

SPC
Secretariat
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Community



CRISP



Coral Reef Initiatives for the Pacific
Initiatives Corail pour le Pacifique

COMPONENT 2C - Project 2C2

Bioprospection

Increase biodiversity knowledge
Algae and benthic invertebrates taxonomy

December 2007

MISSION REPORT



BIODIVERSITY AND MARINE SUBSTANCES FROM THE FIJI ISLANDS Algae/Sponges/Ascidians/Echinoderms

FIELD TRIP TO FIJI

7-27 MAY 2007



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CRISP



Coral Reef InitiativeS for the Pacific
Initiatives Corail pour le Pacifique



The CRISP programme is implemented as part of the policy developed by the Secretariat of the Pacific Regional Environment Programme for a contribution to conservation and sustainable development of coral reefs in the Pacific.

The Initiative for the Protection and Management of Coral Reefs in the Pacific (CRISP), sponsored by France and prepared by the French Development Agency (AFD) as part of an inter-ministerial project from 2002 onwards, aims to develop a vision for the future of these unique ecosystems and the communities that depend on them and to introduce strategies and projects to conserve their biodiversity, while developing the economic and environmental services that they provide both locally and globally. Also, it is designed as a factor for integration between developed countries (Australia, New Zealand, Japan, USA), French overseas territories and Pacific Island developing countries.

The CRISP Programme comprises three major components, themselves composed of projects, which are:

Component 1A: Integrated Coastal Management and Watershed Management

- 1A1: Marine biodiversity conservation planning
- 1A2: Marine Protected Areas (MPAs)
- 1A3: Institutional strengthening and networking
- 1A4: Integrated coastal reef zone and watershed management

Component 2: Development of Coral Ecosystems

- 2A: Knowledge, beneficial use and management of coral ecosystems
- 2B: Reef rehabilitation
- 2C: Development of active marine substances
- 2D: Development of regional data base (ReefBase Pacific)

Component 3: Programme Coordination and Development

- 3A: Capitalisation, value-adding and extension of CRISP Programme activities
- 3B: Coordination, promotion and development of CRISP Programme

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COMPONENT 2C

Marine Bioprospection

■ PROJECT 2C-1:

Legal framework - Upgrading island country legislation for the sharing of benefits from development of active marine substances

■ PROJECT 2C-2:

Taxonomy - Improvement of knowledge of benthic reef invertebrate and algae taxonomy

■ PROJECT 2C-3:

Technological aspect - Identification of active marine substances

■ PROJECT 2C-4:

Institutional strengthening - Training of Pacific island resource persons

CRISP is funded by :



BIODIVERSITY AND MARINE SUBSTANCES FROM THE FIJI ISLANDS

ALGAE/SPONGES/ASCIDIANS/ECHINODERMS

**Field trip to Fiji
7 MAY–27 MAY 2007**

**Claude Payri, team leader
Sylvain Petek
Jean-Louis Menou
Gregory Lasne
John Butscher**

UMR 152
« Pharmacochimie des
substances naturelles et
pharmacophores redox »
IRD-UPS, Toulouse

UMR 7138
« Systématique, adaptation,
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ABSTRACT

The goal of this “BSM-Fiji” campaign, scheduled from 7 to 27 May 2007, was to sample algae, sponges and ascidians so as to conduct pharmacological studies and analyse the region’s biodiversity. Sampling was carried out in the provinces of Bua, Macuata (Vanua Levu Island), Cakaudrauve (Ringgold atolls), Lomaiviti (N’Gau Islands) and Kaduvu.

This campaign was part of the CRISP (Coral Reef InitiativeS for the Pacific) program and formed Component 2C2 of the project. It was a follow-up to the “BSM-Solomons” campaign carried out in 2004 and earlier campaigns by the IRD in New Caledonia (SNM1 : Bellona reefs and SNM2 Northern Lagoon) and in Vanuatu (European MAST 3 program) as one of the programs designed to foster biodiversity through research on new natural substances of marine origin.

In addition to enabling an inventory of the groups involved, these samples will supply materials for several on-going phylogenetic and phylogeographic studies and make it possible to characterise the zone biogeographically through comparison with island groups for which we have the same type of data already (Solomon Islands, Vanuatu, New Caledonia).

Pharmacology studies will make it possible to look for new sources of active substances, mainly in sponges (Porifera) but also in ascidians and brown Furoids algae. Research on biological activities will be carried out in the team’s areas of expertise, i.e. malaria, cancer, inflammation and the cardiovascular system.

In addition, the environmental data (geomorphologic characterisation and bionomic description) collected at the various stations form a reference database for these sites, most of which have never been prospected.

In all, the results of this campaign contribute to fostering biodiversity through increased knowledge about this heritage and research into new natural substances of marine origin.

Introduction

The campaign took place from 7 to 27 May 2007 on board the R/V *Alis* in the Fiji Islands, particularly in the Vanua Levu group, i.e. the province of Bua, the province of Macuata (Cakau Levu reefs), the province of Cakaudrove (Ringgold reefs); the Lomaiviti group (province of Lomaiviti: Naivai and Gau Islands) and the province of Kandavu (Astrolabe reefs) (map). It was part of the CRISP program and followed an IRD campaign in the Solomon Islands in 2004 (BSM-Salomon1 campaign) as one of the programs designed to foster biodiversity through research into new natural substances of marine origin.

This campaign had two objectives:

- Sample the three major benthic groups in reef zones from 0 to 60 m, i.e. sponges, ascidians and macrophytes, in order to make an inventory and descriptions of the species and, then, characterise the zone biogeographically through comparison with the islands groups that have already be explored, i.e. Solomon Islands, Vanuatu, New Caledonia.
- Look for new sources of active substances in the team's areas of expertise, i.e. malaria, cancer, inflammation and the cardio-vascular system, in particularly on sponges, ascidians and brown Fucus algae.

Participants

Claude Payri, UPF-IRD-UR 148, Noumea, chief scientist for this expedition

Sylvain Petek, CR2, IRD-UMR 152, Noumea, chemistry

Jean-Louis Menou, IRD Noumea, scientific diver in charge of hyperbaric operations,

Grégory Lasne, IRD Noumea, scientific diver

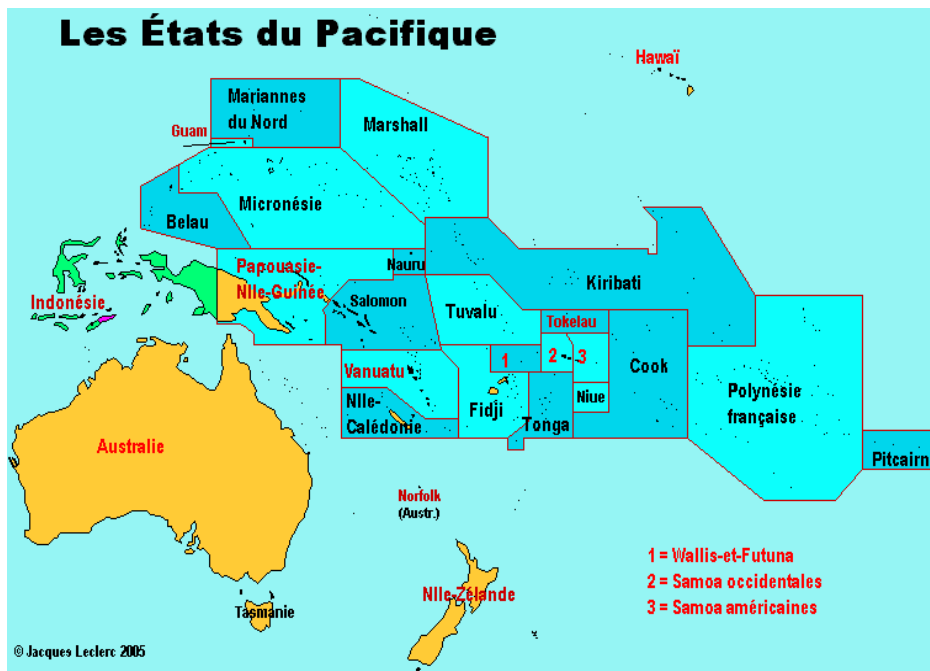
John Butscher, IRD Noumea, scientific diver

Joji Vakawaletabua, Department of Fisheries, Suva, Fijian observer

Crew of the R/V *Alis*

Captain Hervé le Houarno

Geographic location



The Republic of Fiji is located north of New Zealand, east of New Caledonia and Vanuatu, west of Tonga and Samoa and south of Tuvalu (Fig. 1)

Figure 1: Pacific Island countries and territories

The Fiji archipelago comprises 844 islands, small islands and atolls, only about 100 of which are inhabited. The two main islands are Viti Levu (10,493 sq km) in the southwest and Vanua Levu (5,515 sq km) in the north-east; they account for 87% of the country's total surface area. Other important islands are Taveuni (435 sq km), Kandavu (409 sq km), Ovalau (104 sq km), Ngau (140 sq km), Koro (104 sq km) and Rotuma, located some 465 km to the north-west. In the east stretches out the Lau group, which is mainly composed of atolls and whose access is limited and controlled by local populations (according to www.tfq.ulaval.ca) (Fig. 2).



