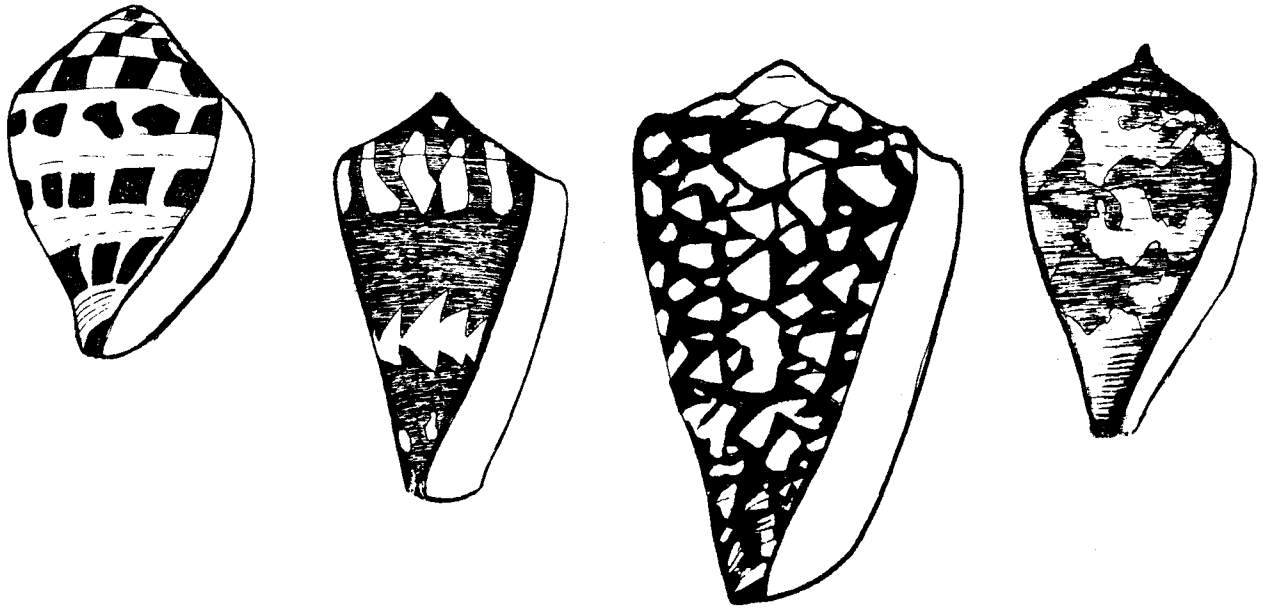
Dealers are interested in shells from Fiji as we are lucky to have plenty of unusual and beautiful shells.

The Chief Fisheries Officer is trying to encourage coastal people to collect shells for sale to dealers overseas, and the notes in this booklet are to let you know about the business and how it works.

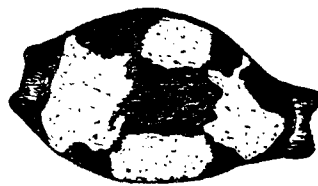
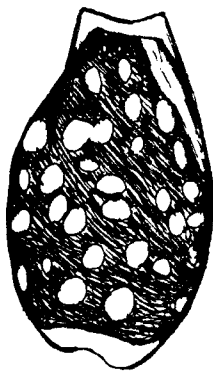
The Fisheries Division has an officer stationed in Suva who is experienced in the identification and marketing of shells and he can be contacted at this address:

The Chief Fisheries Officer
M.A.F.
P.O. Box 358
Suva

Also there are a number of private firms in Fiji dealing in shells and their addresses are available from the Shell Project Officer.



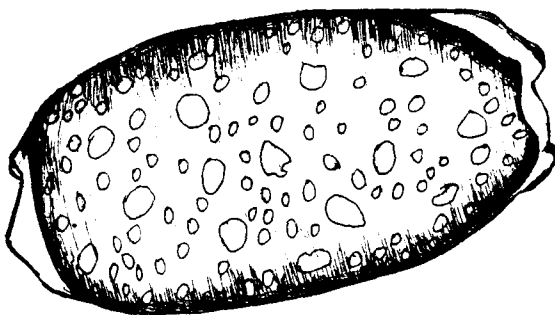
Cone Shells



Cowrie Shells



Harp Shell



These are some of the many kinds of shells that can be found in Fijian waters. There are many others, small and large, which also are valuable.

COLLECTING SHELLS

Shells may be found in many places - on reefs, under stone and coral, in sand, mud and grass, or by diving and swimming along the edges of the reef. Most people who live near the sea know the places where shells are to be found, particularly the women who collect shells for food.

In addition many kinds of land snails can be found in the jungle and around village gardens in Fiji and many of these can be sold.

When you collect shells it is a good idea to put the shells in a cloth or plastic bag tied about your waist.

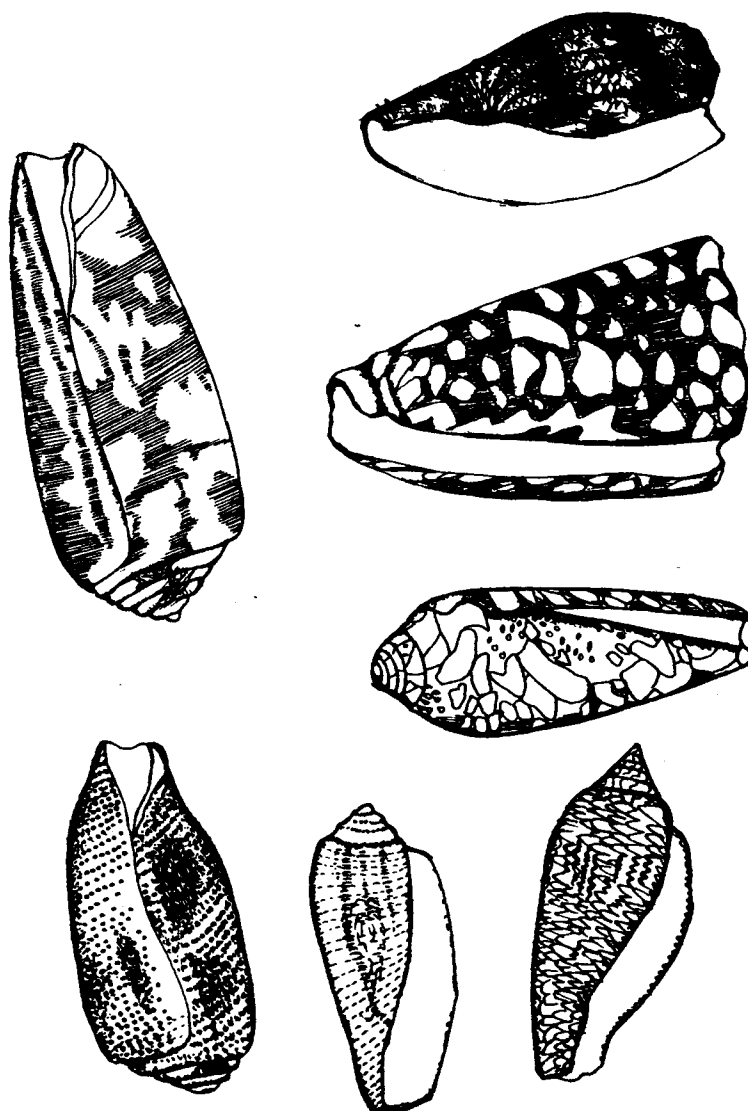
Take care when picking up and handling cone shells (see picture). Some of these are poisonous and people have died from the sting of cone shells. When you find one put it into a bag and do not hold it in your hand. Make sure children do not play with live cone shells.