Figure 2: Fiji Islands

Previous studies

Many studies have been done on Fiji's coral reefs and lagoons. Nevertheless, in the area we were interested in, a review of the literature showed that studies on active substances from Fiji's fauna and flora appeared in 38 publications (Appendix 1) and covered about 30 organisms (20 sponges, 5 ascidians, 4 microbialites and 1 alga) – relatively low figures given Fiji's extensive reefs. The zones prospected up to then were located near the University of the South Pacific (USP) in Suva as only a very few dive clubs and teams had been able to obtain the resources needed to go out away from urban areas. Because of the research station on Kadavu, several explorations had been done in the Great Astrolabe Reef.

The flora of the shallow seabeds of Suva and Rotuma, located in the northern part of the island group, have been covered in a great many taxonomic and floristic studies compiled by South, N'Yeurt and Skelton (e.g. South, G. R. and P. A. Skelton, 2003. "Catalogue of the marine benthic macroalgae of the Fiji Islands, South Pacific" *Australian Systematic Botany* **16**: 699). In contrast, little is known about seabeds deeper than 25 m (Littler and Littler, 2003. South Pacific reef plants, OffShore Graphics, Inc. Washington, DC, USA) and areas located at a distance from the major urban centres.

More recently, i.e. in December 2004, *WWF* carried out an integrated study of the Great Sea Reef, Cakaulevu and associated ecosystems. This work notably included a list of the region's algae, coral and fish, along with some information on the health of the reefs.

In addition, about 30 extracts of marine invertebrates from a variety of groups, prepared by USP, were tested by the UMR152 on our pharmacological targets and are currently being studied by a Fijian student from USP at the IRD centre in Noumea and the CNRS Institute on the Chemistry of Natural Substances in Gif-sur-Yvette, France.

Permits to work and to export biological material

The Fijian Ministry of Fisheries and the provinces involved must issue a certain number of permits before any work can be carried out in Fijian waters. Five *Memoranda of Understanding* (MOUs) were jointly signed by the IRD, the Fisheries Department and the representatives of each province, but only four of them were actually used. More than 15 months of paperwork were needed for these formalities (Appendix 2).

In addition, at each work site we first had to use the MOUs to get the permission of the chiefs of nearby villages (gologoli). This was accomplished on-site before each dive. A Fijian observer seconded by the Fisheries Department helped us with this task and travelled with us throughout the expedition. This custom ceremony, called *sevusevu*, consists of offering kava roots to prepare a drink that is shared by everyone at the meeting. All of these steps accounted for a cumulated total of two days of campaign time.

Finally the export of biological material to New Caledonia was subject to an import permit issued by the plant health services in Noumea and an export permit issued by the Fijian Fisheries Department (Appendix 2).

Study sites

The study zones were preselected based on the navigation possibilities so as to cover as diverse a range of habitat types as possible (geomorphologic type/exposure to swell and prevailing winds).

Prospecting was done in the provinces of Bua and Macuata, particularly north of the island of Vanua Levu; Cakaudrauve, particularly the Ringgold atolls; and Lomaiviti, mainly the islands of N'Gau and Kadavu (Fig. 3).