It is safer to pick up cone shells by their broad end, but remember that cone shells can sting from any position.

Some shells are very valuable and others have little or no value. At first you will find it hard to know which are the most valuable shells but after you sell some you will soon learn.

These are Cone Shells. Some Cone Shells are poisonous and can kill.

Handle all Cone Shells with care.



CLEANING SHELLS

Very young shells or old shells which have bad marks, are broken, or are covered with coral growths have no value. Leave those in the sea.

Some shells have a skin over the outside of the shell. This can be cleaned away properly when the shells arrive at the shell depot in Suva.

When you scrape this skin off with a knife, sometimes the shell is scratched and the lip broken.

Shells found 'dead' on the beach are usually worthless, but some have a small value.

Land snails can be killed by sprinkling them with salt. Leave them overnight and the next day the softened meat can easily be extracted with a needle.

Shell dealers and collectors prefer to buy shells which have been caught alive and these bring the best prices. However, they do not want the animal which lives in the shell because it stinks when it dies. So we must clean and remove the meat from inside the shell.

For people in the village the best and easiest way is to place the shells in sand and let them stink or rot away. Ants will also help by eating the meat. When the animal has rotted away, wash the shells thoroughly. If there is no more smell the shells are clean inside.

This method of cleaning out the animal sounds very easy but care must be taken while the meat is rotting. Some shells like cowries and olives are very shiny on the outside and the colour and shine is spoiled if the dirty water from the rotting animal runs over the shell. The best way is to fill a box with sand and stand the shells up in the sand. Strong sunlight also spoils the shine and colour of shells so the box of sand should be placed under the house or in shade. Cover the shells or dogs will try to eat the stinking meat and some shells may be broken.

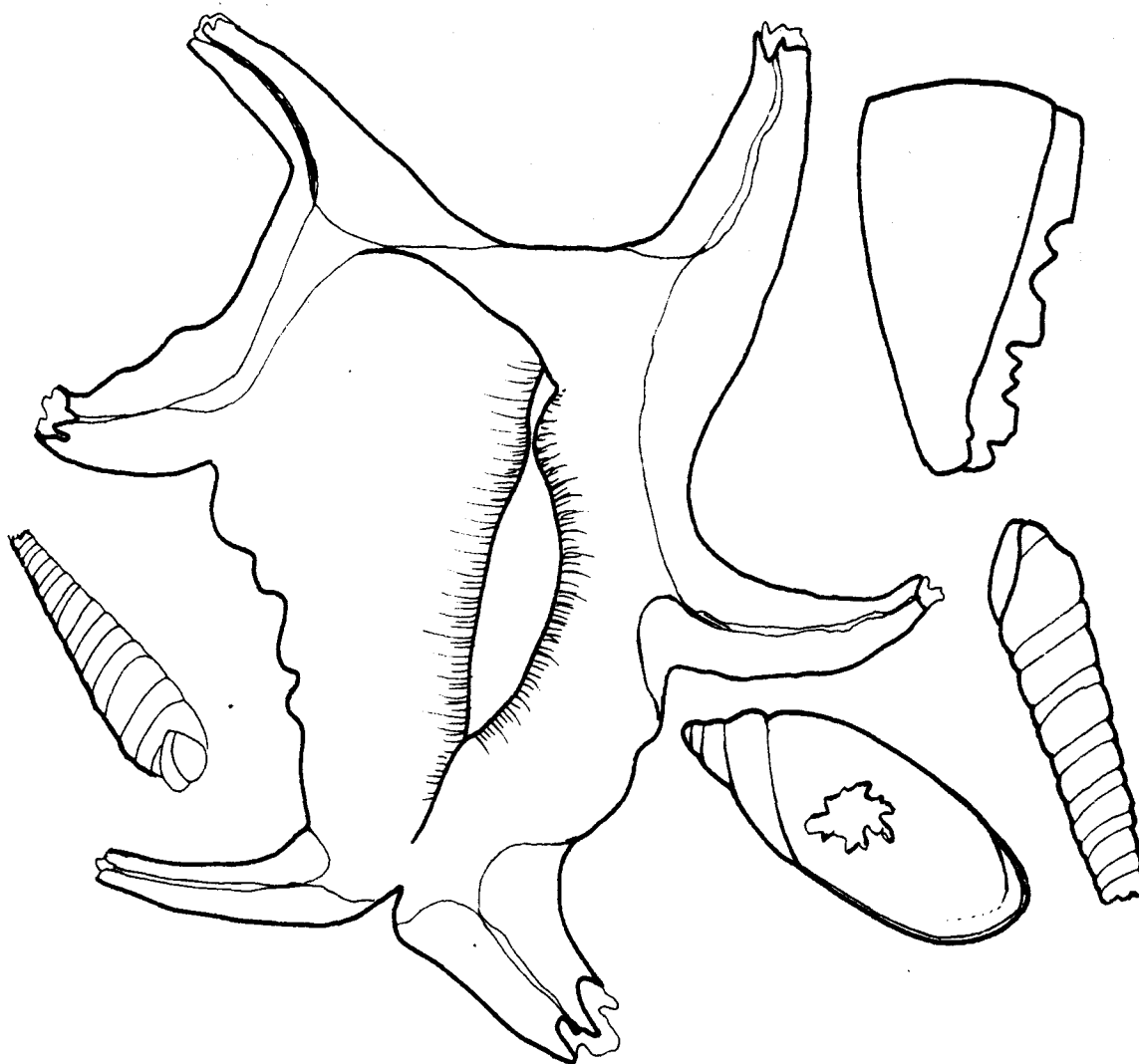
If you want to clean the shells quickly they can be boiled in water and the animal dug out with pins and pieces of wire, but be careful or the mouth or lip of the shell will be chipped or broken and the shell will drop in value.