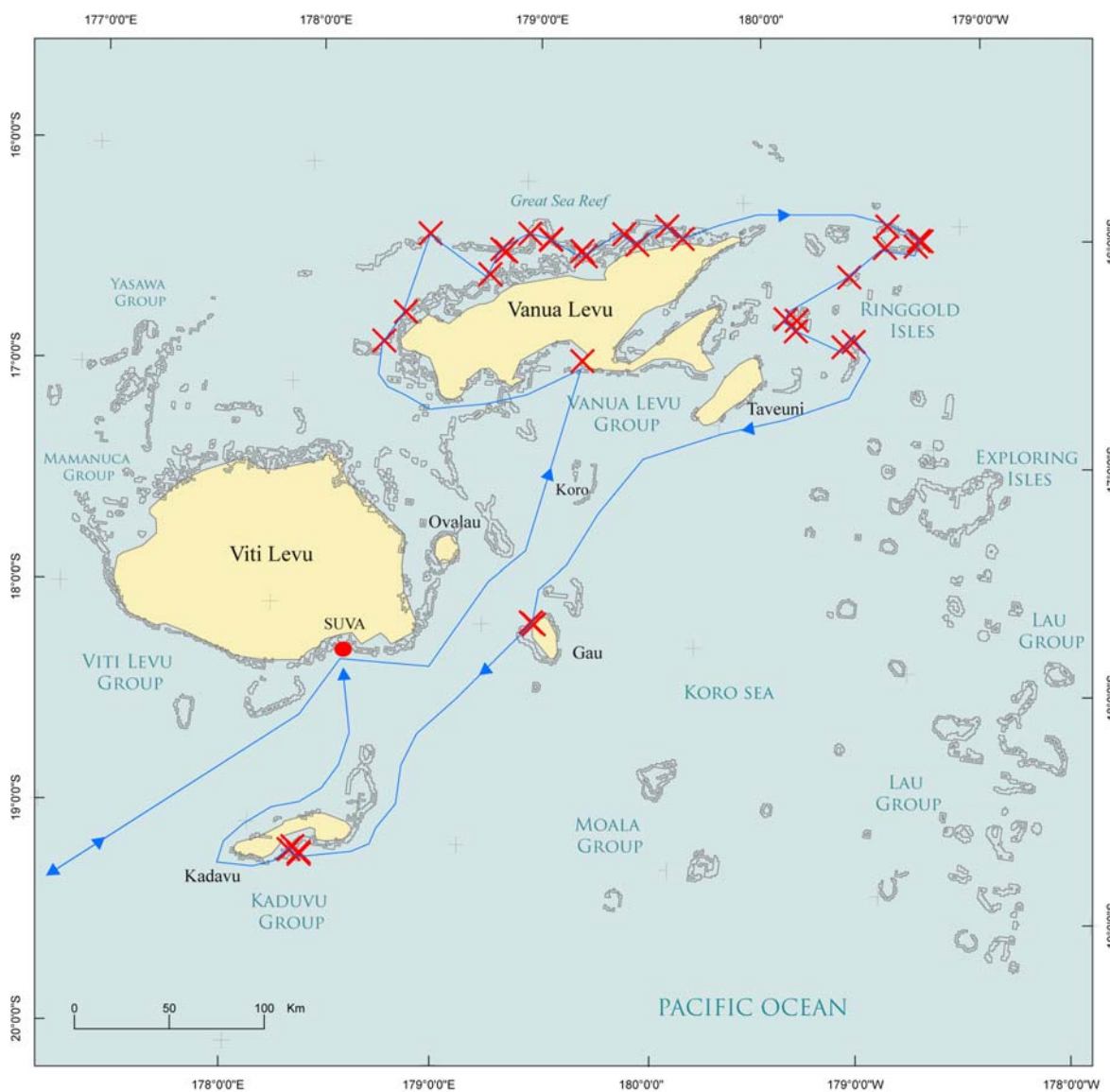


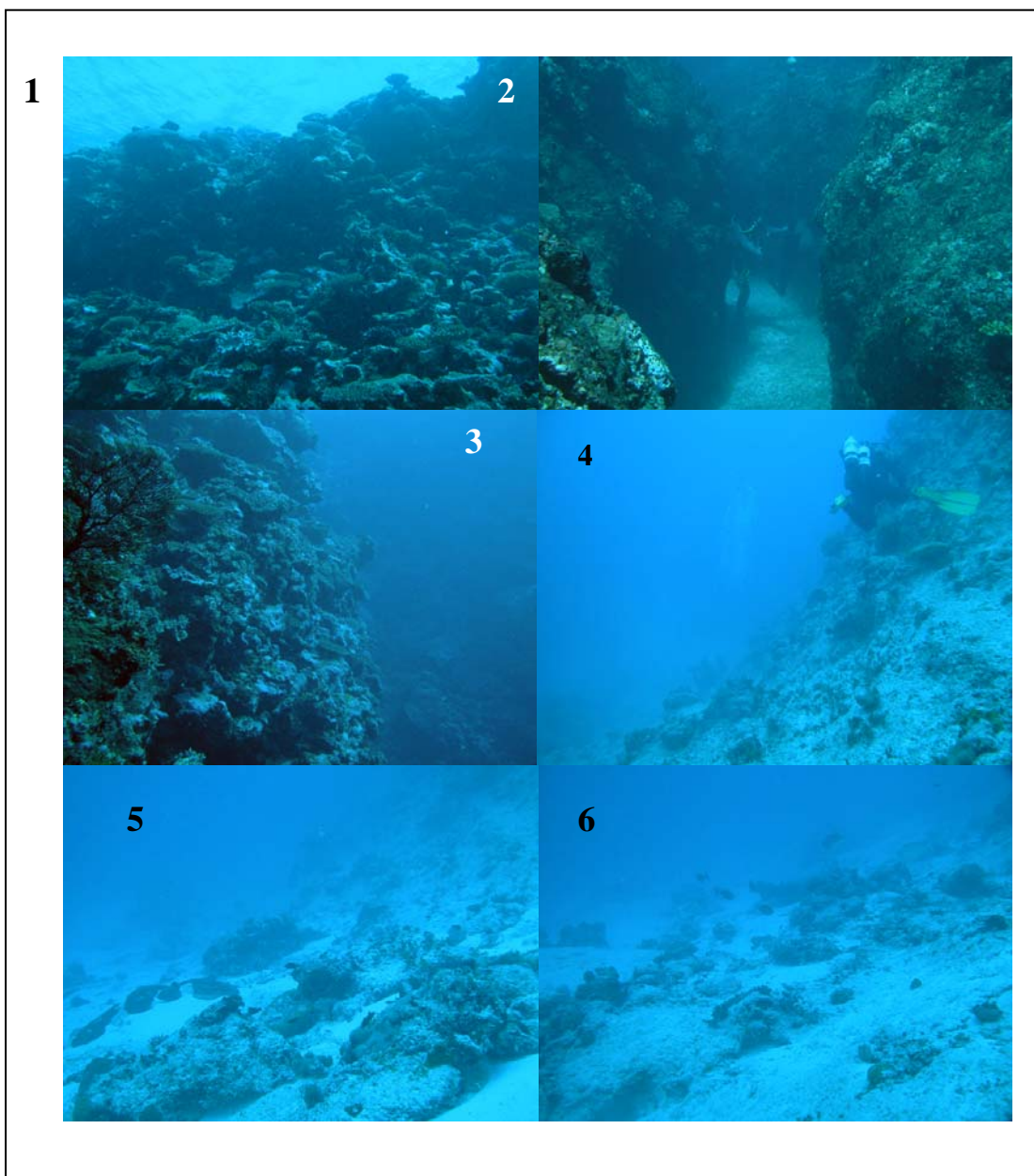
Figure 3: Geographic location and expedition itinerary

Geomorphologic status

The habitats sampled mainly consisted of coral habitats, lagoon seabeds and, less frequently, marine seagrass beds and shallow-water seaweed beds along the coasts. We gave priority to distant habitats like those on the outer slopes so as to increase our knowledge of these sites, which have gone practically unstudied in comparison to the shallow waters of the lagoon, which are more accessible to coastal shipping resources.

Outer slopes:

The top of outer slopes is usually composed of a compact platform (1) that may be covered with narrow and deep grooves (2) (down to 10 m). Then a highly covered slope may be vertical (3) or more gradual down to a depth of about 45 m (4), where the first break in the slope can be seen (5). Coral structures become rarer and give way to sandy passes and hollows. The inclination of the slope decreases down to 60 m where the bottom is sandy (6).



Lagoon seabeds:

Lagoon seabeds are often subject to soil deposits from the island and sediments are mixed (coral/dirt). There are generally two facies, i.e. seaweed beds, mostly colonised by green *Caulerpa* and *Halimeda* algae (7); and mixed bottoms with coral formations (8).



Specific formations:

A few isolated pinnacle formations were also prospected (9) along with passes.



Work assignments

Table 1: work assignments

	Menou	Butscher	Petek	Payri	Lasne
Collect invertebrates	+	+	+		(+)
Collect algae		(+)		+	+
Take photos of organisms <i>in situ</i>	+				+
Take photos of invertebrates <i>ex situ</i>			+		
Station description	+			+	
Label and pack organisms (chemistry, MB, phylogeny)			+	+	
Invertebrate descriptions	+		+		
Maintain diving equipment, refill tanks		+			
Surface/dive surveillance		+			+
Write reports				+	



Refilling station (John Butscher)



Sorting sponges on the deck (Sylvain Petek)

Campaign work calendar

Table 2: Calendar of activities

WORK DONE FROM THE BOAT							
Day	Date	Latitude S	Longitude E	location	Min. depth	Max depth	Activities – Main events
J1	7/5/07			Suva			Took scientists on board
J2	8/5/07			Suva			Clearance and work permit Departure for Vanua Levu
J3	9/5/07			Vanua Levu			Arrival Vanua Levu; took Fisheries Department observer on board Sevusevu
J4	10/5/07	16°46.600	178.24.344	Vanua Levu	5	22	Station Fiji-01
	10/5/07	16°38.207	178.29.520	Vanua Levu	6	23	Station Fiji-02
J5	11/5/07	16°25.907	178.51.911	Vanua Levu	6	27	Station Fiji-03
J6	12/5/07	16°18.847	178.54.595	Vanua Levu	8	50	Station Fiji-04
	12/5/07	16°19.387	178.55.799	Vanua Levu	8	13	Station Fiji-05
J7	13/5/07	16°13.950	179°01.900	Vanua Levu	8	52	Station Fiji-06
	13/5/07	16°17.118	179°16.847	Vanua Levu	8	33	Station Fiji-07
J8	14/5/07	16°14.786	179°07.794	Vanua Levu	5	56	Station Fiji-08
	14/5/07	16°18.495	179°17.923	Vanua Levu	5	56	Station Fiji-09
J9	15/5/07	16°15.061	179°07.795	Vanua Levu	5	62	Station Fiji-10
	15/5/07	16°11.480	179°27.927	Vanua Levu	2	3	Station Fiji-11
J10	16/5/07	16°13.893	179°31.884	Vanua Levu	6	49	Station Fiji-12
J11	17/5/07	16°11.119	179°44.217	Vanua Levu	6	60	Station Fiji-13
	17/5/07	16°08.181	179°39.624	Vanua Levu	1	2	Station Fiji-14
J12	18/5/07	16°01.947	179°19.806	"Nagelelevu Lagoon"	6	59	Station Fiji-15
	18/5/07	16°11.010	179°44.381	"Nagelelevu Lagoon"	8	24	Station Fiji-16
J13	19/5/07	16°04.831	179°10.823	"Nagelelevu Lagoon"	8	62	Station Fiji-17
	19/5/07	16°06.762	179°11.264	"Nagelelevu Lagoon"	26	29	Station Fiji-18
J14	20/5/07	16°04.867	179°09.977	"Nagelelevu Lagoon"	26	50	Station Fiji-19
J15	21/5/07	16°16.561	179°28.682	Nukusemanu reef	4,5	72	Station Fiji-20
	21/5/07	16°29.613	179°41.932	Ile Yanuca	4,5	25	Station Fiji-21
J16	22/5/07	16°29.568	179°44.964	"Bud reef"	21	62	Station Fiji-22
	22/5/07	16°32.511	179°41.796	"Bud reef"	4	26	Station Fiji-23
J17	23/5/07	16°35.234	179°28.145	Nanuku reef	6	60	Station Fiji-24
	23/5/07	16°33.609	179°25.563	Heemskercq reef	12	23	Station Fiji-25
J18	24/5/07	16°58.009	179°13.784	Ngau	6	63	Station Fiji-26
	24/5/07	17°57.200	179°15.100	Ngau	0,5	1	Station Fiji-27
J19	25/5/07	19°05.478	178°13.877	Kandavu Galoa Harbour	25	58	Station Fiji-28
	25/5/07	19°06.292	178°12.837	Kandavu "Pearl reef"	3	15	Station Fiji-29
J21	26/5/07	19°06.862	178°15.752	Kandavu "Pearl reef"	6	46	Station Fiji-30
	26/5/07	19°07.303	178°15.861	Kandavu "Pearl reef"	23	41	Station Fiji-31 – Headed towards Suva
J22	27/5/07			SUVA			Scientists left ship

We travelled to the stations on the *Alis*, with the long transits taking place normally at night or in the early morning depending on hydrographical data about the zone. Once in the zone, the *Alis* would be positioned as close to the dive sites as possible and usually the divers would be taken to the stations in one of two 4.5 m skiffs equipped with 40 hp motors. A very few dives were done directly from the *Alis*.



Alis moored



Divers' boat

Sampling methods

Most observations and sampling of organisms were carried out by scuba at depths of up to 60 meters. The divers worked in teams of two or three and each group was linked to a surface buoy that could be seen from the boat.



On deep and long dives, Nitrox was used to avoid decompression issues.

On reef flats and shallow reefs, sampling was done on foot.



The organisms were sampled directly by hand.

For macrophytes, specimens were removed whole, taking care to detach the thallus from the substratum using a knife.

Several specimens of the same taxon were collected for taxonomic studies. Only the Fucoids were sampled quantitatively (> 500 g) so as to carry out polyphenol analyses. Wherever possible, taxa were photographed *in situ*.

For sponges and ascidians, sampling was done by hand or with a knife or shears depending on the size of the organisms and how they were attached to the substratum. For both groups, those species whose size or abundance made quantitative collection possible (> 500 g) were photographed *in situ* and then removed, with a goal of collecting at least 500 g or, ideally, 2 kg for the pharma-chemical study.

Station descriptions

The geographic coordinates of each station visited were noted (GPS position) and the station was described using a topographic profile along with a geomorphologic description. A succinct list of the coral was made by G. Lasne. J.-L. Menou assessed the site's biological diversity, in particular noting the existence of the main Echinoderm species (sea cucumbers, starfish, ophiurids and sea urchins). For this group, only those species whose identification was doubtful were collected.

Tables 3 and 4 summarise station data and contain the geomorphologic profiles of each station.

Table 3: position and location of station, date, length and depth of dives

STATION No.:	LATITUDE	LONGITUDE	DATE	LOCALITY	LOCATION	MIN DEPTH	MAX DEPTH	TIME	Length of dive
Fiji-01	16°46.600	178.24.344	10/5/07	Vanua Levu	Western slope of Kakaualau Reef	5	22	09:20	1:39
Fiji-02	16°38.207	178.29.520	10/5/07	Vanua Levu	N-NW slope of Laukotolailai Reef	6	23	15:53	1:01
Fiji-03	16°25.907	178.51.911	10/5/07	Vanua Levu	Reef in channel between Lawake Island and Namoli Reef	6	27	13:43	1:19
Fiji-04	16°18.847	178.54.595	12/5/07	Vanua Levu	"Great Barrier Reef" west of Ravi Ravi channel barrier reef outer slope	8	50	08:25	1:24
Fiji-05	16°19.387	178.55.799	12/5/07	Vanua Levu	Ravi Ravi channel eastern edge of pass near outlet	8	13	15:38	1:15
Fiji-06	16°13.950	179°01.900	13/5/07	Vanua Levu	Kakaulevu Reef western edge across from Kia Island	8	52	08:43	1:52
Fiji-07	16°17.118	179°16.847	13/5/07	Vanua Levu	Kakaulevu Reef northern edge east of Kia Island	8	33	16:33	0:52
Fiji-08	16°14.786	179°07.794	14/5/07	Vanua Levu	Kakaulevu Reef northern edge east of Kia Island (in bend)	5	56	08:22	1:24
Fiji-09	16°18.495	179°17.923	14/5/07	Vanua Levu	Lagoon between "Cakaulevu" barrier reef and "Vuata Reef"	5	56	16:03	0:23
Fiji-10	16°15.061	179°07.795	15/5/07	Vanua Levu	Kakaulevu Reef northern edge east of Kia Island (inner part of bend)	5	62	08:22	1:40
Fiji-11	16°11.480	179°27.927	15/5/07	Vanua Levu	Kakaulevu Reef flat outer slope	2	3	16:40	1:15
Fiji-12	16°13.893	179°31.884	16/5/07	Vanua Levu	Outer slope of barrier reef west of "Sau Sau Pass"	6	49	09:12	1:20
Fiji-13	16°11.119	179°44.217	17/5/07	Vanua Levu	Outer slope of Cakaunikuita barrier reef 5.5 miles west of the pass, near tip.	6	60	08:35	0:51
Fiji-14	16°08.181	179°39.624	17/5/07	Vanua Levu	Lagoon, intermediate reef flat	1	2	16:35	1:15
Fiji-15	16°01.947	179°19.806	18/5/07	"Nagelelevu Lagoon"	Northwest tip of barrier reef, outer slope	6	59	08:40	1:04
Fiji-16	16°11.010	179°44.381	18/5/07	"Nagelelevu Lagoon"	First small pass southwest of barrier reef before "Rendell Channel"	8	24	15:34	1:03
Fiji-17	16°04.831	179°10.823	19/5/07	"Nagelelevu Lagoon"	Outer slope north of "Toulalia" Island	8	62	08:52	0:59
Fiji-18	16°06.762	179°11.264	19/5/07	"Nagelelevu Lagoon"	Lagoon seabed about 1 mile west of island	26	29	16:03	0:42
Fiji-19	16°04.867	179°09.977	20/5/07	"Nagelelevu Lagoon"	Outer slope north of Ngelelevu Island	26	50	09:15	1:21
Fiji-20	16°16.561	179°28.682	21/5/07	Nukusemanu reef	Outer slope north of atoll	4,5	72	09:19	1:29
Fiji-21	16°29.613	179°41.932	21/5/07	Ile Yanuca	Along coast at northern tip of island	4,5	25	16:42	0:44
Fiji-22	16°29.568	179°44.964	22/5/07	"Bud reef"	Lagoon pinnacle across from Yavu Island	21	72	08:37	1:03
Fiji-23	16°32.511	179°41.796	22/5/07	"Bud reef"	Nananikita bud reef – eastern edge	4	26	15:29	0:55
Fiji-24	16°35.234	179°28.145	23/5/07	Nanuku reef	North-west of lagoon	6	60	08:52	1:21
Fiji-25	16°33.609	179°25.563	23/5/07	Heemskercq reef	Outer slope of immersed barrier reef north of Nanuku Reef	12	23	16:04	0:52
Fiji-26	16°58.009	179°13.784	24/5/07	Ngau	Outer slope of barrier reef across from village	6	63	10:44	1:19
Fiji-27	17°57.200	179°15.100	24/5/07	Ngau	Coastal reef flat in front of village	0,5	1	16:30	1:30
Fiji-28	19°05.478	178°13.877	25/5/07	Kandavu Galoa Harbour	Outer slope of barrier reef	25	58	10:24	1:02
Fiji-29	19°06.292	178°12.837	25/5/07	Kandavu "Pearl reef"	Lagoon, inner slope of barrier reef	3	15	15:55	0:49
Fiji-30	19°06.862	178°15.752	26/5/07	Kandavu "Pearl reef"	Outer slope of barrier reef –southern tip	6	46	08:46	1:23
Fiji-31	19°07.303	178°15.861	26/5/07	Kandavu "Pearl reef"	Outer slope of barrier reef – eastern tip t	23	41	14:51	1:00

Table 4: Geomorphologic description of stations and environmental parameters and a few general comments

Station	station description	distance covered	current	direction	visibility	environment	typology 1	typology 2	comments
Fiji-01	Gently sloped sand bottom with <i>Halimeda</i> segments, dense algae and ascidian cover from 22 to 18 m, then a zone of rubble and bare slab from 16 to 12 m. On the edge of the reef, large coral formations from 3 to 12 m.	-	medium	south	6	coastal	Intermediate reef	Edge of channel	-
Fiji-02	Gently sloped bottom with muddy grey sand and a few rubble pinnacles from 22 to 16 m, then edge of reef with large coral formations.	-	none	-	3	coastal	Intermediate reef	Edge of channel	-
Fiji-03	Strongly sloped bottom with muddy grey sand, small and large rubble from 8 to 26 m, with large coral formations and rich attached fauna, then a muddy sand bottom with a very gentle slope.	-	weak	S-E	3	Inner sea reef	Intermediate reef	Edge of channel	-
Fiji-04	Relatively flat spur groove zone with shallow grooves from 8 to 12-15 m, then a vertical drop-off from 18-20 m to 45 m and a steep slope with detached spurs on a sandy bottom and <i>Halimeda</i> segments from 45 to 50 m.	50	-	-	15	Reef	Barrier reef	Outer slope	-
Fiji-05	Summit reef flat in the horn, very shallow drainage channels, flat floor with bare slab and small coral formations, a large number of <i>Alcyonaria</i> , dense <i>Dysidea</i> cover.	130	-	-	15	Reef	Pass	Edge of pass	Strong current and swell, difficult to dive, sample, take photos
Fiji-06	Entered water at edge of an outcropping spur. Vertical slope from 3 to 12 m with crevices then a steep slope of slab and rubble from 12 to 18-20 m, followed by a vertical drop-off from 25 to 50 m. Sandy bottom with large detached coral heads.	15	-	-	15	Reef	Barrier reef	Outer slope	-
Fiji-07	Medium slope of slab and madrepores from 8 to 25 m, then steeper slope from 25 to 32 m, followed by a very gently sloped bottom of coarse sand and rubble.	40	-	-	15	Reef	Barrier reef	Outer slope	-

Station	station description	distance covered	current	direction	visibility	environment	typology 1	typology 2	comments
Fiji-08	Nearly vertical reef edge with a few narrow shelves from 8 to more than 60 m.	20	-	-	10	Reef	Barrier reef	Outer slope	Nearly vertical drop-off, rich in sea fans
Fiji-09	Shallow lagoon between barrier reef and an intermediary reef. Coral sand floor with a few scattered metre-high coral heads.	20	-	-	10	Lagoon	Lagoon floor	0	Few organisms in murky water
Fiji-10	Nearly vertical coral reef edge with a few narrow shelves from 8 to more than 60 m. Thick cover of attached fauna with calcareous sponge " <i>Leucetta</i> spp" predominating.	20	-	-	10	Reef	Barrier reef	Outer slope	Little light at about 50 m
Fiji-11	Coral reef flat made of slab and large-grained sand with patches of madrepores.	100	-	-	3	Reef	Barrier reef	Outer slope	Many giant clams
Fiji-12	Nearly vertical coral reef edge from 6 to 30 m, with crevices and overhangs, then a slope of about 45° of slab and large rubble from 30 to 42 m, stretched out towards open ocean by a low spur up to 50 m.	20	strong	west	15	Reef	Barrier reef	Outer slope	Not very rich and difficult current
Fiji-13	Coral reef edge with crevices and nearly vertical overhangs from 6 to 25 m, then 45° reef flat from 15 m and a second drop-off from 35 to 60 m, then a small narrow flat and a vertical drop-off down to more than 80 m.	20	weak	north	15	Reef	Barrier reef	Outer slope	Fairly rich in sea fans and a little less so in sponges; few algae. Little light below 55 m
Fiji-14	Muddy sand reef flat with thick seagrass bed cover and a few areas of big coral blocks covered by large Sargasso seaweed.	50	none	-	2	Lagoon	Inner reef flat	Seagrass bed	-
Fiji-15	Series of big coral pinnacles peaking between 12 and 6 m, on a bottom of sand and large rubble at 20m. From 25 to 60 m, steep slope of madrepores. Then subsiding eroded spur groove area on a bottom of large pieces of sand with <i>Halimeda</i> segments.	50	weak	south	30	0	0	0	Many sponges and algae, very clear water, one <i>C. albimarginus</i>