When boiling shells be careful to put them in cold water, and then bring it to the boil. Shells can crack if put directly into hot water.

Some shells have a door (called the operculum). These should be kept with the shell it belongs to as it increases the value. Doors on some shells are hard and shiny like the pretty "cats eye", while others are thin and tough like plastic or leather, but all should be kept to get the best price.

Shells should not be kept in tins or metal containers as rust marks on shells cannot be removed, and this will often make a shell worthless.

These shells have broken points or other defects which make them of no value - Leave them in the sea!!!



PACKAGING AND SENDING SHELLS TO DEPOT IN
SUVA

When the shells are ready for sending to Suva be careful how you pack them. If they break they will not be worth anything and the time taken in collecting and cleaning will have been wasted.

Wrap each shell carefully in a soft paper or dry banana leaves inside a strong carton or box.

If the shipment is by airfreight, use a strong but light-weight carton or the cost of freight will be too much. When the shells are sent by ship the box should be stronger as the weight is not so important.

If you find a rare shell that is worth a lot of money, it is better to send separately in a small well-packed parcel by airmail.

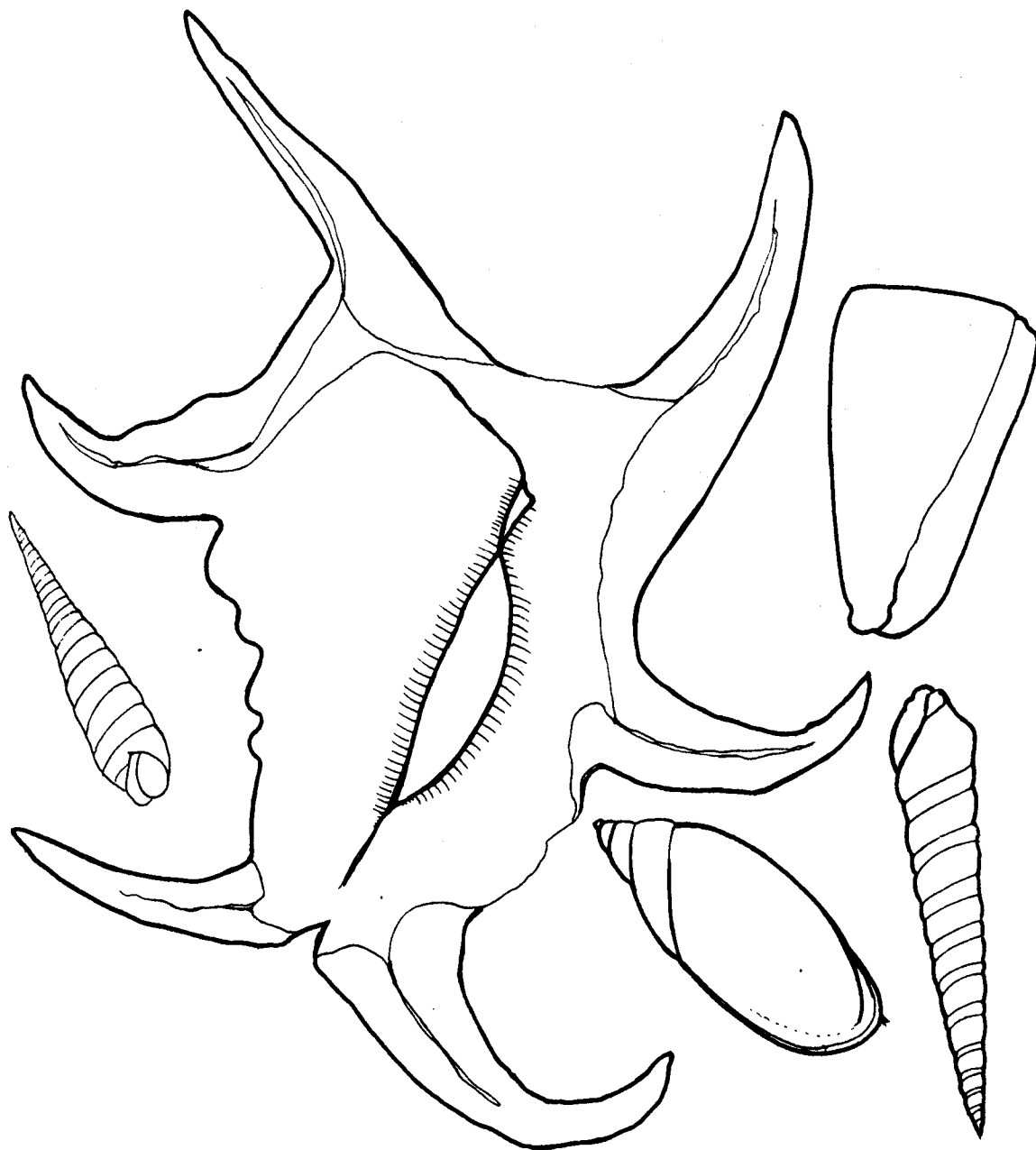
Place your name and address inside the carton or box so that the staff at the Depot in Suva can send the money to you as soon as the box of shells is received and the contents sorted and valued.

Fill the box with shells so they do not move about. A loosely packed box will cause many to break.