Station	station description	distance covered	current	direction	visibility	environment	typology 1	typology 2	comments
Fiji-16	Edge of pass on lagoon side reef edge with shelves from 8 to 25 m bare reef slab with a few massive coral formations, then an almost flat bottom with very white sand.	50	Strong	South	30	Reef	Pass	Edge of pass	Area with a strong current, very clear water, two playful <i>C. amblyrhynchos</i> , enormous green puff sponges
Fiji-17	Raised reef, extension of an immersed reef flat at 4 m, fringing, beaten by the surf with cracks, grooves and crests. Then a sharp, nearly vertical slope to 25 m, followed by a approximately 45° talus made of large rubble from 25-28 m to 45 m. Second very sharp drop-off with almost no shelves down to more than 80 m.	10	none	-	30	Reef	Raised reef	Outer slope	A lot of sponges and algae, very clear water, eagle- and sting-rays
Fiji-18	Lagoon floor with a very gentle slope, white and slightly powdery sand, with meter-high coral heads.	100	none	-	6	Lagoon	Lagoon floor	0	Many sponges and algae, particle-filled water
Fiji-19	Raised reef extended by a reef flat 4 m underwater, fringing, beaten by surf with cracks, grooves and crests. Then intermittent spurs on a 45° slope down to 35 40 m, followed by a zone of smoother terrain at 50 m.	50	weak	west	30	Reef	Coastal reef	Outer slope	Many sponges, very clear water, few fish
Fiji-20	Isolated pinnacle, peaking at 4.50m below the surface, with nearly vertical walls down to 19 m, then a plateau of hardened slab and large rubble about 25 m wide, then a strip of coral about 15 m from the edge of a second nearly vertical drop-off from 15 to 60 m. Then a 35° slope of rubble and coral sand with <i>Halimeda</i> segments and big foraminifers down to more than 70 m.	80	weak	South	30	Reef	Barrier reef	Outer slope	Many sponges, very clear water, few fish, many algae
Fiji-21	Small high-island fringing reef. Steeply sloped reef edge from 3 to 20 m, then gently sloped sandy bottom with <i>Halimeda</i> segments.	50	none	-	10	Reef	Fringing reef	Coastal reef	Very weathered reef covered with blue-green algae

Station	station description	distance covered	current	direction	visibility	environment	typology 1	typology 2	comments
Fiji-22	Isolated pinnacle peaking at 21 m. Steeply sloped coral talus from 25 to 65 m, then gentle slope from 65 to more than 70 m.	50	none	-	10	Reef	Fringing reef	Coastal slope	The slope was covered with broken coral, very low percentage of live coral, practically no fish except for a few deep-sea Naso. One turtle
Fiji-23	Isolated pinnacle peaking at 21 m. Steeply sloped coral talus from 25 to 65 m, then gentle slope from 65 to more than 70 m.	50	none	-	10	Reef	Fringing reef	Coastal slope	-
Fiji-24	45° coral slope from about 6 to 20 m, then a strip of spikes at very edge of the second drop-off. Then a vertical slope from 25 to 65 m, with crevices and overhangs, extended by a sharp slope of sand and <i>Halimeda</i> segments and rubble from 65 to 80 m.	40	weak	south	30	Reef	Barrier reef	Outer slope	About 20% live coral cover in 6 to 20 m zone, 80% <i>Halimeda</i> cover from 65 to 75 m. A few big sea fans >1.5 m
Fiji-25	Grooved plateau peaking at 10-12 m. Flat bottom with low spurs and grooves of rubble and sand and <i>Halimeda</i> segments.	40	none	-	12	Reef	Intermediate reef	Summit plateau	About 20% live coral cover; thick <i>Halimeda</i> cover. A few large clusters of <i>Turbinaria</i> . One <i>Rumphella agregata</i> sea fan >1.5 m
Fiji-26	Began dive near a pinnacle detached from the reef. Vertical walls from 4 to 15 m, then a very gentle slope over about 20 metres. Second vertical drop-off from 20 to 50 m, with many vaults and overhangs. Then a medium to steep slope from 50 to 65 m, made of coarse sand.	35	none	-	20	Reef	Barrier reef	Outer slope	Very weathered reef with few live coral
Fiji-27	Edge of the mangrove, muddy reef flat with large rubble and coral border.	100	none	-	0	Coastal	Coastal reef	Reef flat	Yellow coral heads that were hard on the propellers
Fiji-28	Edge of the first vertical drop-off at 25-27 m, hardened bare slab with a few <i>Tubastrea micrantha</i> , down to 45-50 m, then a steep slope of slab and large rubble. Big pinnacles, detached from the reef rising to 24-25 m below the surface.	35	none	-	0	Reef	Barrier reef	Outer slope	Stripped reef, practically no more live coral, the entire dive was done on a large spur detached from the reef, which peaked at 24 m

Station	station description	distance covered	current	direction	visibility	environment	typology 1	typology 2	comments
Fiji-29	Began dive at a depth of 14 m near a patch of coral that broke the surface. Gently sloped bottom of very fine white sand with large areas covered by a film of microbialites and blue-green algae. Meter-high coral bolder with sponges. At the edge of the patch, the floor rose sharply with many colonies of dead and a few live (2%) branching coral.	40	none	-	6	Reef	Barrier reef	Inner slope	95% dead coral, with a few remaining <i>Acropora</i> and rare <i>Porites</i> and <i>Diploastrea</i> . Virtually no fish on the bottom but a bit more life higher up
Fiji-30	Began dive at a depth of 45 m. Gently sloped-bottom with fine white sand and many small foraminifers. At about 40 m, a sharper slope of slab and large rubble with a few areas of <i>Juncella</i> , rising to 35 m at the foot of big vertical spurs peaking at 6 m.	100	none	-	15	Reef	Barrier reef	Outer slope	The live coral zone (30%) was limited to the first 15 metres, further down little coral or other fixed organisms, aside from a few beautiful sea fans and some rare Antipatharia. When the dive began, John caught a glimpse of a big dark shark (<i>C. obscurus</i> ?)
Fiji-31	Began dive at a depth of 25 m, at the summit of a large spur that peaked at 22 m. Sharp drop-off from 27 to 65 m.	30	medium	North	15	Reef	Barrier reef	Outer slope	Fairly live area of coral at the top of the spur or the reef edge, with beautiful sea fans