Mark the box with the address as follows:

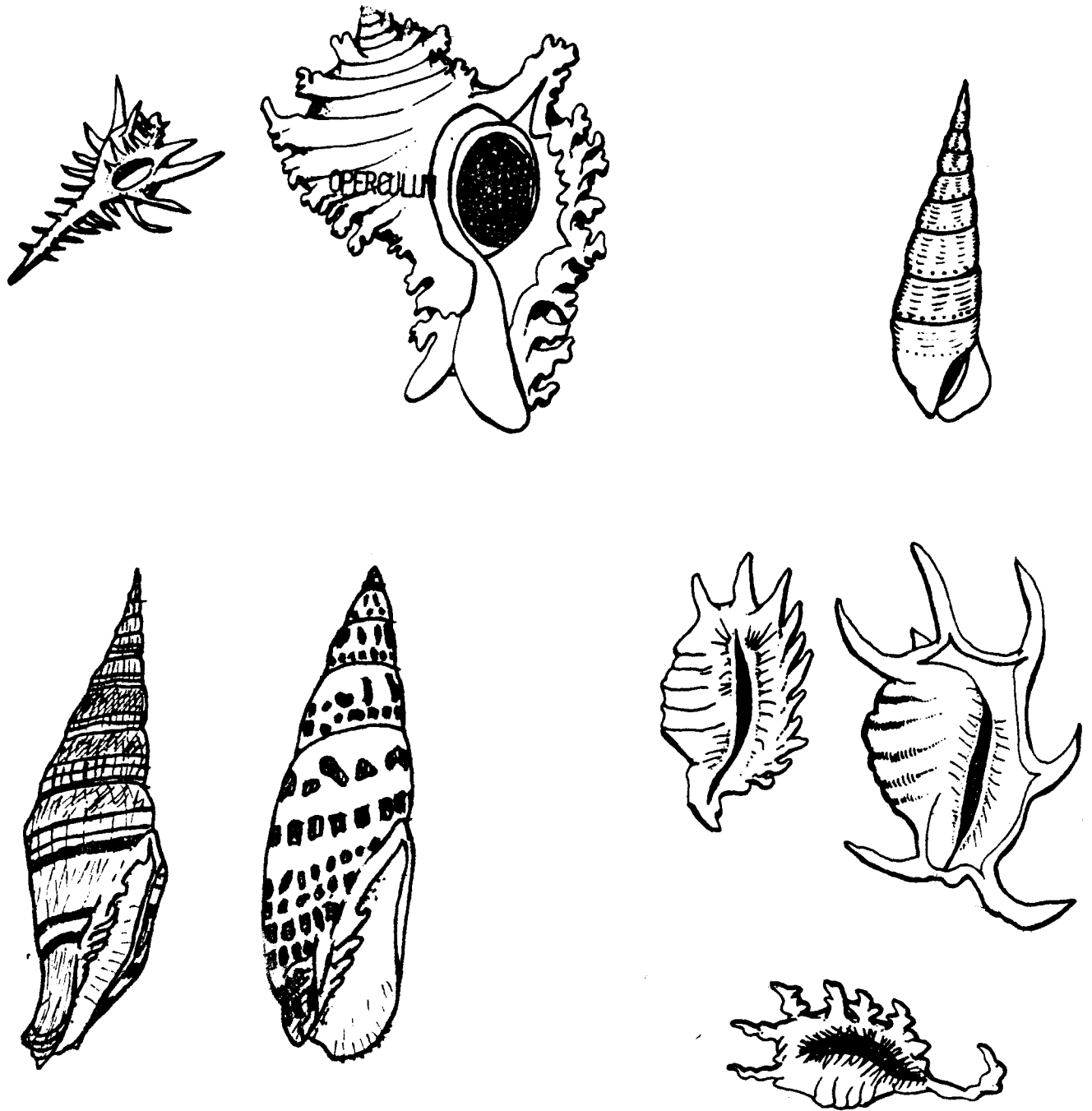
The Chief Fisheries Officer
M.A.F.
P.O. Box 358
Suva

These shells are good. They should be cleaned out carefully, then packed well, and sent to the Shell Depot in Suva.



THESE NINE POINTS ARE IMPORTANT

1. Cowries and olive shells must have a good shine and colour.
2. Cone shells must have a clean and straight lip or mouth.
If the lip is chipped the values are low. Some are worthless.
3. *Terebra* shells or augers have a long sharp apex or point.
Take care not to break this fine point.
4. All shells will spoil if left in the sun.
5. Only keep good clean shells. Throw the young and old marked ones back into the sea as breeding stock. Old shells found on the beach are no good.
6. Do not be disappointed if some shells are not worth much. The size of the shell is not always the best guide to value. Some very small shells like the smaller cowries and cones are worth much more than some very large and pretty shells. The value depends on the number of shells of that kind that are found in various parts of the world. Also remember that the freight costs of sending large and heavy shells is much higher than the charges for small shells.
7. Shells collected and used for food may have a value as an ornament or for making jewellery after the animal has been removed and eaten. Usually these shells are common and not worth much each but a bagful could be sent by ship to Suva and return a profit to the village collectors.
8. Remove all the dead animal from the shell before sending to Suva.
9. Address the carton or box properly and do not forget to write your name and address and place inside the package.



All these shells have spires or points which can be broken, damaging the shells, and destroying their value.

CONSERVATION

When a new business is started it is very important that much thought is given to ensure that a profit will be made. It is just as important to make sure that a profit will continue to be made in the years ahead.

CONSERVATION - is the term used to describe a careful control of the resource - the animals, birds or plants that are being used to make the business. In this case the resource is SHELLS. If pretty coral pieces are also used they must be considered also.

The shallow waters around Fiji have plenty of shells. If they are collected carefully and only a few at a time, they will continue to breed and there will always be plenty of shells.

If people become greedy and collect and sell all the shells they find on the reefs and beaches there will be none left to breed and some kinds of shells will disappear altogether.

The word CONSERVATION means many more things and is a wide and difficult subject and science. In simple talk it means the careful control of the harvesting of an animal or tree or plant so that some remain to continue to grow and breed.

We must think of our children and grandchildren and do our best to make sure that there will be shells for them to eat and trade and sell.

If the following rules are kept we are on the right road in helping with the conservation of shells:

1. Only keep good shells. If they have broken lips or spires and if their surface is covered with too much coral, leave them in the sea to breed. They have no value.
2. Do not throw these spoiled shells away on the dry sand or in the bush where they will die. Put them back in the sea.
3. Very young or small shells should also be left in the sea.
4. All stones and pieces of coral which are lifted to find shells should be turned back again the way they were. Shells feed on tiny animals and plants which live on the underside of stones away from bright light and these will die if stones are not replaced. Also, many shells lay their eggs underneath stones - these will also be destroyed.
5. A good method of controlled collecting is to search on one part of the reef, then leave a part of the reef alone, then search on another part. The shells left behind will breed and spread on to the reef that has been collected. This is the best way of collecting pretty pieces of coral if coral collecting is part of the new business.

6. Only collect the shells you know have a value. Then clean them carefully and do not waste them.

THINK CAREFULLY ABOUT THESE THINGS AND IF YOU ARE CAREFUL HOW
YOU COLLECT, THERE WILL ALWAYS BE SHELLS IN THE SEA IN YOUR AREA.

Appendix 4 List of Bivalve species recorded from Fiji

F. Arcidae

Anadara scopha maculosa

A. tricenicosta

A. inequivalis

A. fibula

Arca ventricosa

Barbatia bicolorata

B. lima

B. virescens

B. boricardi

F. Cardiidae

Discors cyratum

Fragum fragum

F. unedo

Fulvia tenuicostata

Laevicardium biraliatum

Trochycardium maculosum

Vasticardium enosle

Corculum sp.

F. Carditidae

Cardita variegata

F. Donacidae

Donax carinatus

D. cunealus

D. semigranosus

D. faba

D. swenal

F. Chamidae

Chama ambigua

C. dunkeri

C. fibula

C. lazarus

C. reflexa

F. Isognomonidae*Isognomon alatus**I. isognomon*F. Glycymeridae*Glycymeris reevi*F. Fimbriidae*Fimbria fimbriata*F. Mytilidae*Modiolus philippinarum**Mytilus grayana**Septifer bilocularis**S. excisus*F. Ostreidae*Crassostraea gigas**Dendostraea hyotis**Lopha cristagalli**Saxostraea glomerulata*F. Limidae*Lima lima**L. orientalis**L. ales*F. Lucunadae*Codakia punctata**C. tigerina**C. ovum**C. exasperata*F. Mactridae*Mactra cuneata**M. aspersa*F. Pectinidae*Chlamys ratula**C. squamosa**Gloriapallium pallium*

F. Pholadidae

Barnea manilensis
B. obturanente
Jouannetia globulosa

F. Pinnidae

Atrina vexillum
Pinna muricata
Streptopinna saccata

F. Psammobiidae

Asaphis violescens
A. diflorata
Gari maculosa
G. truncata
Psammocola ratiata
Psammotoea elongata

F. Pteriidae

Pinctada margaritifera
Pteria peasii
P. penguin

F. Spondylidae

Spondylus calcifer
S. ducalis
S. princeps
S. varius

F. Tellinidae

Cyclotellina remies
C. seobinata
Marta firatexta
Sobetellina atrata
S. violacae
Tellina pralalum
T. pralalum
T. staurella
T. irigata
Tapes vulsella
T. philippinarum

F. Trapeziidae*Trapezium bicarinatum**T. schumaker*F. Tridacnidae*Tridacna elongata**T. derasa**T. squamosa**T. crocea**Hippopus hippopus*F. Unionidae*Batissa violacea**F. Teredinidae*Teredo navalis*F. Vermelidae*Sepulorlis imbricatus**S. xenophorus*F. Veneridae*Antigona lamellaris**Gafrarium lumcidum**G. pectinatum**G. dispar**Glycodonta marica**G. scabra**Lioconcha castremsis**L. ornata**Taper litterortus**T. papillonacea**Pitar obliquata**P. pellucidus**Tivela byronensis**Venus columbiensis**Periglypta reticulata*

* freshwater Kai

Appendix 5 Valuable land shells of Fiji

Placostylus elobatus

P. fulguratus

P. kandavuensis

P. hoyti

P. morosus

P. ochrostomus

P. seemani

These are the largest and most attractive land shells of Fiji. However, there are many more smaller species that are also of appeal to collectors.

Appendix 6 Commercial catalogue of specimen shells found in Fiji

Note: "b" = beach specimen (i.e. a shell collected dead on the beach)

"gb" = good beach specimen

<u>Species</u>	<u>Current Value \$US</u>	<u>Species</u>	<u>Current Value \$US</u>
<u>F. Angaridae</u>		<u>F. Conidae</u>	
<i>Angaria delphinus</i>	.40	<i>Conus aureus</i>	25.00
<u>F. Bursidae</u>		<i>C. aureus b.</i>	2.00
<i>Bursa bubo</i>	4.50	<i>C. barbara</i>	2.75
<i>B. bufonia</i>	1.50	<i>C. bullatus</i>	NIA
<i>B. cruentata</i>	1.50	<i>C. canonicus</i>	.30
<i>B. crumena</i>	1.50	<i>C. capitaneus</i>	.40
<i>B. granularis</i>	.75	<i>C. catus</i>	.20
<i>B. g. bitubercularis</i>	2.10	<i>C. chaldaeus</i>	.25
<i>B. gyrineum</i>	1.00	<i>C. circumcissus</i>	NIA
<i>B. leo</i>	1.25	<i>C. coccineus</i>	6.50
<i>B. margaritula</i>	2.10	<i>C. coronatus</i>	.30
<i>B. rana</i>	.80	<i>C. distans</i>	.35
<i>B. rosa</i>	2.20	<i>C. ebraeus</i>	.15
<i>B. rubeta</i>	1.25	<i>C. eburneus</i>	.20
<i>B. spp.</i>	.90	<i>C. emaciatus</i>	.50
<u>F. Cassidae</u>		<i>C. episcopus</i>	.40
<i>Phalium areola</i>	.80	<i>C. flavidus</i>	.35
<i>P. bisulcatum</i>	2.25	<i>C. floccatus</i>	60.00
<i>P. glaucum</i>	2.70	<i>C. floccatus b.</i>	7.50
<i>P. pila</i>	1.30	<i>C. floridulus</i>	20.00
<i>Cassis cornuta</i>	5.00	<i>C. figulinus</i>	.40
<i>C. erinaceus</i>	.40	<i>C. generalis</i>	.90
<i>C. rufa</i>	5.00	<i>C. geographus</i>	.65
<i>C. turgida</i>	.50	<i>C. glans</i>	1.20
<i>Cassmaria ponderosa</i>	.75	<i>C. imperialis</i>	.75
<u>F. Conidae</u>		<i>C. legatus</i>	12.50
<i>Conus aculeiformis</i>	12.00	<i>C. leopardus</i>	.50
<i>C. aculeiformis b.</i>	2.00	<i>C. litoglyphys</i>	.70
<i>C. acutangulus</i>	2.75	<i>C. litteratus</i>	.30
<i>C. ammiralis</i>	8.00	<i>C. lividus</i>	.50
<i>C. arenatus</i>	.75	<i>C. magus</i>	.65
<i>C. aulicus</i>	5.00	<i>C. magnificus</i>	17.50
		<i>C. marmoreus</i>	.40