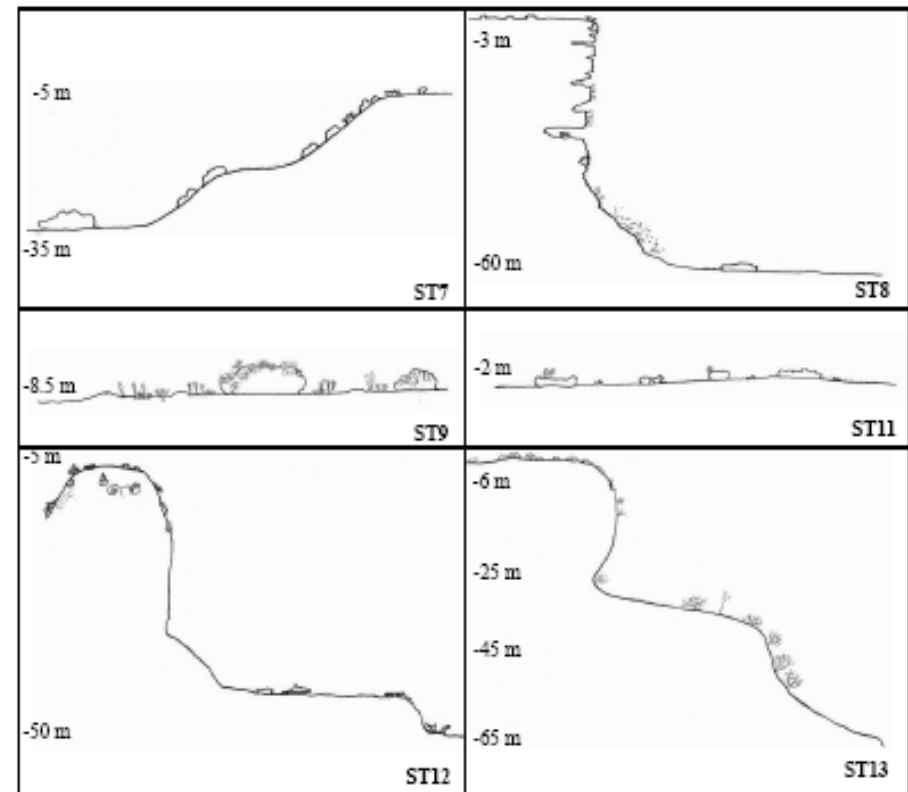
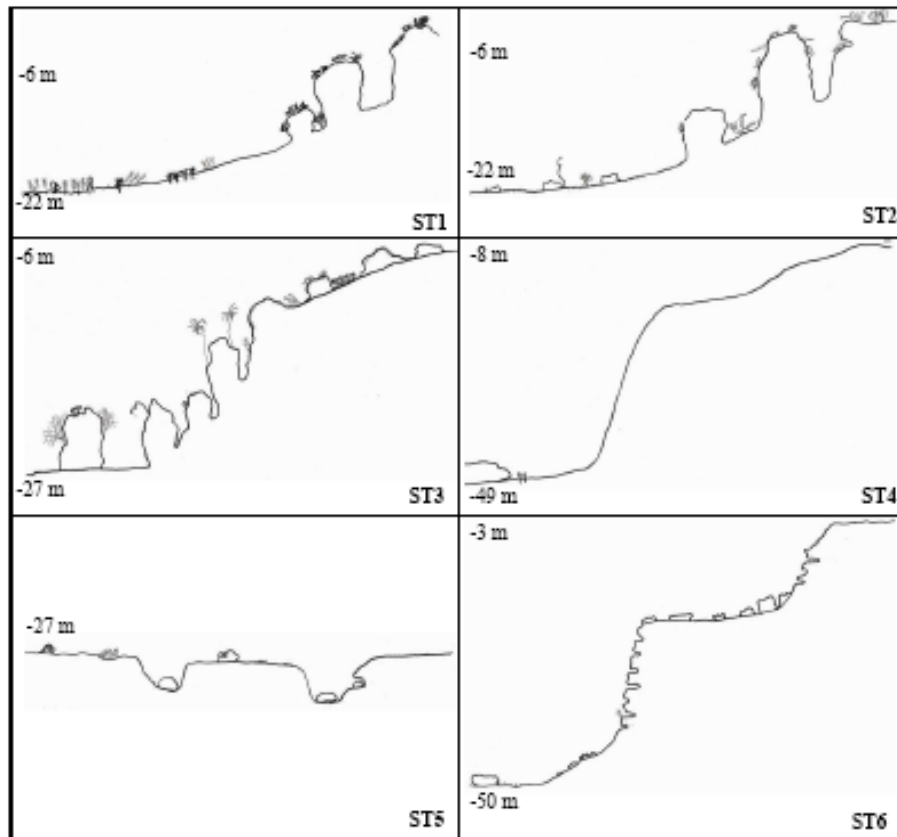


Figure 4: Geomorphologic profiles of study stations (1 to 13)

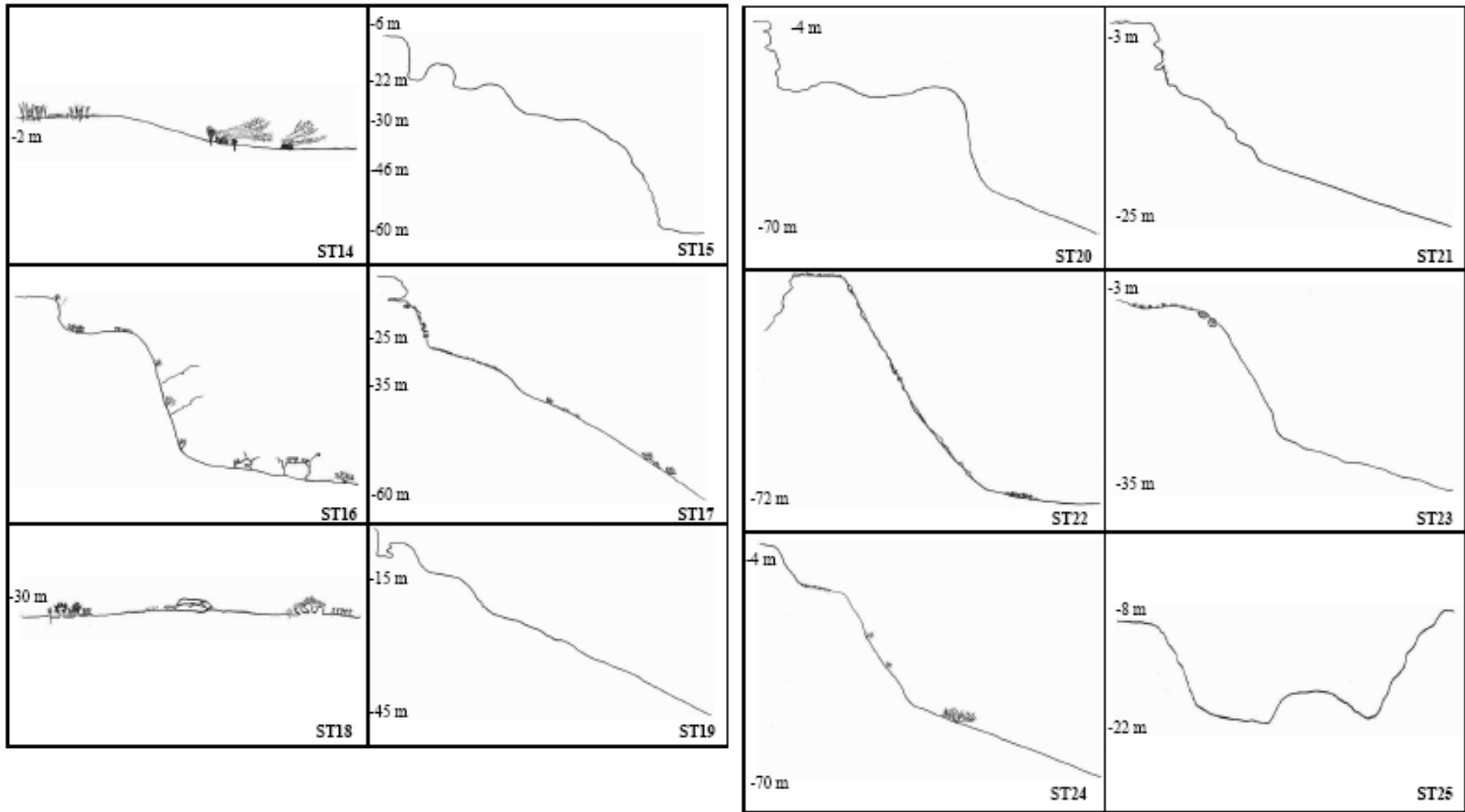


Figure 4: Geomorphologic profiles of study stations (14 to 25)

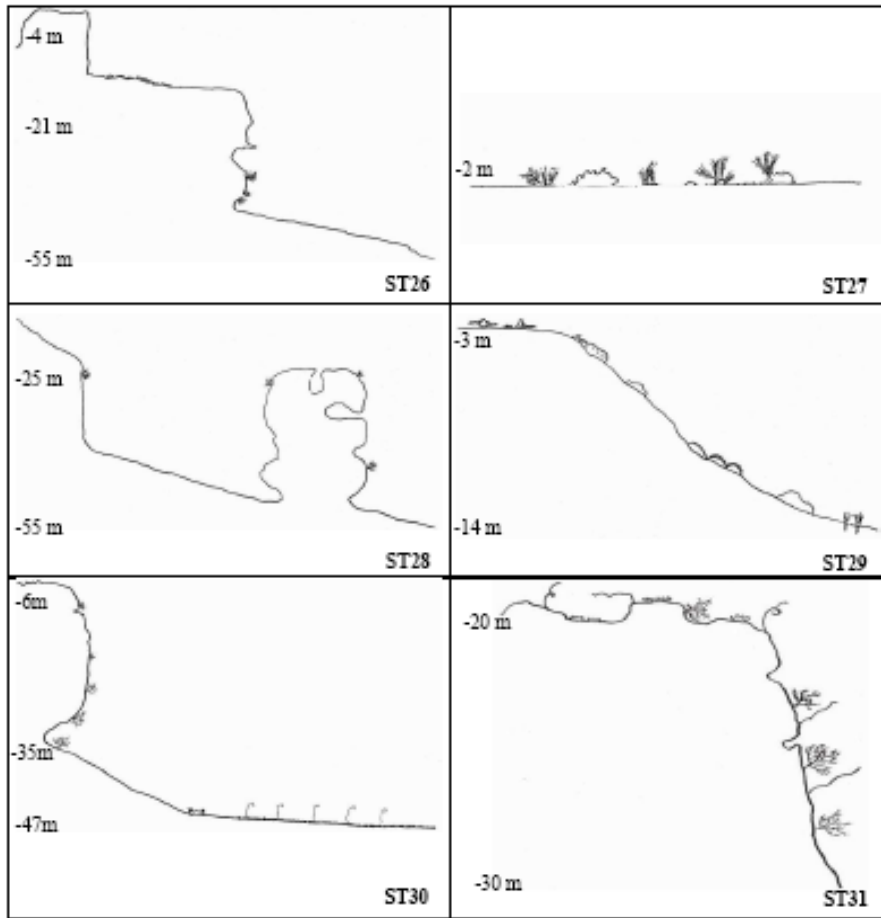


Figure 4 (end): Geomorphologic profiles of study stations (26 to 31)

Sample processing

Macrophytes

At the end of the dive, at each station, the samples were sorted and then each taxon was pressed in a herbarium collection and given a reference code including the geographical zone FJ (Fiji), the year of sampling 07 (2007) and finally a number in ascending order, e.g. Fj07-001. When possible, for each taxon triplicate samples were pressed for herbarium deposit for: i) IRD collections, ii) USP collections, iii) Museum of Paris collection (PC).