<u>Species</u>	<u>Current Value \$US</u>	<u>Species</u>	<u>Current Value \$US</u>
<u>F. Conidae (cont)</u>		<u>F. Conidae (cont)</u>	
<i>Conus m. bandanus</i>	1.10	<i>Conus terebra</i>	.80
<i>C. miles</i>	.25	<i>C. tessulatus</i>	1.50
<i>C. miliaris</i>	.75	<i>C. textile</i>	.40
<i>C. mitratus</i>	4.75	<i>C. tulipa</i>	1.00
<i>C. moreleti</i>	2.50	<i>C. varius</i>	1.50
<i>C. musicus</i>	.30	<i>C. vexillum</i>	1.40
<i>C. mustellinus</i>	.75	<i>C. virgo</i>	.50
<i>C. nussatella</i>	.75	<i>C. vitulinus</i>	.60
<i>C. obscurus</i>	1.75	<u>F. Cymatiidae</u>	
<i>C. ochroleucus</i>	NIA	<i>Cymatium caudatum</i>	1.90
<i>C. onaria</i>	.40	<i>C. distortio-anus</i>	.45
<i>C. parius</i>	.75	<i>C. d. reticulata</i>	1.10
<i>C. parvulus</i>	.70	<i>C. gemmata</i>	1.00
<i>C. pertusus</i>	7.50	<i>C. gutturnium</i>	1.10
<i>C. planorbis</i>	.50	<i>C. hepaticum</i>	1.55
<i>C. pulicarius</i>	.40	<i>C. lotorium</i>	1.40
<i>C. quercinus</i>	.25	<i>C. nicobaricum</i>	.70
<i>C. radiatus</i>	2.00	<i>C. pileare</i>	.75
<i>C. ranunculus</i>	.25	<i>C. pyrum</i>	1.25
<i>C. rattus</i>	.45	<i>C. rubecula</i>	1.40
<i>C. retifer</i>	4.50	<i>C. sinensis b.</i>	2.15
<i>C. scabriusculus</i>	1.00	<u>F. Cypraeidae</u>	
<i>C. semisulcatus b.</i>	4.00	<i>Cypraea annulus</i> 5 for	.20
<i>C. sowerbii g.b.</i>	3.50	<i>C. arabica arabica</i> 3 for	.20
<i>C. spectrum</i>	2.50	<i>C. a. eglantina</i>	.60
<i>C. sponsalis</i>	.60	<i>C. argus</i>	2.40
<i>C. stercusmuscarum</i>	.30	<i>C. asellus</i>	.40
<i>C. striatellus</i>	.75	<i>C. aurantium</i>	250.00
<i>C. striatus</i>	.50	<i>C. beckii</i>	15.00
<i>C. sugillatus</i>	.20	<i>C. beckii b.</i>	1.00
<i>C. sulcatus b.</i>	3.00	<i>C. bistrinotata</i>	1.00
<i>C. suratensis</i>	2.50		

<u>Species</u>	<u>Current Value \$US</u>	<u>Species</u>	<u>Current Value \$US</u>
<u>F. Cypraeidae</u>		<u>F. Cypraeidae (cont)</u>	
<i>Cypraea bregeriana</i>	12.00	<i>C. poraria</i>	.60
<i>C. brevidentata</i>	7.50	<i>C. punctata</i>	1.60
<i>C. caputserpentis</i> 5 for	.20	<i>C. scurra</i>	1.50
<i>C. carneola</i>	.35	<i>C. staphylea</i>	.40
<i>C. caurica</i>	.25	<i>C. stolida</i>	2.40
<i>C. childreni</i> g.b.	7.50	<i>C. talpa</i>	.60
<i>C. chinensis</i>	1.40	<i>C. teres</i>	.80
<i>C. cicurcula</i>	.75	<i>C. testudinaria</i>	2.50
<i>C. clandestina</i>	.45	<i>C. tigris (lge)</i>	.45
<i>C. cribaria</i>	2.50	<i>C. tigris (sml)</i>	.25
<i>C. depressa</i>	.90	<i>C. valentia</i>	800.00
<i>C. eburnea</i>	1.15	<i>C. vitellus</i>	.30
<i>C. erosa</i>	.10	<i>C. ziczac</i>	.80
<i>C. erronea</i>	.15	<u>F. Ovulidae</u>	
<i>C. felina</i>	.40	<i>Calpurnus verrucosus</i>	.50
<i>C. globulus</i>	1.00	<i>C. semistriatus</i>	.75
<i>C. helvola</i>	.60	<i>Ovula ovum</i>	.40
<i>C. hirundo</i>	1.00	<i>O. costellata</i>	6.50
<i>C. humphreysii</i>	2.50	<u>F. Muricidae</u>	
<i>C. isabella</i>	.20	<i>Drupea grossularia</i>	.45
<i>C. labrolineata</i>	.30	<i>D. hippocastanum</i>	.45
<i>C. limacina</i>	1.00	<i>D. morum</i>	.35
<i>C. lynx</i>	.15	<i>D. ricinus</i>	.20
<i>C. mappa</i>	5.00	<i>D. rubusidaea</i>	.40
<i>C. mariae</i>	11.00	<u>F. Harpidae</u>	
<i>C. mariae</i> b.	2.00	<i>Harpa amouretta</i>	.25
<i>C. margarita</i>	7.50	<i>H. articularis</i>	1.30
<i>C. mauritiana</i>	.50	<i>H. davidus</i>	2.00
<i>C. minoridens</i>	.50	<i>H. harpa</i>	2.40
<i>C. moneta</i> 5 for	.20	<i>H. major</i>	1.60
<i>C. nucleus</i>	.75	<u>Inquisitor</u>	
<i>C. onyx melanesia</i>	12.00	<i>Inquisitor solomensis</i>	.75
<i>C. pallidula</i>	.85		