For each species, part of the thallus was removed and preserved in buffered formalin (5% seawater and borax) for later anatomical studies.



For calcareous red algae, the specimens were dried in open air before being packed separately in labelled plastic bags.

For certain groups (including Sargassaceae, Laurencia complex, *Codium*), a tissue sample was taken from one specimen (voucher) and preserved in silica gel for later molecular analysis as part of the phylogenetic and phylogeographic studies. For the biochemical study on polyphenols, 1 to 2 kg of samples were kept in the freezer at -20°C while awaiting freeze-drying back in the lab.

Invertebrates

For sponges and ascidians, the organisms collected were first sorted by taxon, then given the alphanumerical reference code corresponding to their zoological group and a sample number for that group in reference to the IRD LAGPLON, database, e.g. R0001 for sponges, UA0001 for ascidians. A digital photo was then taken and a precise description made covering the shape, colour, consistency and any other features that might be useful later for taxonomic identification.



For each sponge morphotype, three specimens were preserved separately in 75° ethanol to be used for i) the reference collection kept in Noumea, ii) USP collections, iii) identification by a specialist. For the latter, a very small sample (small 5 mm x 5 mm cube) was taken from inside the colony and preserved in absolute ethanol for typing and a molecular phylogenetic study. For the ascidians, before being set, the specimens were kept in seawater with a few flakes of menthol to keep the organisms flush. They were then set in a 10% formaldehyde solution.

The rest of the samples (by taxon) were then weighed, labelled and kept in the freezer a -20°C for later pharma-chemical studies.

Sample results and initial scientific findings

1 - Study settings

The 31 prospected sites allowed the identification of five major geomorphologic types. In addition to the outer slopes and reefs of the Ringgold atolls, where the waters were relatively clear, those lagoons and reef sites under Vanua Levu's influence had muddy waters and hyper-sedimentation unfavourable for plants. In general, the reefs were not in very good shape and live coral cover never exceeded 30%, and was often under 20%; coral populations showed successive episodes of mortality linked to the impact of tropical storms (scattered coral) or bleaching events (dead branching coral that were still standing).

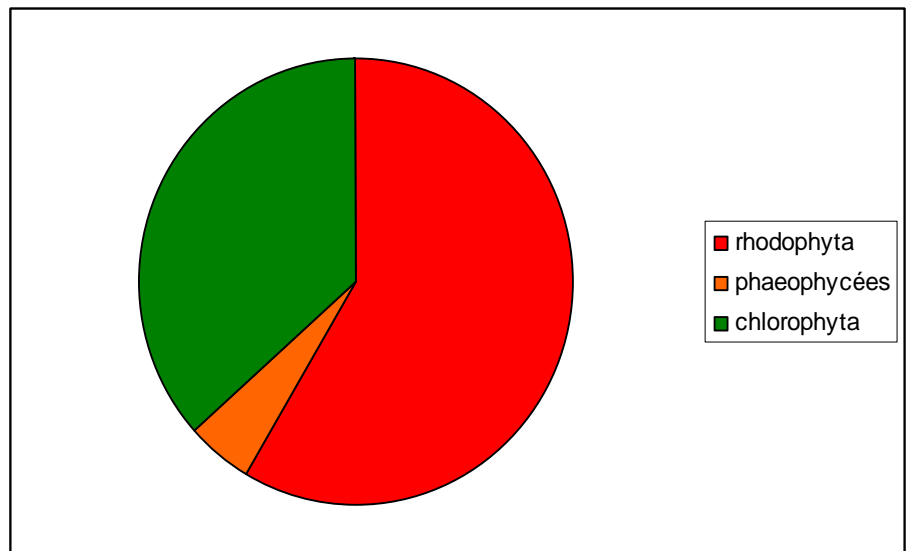
2 - Inventories

For the inventories, reference collections and diversity analysis, there were 910 marine plant specimens, including abundant material for the three phylogeny/phylogeography dissertations (*Sargassum*, *Corallinaceae* and *Laurencia*), 139 sponges and 6 ascidians (see lists in Appendixes 3 and 4a, b).

2.1 - Marine flora

The flora list given in Appendix 4 was prepared in collaboration with Antoine N'Yeurt, PhD, working on a post-doc at UR 148 at the Noumea IRD centre.

For marine flora, the initial results revealed 250 species of algae. These species were divided into 58% red algae (*Rhodophyceae*), 37% green algae (*Chlorophyceae*) and 5% brown algae (*Phaeophyceae*). Nearly 100 samples of calcareous red algae are currently under study and were not included in this inventory. Four marine spermatophytes were recorded, including *Halophila ovalis* f. *bullosa*, which is endemic to Fiji.



Most observations and samples covered new material, since previously these sites had not been studied much, if at all. Samples from bathymetric layers under 40 m included several taxa recorded for the first time in Fijian waters and several which may be new to science (Appendix 3, list of algae and their distribution by station).

2.2 - Sponges and ascidians

The taxonomic study of the sponges and ascidians is underway. A preliminary list is given in Appendix 4b. Some 60 genera have been recorded and nearly 18 taxa may be species that are new to science.

3 - Pharmacology

Quantitative samples for the pharmaco-chemical study amounted to some 219 kg of organisms, including 99 references for sponges, 2 for ascidians and 4 for brown algae of masses ranging from 55 g to 12.6 kg (Appendix 4a). All this material will undergo a range of biological tests developed by the project's 15 partners.

Some organisms belonging to the same species were collected at different stations for screening and the chemical study. In those cases in which the biomass for a given species was high enough within a station, the batches were stored separately by station for that reference. This will make it possible to uncover any variations in biological activity and/or chemical composition by collection site. For that reason, 116 batches of sponges and 3 batches of ascidians were made, ground and freeze-dried. This covers batches from 55 g to 11,415g of packaged fresh material, with a mean weight of 1,626 g.

Discussion

Our sampling objectives were met with 31 sites prospected in the various pre-identified lagoon and reef habitats at depths of 0 to 60 m. The prospecting effort was optimal since it covered two study sites per campaign day, on average, with each site comprising three or even four bathymetric levels, i.e. 0-10 m, 10-20 m, 20-40 m, 40-60 m depending on the site's geomorphology.

1 - Marine flora

Our data can be compared to those in existing literature, particularly data about the reefs in the northern part of Vanua Levu (Great Sea Reef and Cakalevu Reef), which were included in a RAPP (rapid assessment) as part of a study by WWF (Jenkins et al. 2004) [Jenkins et al. 2004. Fiji's Great Sea Reef, the first marine biodiversity survey of Cakaulevu and associated coastal habitats. WWF, 5 -16 December 2004, 205 pp]. The list of algae species for these sites totalled some 184 species including 93 red algae (51%), 64 green algae (37%) and 27 brown algae (14%). Our campaign found another 66 species but distribution within the main divisions was similar. The new ones were mainly red and green algae located on the outer slopes and in bathymetric levels >-30 m - habitats that are rarely studied. In addition, the studies carried out in the Ringgold group (east of Vanua Levu) were unprecedented and, to our knowledge, no algae sampling had ever been done in these remote sites before our campaign.

According to South & Skelton, (2003)[South & Skelton, (2003) Catalogue of the marine benthic macroalgae of the Fiji Islands, South Pacific, Australian Systematic Botany, 16: 699-758] 463 algae are currently known in the Fiji Islands including 271 Rhodophyta (59%), 145 Chlorophyta (31%) and 47 Phaeophyceae (10%). However, crossovers between our observations and existing data only involved 150 taxa and the other 100 species represented

new observations for the region, with certain taxa that are species new to science now being described.