<u>Species</u>	<u>Current Value \$US</u>	<u>Species</u>	<u>Current Value \$US</u>
<u>F. Janthinidae</u>		<u>F. Mitridae</u> (cont)	
<i>Janthina violacea</i>	.30	<i>Mitra tornata</i>	4.75
		<i>Neocancilla clathrus</i>	.50
<u>F. Mitridae</u>		<i>N. papilio</i>	.35
<i>Cancilla bacillum</i>	.45	<i>Pterygia crenulata</i>	3.10
<i>C. circula</i> b.	1.25	<i>P. dactylus</i>	.45
<i>C. filaris</i>	2.00	<i>P. fenestrata</i>	1.00
<i>C. flammigera</i>	1.75	<i>P. necea</i>	.50
<i>C. granatina</i>	.70	<i>Scabricola caerulea</i>	.65
<i>C. insculpta</i>	4.25	<i>S. desetangsii</i>	1.70
<i>C. interlirata</i>	1.25	<i>S. fusca</i>	3.50
<i>C. peasei</i>	3.25	<i>Strigatella paupercula</i>	.55
<i>C. verrucosa</i>	.75	<i>S. pelisserpentis</i>	2.90
<i>Imbricaria conica</i>	1.75	<i>S. scutulata</i>	.45
<i>I. conularis</i>	.30	<i>Swainsonia casta</i>	.50
<i>I. olivaeformis</i>	.30	<i>S. ocellata</i>	4.10
<i>I. punctata</i>	.50	<i>S. variegata</i>	2.10
<i>I. vanikorensis</i>	1.30		
<i>Mitra ambigua</i>	.70	<u>F. Costellariidae</u>	
<i>M. cardinalis</i>	.45	<i>Pusia amabilis</i>	3.75
<i>M. chrysostoma</i>	1.20	<i>P. infausta</i>	4.50
<i>M. contracta</i>	1.60	<i>P. tuberosa</i>	1.25
<i>M. coronata</i>	1.60	<i>Vexillum acuminatum</i>	.80
<i>M. cucumerina</i>	.75	<i>V. acupictum</i>	4.25
<i>M. eremitarum</i>	.40	<i>V. aurantium</i>	.90
<i>M. ferruginea</i>	.40	<i>V. cadaverosum</i>	.80
<i>M. floridula</i> b.	2.75	<i>V. caffrum</i>	1.50
<i>M. fraga</i>	.70	<i>V. cophinum</i>	2.90
<i>M. imperialis</i>	1.00	<i>V. costatum</i>	9.50
<i>M. incompta</i>	5.50	<i>V. deshayesi</i>	1.05
<i>M. mitra</i>	.45	<i>V. discolorium</i>	.60
<i>M. papalis</i>	.90	<i>V. exasperatum</i>	.40
<i>M. peculiaris</i>	2.50	<i>V. festum</i> b.	3.50
<i>M. rosacea</i>	7.50	<i>V. gruneri</i>	1.15
<i>M. stictica</i>	.50	<i>V. michau</i>	1.50
<i>M. tabanula</i>	2.50	<i>V. modestum</i>	2.25

<u>Species</u>	<u>Current Value \$US</u>	<u>Species</u>	<u>Current Value \$US</u>
<u>F. Costellariidae (cont)</u>		<u>F. Muricidae (cont)</u>	
<i>Vexillum obeliscum</i>	2.25	<i>Murex tribulus</i>	1.60
<i>V. pacificum</i>	.45	<i>M. trigonula</i>	4.75
<i>V. plicarium</i>	.65	<i>M. triquetra</i>	2.50
<i>V. polygonium</i>	2.00	<i>Phyllocoma convolutum</i>	7.25
<i>V. radius</i>	3.50	<i>Pterynotus alatus</i>	5.70
<i>V. radix</i>	3.10	<i>Vitularia miliaris</i>	2.60
<i>V. regina</i>	12.00	<u>F. Nautilidae</u>	
<i>V. rufofilosum</i>	2.75	<i>Nautilus pompilius</i>	3.00
<i>V. rugosum</i>	.50	<u>F. Neritidae</u>	
<i>V. sanguisugum</i>	.90	<i>Nerita polita</i>	.20
<i>V. semifasciatum</i>	1.10	<u>F. Olividae</u>	
<i>V. subdivisum</i>	2.75	<i>Oliva annulata</i>	.40
<i>V. suluense</i>	2.75	<i>O. bulbiformis</i>	.30
<i>V. taeniatum</i>	12.50	<i>O. carneola</i>	.50
<i>V. turrigerum</i>	2.25	<i>O. dactyliola</i>	.40
<i>V. unifasciatum</i>	4.25	<i>O. elegans</i>	.20
<i>V. virgo</i>	.65	<i>O. episcopalis</i>	.25
<i>V. vulpeculum</i>	.95	<i>O. e. atalina</i>	1.50
<i>V. zelotypum</i>	4.25	<i>O. funebris</i>	.50
<u>F. Muricidae</u>		<i>O. miniacea</i>	1.00
<i>Chicoreus artemis</i>	4.50	<i>O. m. saturata</i>	1.20
<i>C. axicornis</i> b.	9.40	<i>O. oliva</i>	.40
<i>C. brunneus</i>	.65	<i>O. o. algida</i>	.20
<i>C. microphyllus</i>	1.10	<i>O. o. longispira</i>	.25
<i>C. ramosus</i>	4.00	<i>O. paxillus</i>	.80
<i>Farvartia balyeata</i> b.	4.20	<i>O. reticulata</i>	.25
<i>F. peasei</i>	6.50	<i>O. r. evania</i>	.40
<i>F. rosea</i>	5.90	<i>O. r. zigzag</i>	.40
<i>Haustellum haustellum</i>	1.15	<i>O. sidelia</i>	.75
<i>Homalocantha antomica</i>	3.50	<i>O. textilina</i>	.80
<i>Marchia bipinnata</i>	9.50	<i>O. tremulina</i>	.80
<i>M. elongata</i>	14.00	<i>O. tricolor</i>	1.00
<i>M. nodulifera</i>	6.50	<i>O. vidua</i>	1.75
<i>M. triptera</i>	2.60		

<u>Species</u>	<u>Current Value \$US</u>	<u>Species</u>	<u>Current Value \$US</u>
<u>F. Strombidae</u>		<u>F. Terebridae</u>	
<i>Strombus aurisdianae</i>	.30	<i>Hastula matheroniana</i>	.90
<i>S. bulla</i>	.40	<i>H. mera</i>	.90
<i>S. canarium</i>	.25	<i>H. pencillata</i>	1.40
<i>S. canarium albino</i>	2.00	<i>H. plumbea</i>	.90
<i>S. canarium Manus var.</i>	.25	<i>H. strigilata</i>	.25
<i>S. c. isabella</i>	.25	<i>H. stylata</i>	2.10
<i>S. dentatus</i>	.90	<i>Impages hectica</i>	.30
<i>S. erythrinus</i>	1.50	<i>Terebra affinis</i>	.40
<i>S. gibberulus</i>	.10	<i>T. amanda</i>	2.60
<i>S. labiatus</i>	4.50	<i>T. anilus</i>	1.30
<i>S. liabiatus b.</i>	.50	<i>T. areolata</i>	.70
<i>S. lentignosus</i>	.30	<i>T. argus</i>	.40
<i>S. luhuanas</i>	.10	<i>T. babylonia</i>	.35
<i>S. minimus</i>	.25	<i>T. cerithina</i>	.50
<i>S. mutabilis</i>	.25	<i>T. chlorata</i>	.35
<i>S. popus</i>	2.00	<i>T. columellaris</i>	.30
<i>S. popus b.</i>	.50	<i>T. conspersa</i>	1.20
<i>S. sinuatus</i>	3.50	<i>T. crenulata</i>	.40
<i>S. terebellum</i>	.25	<i>T. dimidiata</i>	.50
<i>S. variabilis</i>	1.60	<i>T. felina</i>	.30
<i>S. plicatus</i>	1.50	<i>T. fenestrata</i>	7.50
<i>Lambis chiragra</i>	1.10	<i>T. flavescens</i>	2.00
<i>L. cricata</i>	3.50	<i>T. flavofasciata</i>	1.30
<i>L. lambis</i>	.40	<i>T. finiculata</i>	.90
<i>L. millipeda</i>	.75	<i>T. guttata</i>	1.90
<i>L. scorpia</i>	1.10	<i>T. jenningsi</i>	2.75
<i>L. truncata</i>	5.25	<i>T. kilburni</i>	1.50
<u>F. Magilidae</u>		<i>T. laevugata</i>	.75
<i>Rapa rapa</i>	1.75	<i>T. longiscata</i>	.70
<u>F. Terebridae</u>		<i>T. maculata</i>	.45
<i>Duplicaria raphanula</i>	1.90	<i>T. macgillivrayi</i>	2.70
<i>Hastula albula</i>	.75	<i>T. nebulosa</i>	.40
<i>H. lanceata</i>	1.25	<i>T. nitida</i>	2.00
		<i>T. paucistriata</i>	1.50

<u>Species</u>	<u>Current</u> <u>Value</u> <u>\$US</u>	<u>Species</u>	<u>Current</u> <u>Value</u> <u>\$US</u>
<u>F. Terebridae</u>		<u>F. Turridae</u>	
<i>Terebra pertusa</i>	.55	<i>Turris jeffreysi</i>	.80
<i>T. picta</i>	4.10	<i>T. tuberculata</i>	1.80
<i>T. polygyrata</i>	2.75	<i>T. undosa</i>	.50
<i>T. punctatostriata</i>	4.25	<i>T. unizonalis</i>	.35
<i>T. subulata</i>	.75	<u>F. Vasidae</u>	
<i>T. succincta</i>	1.10	<i>Vasum ceramicum</i>	.90
<i>T. textilis</i>	3.25	<i>V. turbinellum</i>	.60
<i>T. triseriata</i>	2.10		
<i>T. undulata</i>	.25		
<u>F. Tonnidae</u>			
<i>Tonna canaliculata</i>	.90		
<i>T. perdix</i>	.50		
<i>T. pomum</i>	.45		
<i>T. tessellata</i>	.50		
<u>F. Trochidae</u>			
<i>Trochus fenestratus</i>	.50		
<i>T. incrassatus</i>	.50		
<i>T. maculatus</i>	.45		
<i>T. niloticus</i>	.60		
<i>T. pyremis</i>	.50		
<u>F. Turbinidae</u>			
<i>Turbo petholatus</i>	.70		
<u>F. Turridae</u>			
<i>Turris acuta</i>	.45		
<i>T. abbreviata</i>	.40		
<i>T. albina</i>	.45		
<i>T. babylonia</i>	1.50		
<i>T. cerithina</i>	.65		
<i>T. cingulifera</i>	.80		
<i>T. crispa</i>	.60		
	.80		

Appendix 7 Basic list of shell books for collectors

Cernohorsky, W.O. (1971) Marine shells of the Pacific (Vol.I).
Sydney: Pacific Publications.

Cernohorsky, W.O. (1972) Marine shells of the Pacific (Vol.II).
Sydney: Pacific Publications.

Cernohorsky, W.O. (1981) Tropical Pacific marine shells.
Sydney: Pacific Publications.

Hinton, A. (1976) Shells of New Guinea and the central Indo-Pacific.
Rutland: C.E. Tuttle.

Pechar, P. and Parkinson, B. (1980) Mitre shells from the Pacific and Indian Oceans. Port Moresby: Robert Brown and Associates.

Radwin, G.E. and D'Attilio, A. (1976) Murex shells of the world: an illustrated guide to the Muricidae. Stanford: Stanford University Press.

Taylor, J. and Walls, J.C. (1975) Cowries. Neptune: T.F.H. Publications.

Walls, J.C. (1979) Cones. A synopsis of the living Conidae.
Neptune: T.F.H. Publications.

Zeigler, R.F. and Porreca, H.E. (1969) Olive shells of the world.
Falls Church: Shell Cabinet.

Appendix 8 Diving equipment necessary for shell project vessel

1 5.32 cfm diesel. marinised compressor
10 80 cu.ft. cylinders
12 K valves
12 Back-packs
12 Regulators with contents gauges and 'octopus'
 second stages
15 Depth gauges
20 Underwater torches
20 prs flippers
20 Diving masks
15 Tank boots - 80's
15 Snorkels
20 Ski suits (assorted sizes)
10 Diving watches
5 Diving knives

plus all necessary spare parts for the regulators
and torches.