In general, the flora was dominated by green algae *Halimeda* (12 species), *Caulerpa* (20 sp) *Rhipilia* (5 sp), *Avrainvillea* (4 sp) and *Udotea* (2 sp), which, in certain areas, form thick mats. For red algae other than the very common calcareous algae, fleshy forms were not at all abundant and certain families (Dumontiaceae) were poorly represented even on outer slopes where they are normally abundant. The brown algae mainly consisted of Sargasso seaweeds (notably *Sargassum polycystum* which has thalli more than 150 cm long) and *Turbinaria ornata* and *T. conoides* in the lagoons on intermediate reefs and fringing reefs.

Finally, seagrass beds mainly grew along the coasts and were composed, for the most part, of *Halodule uninervis* and *Syringodium isoetifolium*, which formed a fairly thick canopy with *Halophila ovalis* and *H. ovalis* f. *bullosa* growing in the sandy bottom. In a few spots on the edges of the mangrove, some *Halodule pinifolia* and, deeper down, *Halophila decipiens* were recorded.

2 - Invertebrates, sponges, ascidians

The sponge samples covering 139 references were classified into 133 different morphological groups. The taxonomic studies underway will identify the precise number of species, 18 of which may be new to science. To our knowledge, no inventory of sponges is available for this region; the initial results show a typically Indo-Pacific fauna (Hooper pers. com.). Taxonomic studies using molecular tools could, however, reveal some new features.

Work to be done

Inventories and species descriptions

To date, taxonomic work on the algae has been completed and less than 10% of the specimens have not had their species identified. Several taxa, particularly from the *Rhipilia* genus, may be new. Taxonomic studies, including DNA analyses, will continue. This work will make it possible to usefully supplement existing algae inventories for the region and will constitute totally new work for outlying regions such as the Ringgold Island group or the northern part of Vanua Levu. This work will provide information on species distribution at the stations and allow analysis of the biological and ecological rarity of taxa. The specific identification work will also make it possible to determine the unique features of the islands visited as compared to the flora of not only the main island of Vetu Levu and Rotuma, for which we have a great deal of published data, but also neighbouring regions.

Pharmaco-chemistry:

Invertebrates (sponges and ascidians) and brown Fucoids algae will be the subject of specific research on unique natural substances with activity of interest for intermediate-host diseases such as dengue fever or malaria (with priority to those activities developed by IRD), but also activity in terms of the so-called Northern diseases CRISP program partners are working on, with the same goal of creating the best added-value possible for the organisms studied.

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NOGLE, L. M.; WILLIAMSON, R. T.; GERWICK, W. H. , Somamides A and B, Two New Depsipeptide Analogues of Dolastatin 13 from a Fijian Cyanobacterial Assemblage of *Lyngbya majuscula* and *Schizothrix* species, *J. Nat. Prod.* **64**, 716-9 (2001)

NOGLE, L. M.; GERWICK, W. H., Somocystinamide A, a novel cytotoxic disulfide dimer from a Fijian marine cyanobacterial mixed assemblage, *Org. Lett.* **4**, 1095-8 (2002)

WILLIAMSON, R. THOMAS; SINGH, Inder Pal; GERWICK, WILLIAM H., TAVEUNIAMIDES: NEW CHLORINATED TOXINS FROM A MIXED ASSEMBLAGE OF MARINE CYANOBACTERIA, *TETRAHEDRON* **60**, 7025-7033 (2004)

Appendix 2: Permits for work and to export biological materials (1/3)



**MINISTRY OF FISHERIES & FORESTS
DEPARTMENT OF FISHERIES**

MOU between 1) Institute for Research and Development, Paris, France 2) the people of Lomaiviti Province and 3) Fisheries Department of the Ministry of Fisheries and Forests.

This Memorandum of Understanding (MOU) is a binding agreement between 1) Institute for Research and Development, Paris, France 2) the people of the Lomaiviti Province – as owners of customary fishing right areas and 3) Fisheries Department of the Ministry of Fisheries and Forests – as representative of Fiji Government, pertaining to the taking of living marine organisms within Fiji fisheries waters for the general purpose of research work.

Summary:

The Intellectual Property Right Unit (IPRU) of the Ministry of Fisheries and Forests is in place, where its primary purpose is fully covered under the provisions in the Convention of Biological Diversity, which Fiji has ratified. The role of the IPRU is to ensure the protection of indigenous rights and resources from the exploits of outside forces and demands.

Conditions:

The following conditions shall apply:

1. All developments pertaining to the taking of living marine organisms within customary fishing right areas in the Fiji Islands shall be subjected to consent by the custodian resource owners.
2. Any removal of live marine organisms (biological material) or materials derived therefrom as specimens out of the country for the purpose of scientific research work will require formal certification from the Fisheries Department.
3. Relevant copies of reports on these scientific research work will be made available to Fisheries Department and customary fishing right owners as and when required for their information, reference and record.
4. Permission must be obtained from the Permanent Secretary for Fisheries and Forests before the samples covered in this agreement are conveyed to any third party or any commercial use is made of the samples except for taxonomic identification purposes only.
5. Any scientific research work undertaken on these specimens for commercial purposes should have definite benefit sharing in place for the customary fishing right owners, the Fisheries Department and the country as a whole.

Acknowledged and agreed on:

this day of 20.....

Jacques CHARMES
Directeur du Département
"Sociétés et Sana"
1) Institute for Research and
Development, Paris, France

Alfonso J. H. H.
2) People of Lomaiviti Province
3) Chief Executive Officer for
Fisheries and Forests

1 Qoliqoli

NB Chief of Samabale Gma
Gives approval to DIVE/SURVEY
J. H.

Atty: Nishanika Officer - Vanuatu.



**MINISTRY OF FISHERIES & FORESTS
DEPARTMENT OF FISHERIES**

MOU between 1) Institute for Research and Development, Paris, France 2) the people of KADAVU Province and 3) Fisheries Department of the Ministry of Fisheries and Forests.

This Memorandum of Understanding (MOU) is a binding agreement between 1) Institute for Research and Development, Paris, France 2) the people of Kadavu Province – as owners of customary fishing right areas and 3) Fisheries Department of the Ministry of Fisheries and Forests – as a representative of Fiji Government, pertaining to the taking of living marine organisms within Fiji fisheries waters for the general purpose of research work.

Summary:

The Intellectual Property Right Unit (IPRU) of the Ministry of Fisheries and Forests is in place, where its primary purpose is fully covered under the provisions in the convention of Biological Diversity, which Fiji is ratified. The role of the IPRU is to ensure the protection of indigenous rights and resources from the exploits of outside forces and demands. It is paramount that indigenous and rural communities participation in the development of their natural resources are respected by all parties, and that sustainable resource use see the over-arching goals, and that any benefits derived should be equally enjoyed by the same.

Conditions:

The following conditions shall apply:

1. All developments pertaining to the taking of living marine organisms with customary fishing right areas in the Fiji Islands shall be subjected to consent by the custodian resources owners.
2. Any removal of live marine organisms (biological material) or materials derived therefrom as specimens out of the country for the purpose of scientific research work will require formal certification from the Fisheries Department; and all samples extracted would be less than 1.0kilograms in weight. Rare and endangered species are prohibited from extraction.
3. Relevant copies of reports on these scientific research work will be made available to Fisheries Department and customary fishing right owners as and when required for their information, reference and record.
4. Permission must be obtained from the Permanent Secretary for Agriculture, Fisheries and Forests before the samples covered in this agreement are conveyed to any third party or any commercial use is made of the samples except for taxonomic identification purposes only.
5. Any scientific research work undertaken on these specimens for commercial purpose should have a definite benefit sharing mechanism in place for the customary fishing right owners, the Government and the country as a whole.
6. A local sample (voucher) collection centre shall be set up in Fiji, with the assistance of Institute of Applied Science, University of the South Pacific.

Acknowledged and agreed on:

this *3rd* day of *May* 20*07*

Jacques CHARMES
Directeur du Département
"Sociétés et Sana"

1) Institute for Research and
Development, Paris, France

Rosko Tu Kadavu
2) People of Kadavu
3) Permanent Secretary for
Agriculture, Fisheries and
Forests

* NB Chief of Gison /s Kadavu
Gives approval to DIVE/SURVEY
J. H.



MINISTRY OF FISHERIES & FORESTS
DEPARTMENT OF FISHERIES

MOU between 1) Institute for Research and Development, Paris, France 2) the people of Cakaudrove Province and 3) Fisheries Department of the Ministry of Fisheries and Forests.

This Memorandum of Understanding (MOU) is a binding agreement between 1) Institute for Research and Development, Paris, France 2) the people of Cakaudrove Province - as owners of customary fishing right areas and 3) Fisheries Department of the Ministry of Fisheries and Forests - as representative of Fiji Government, pertaining to the taking of living marine organisms within Fiji fisheries waters for the general purpose of research work.

Summary:

The Intellectual Property Right Unit (IPRU) of the Ministry of Fisheries and Forests is in place, where its primary purpose is fully covered under the provisions in the Convention of Biological Diversity, which Fiji is ratified. The role of the IPRU is to ensure the protection of indigenous rights and resources from the exploits of outside forces and demands. It is paramount that indigenous and rural communities participate in the development of their natural resources as requested by all parties, and that sustainable resource use are the over-arching goals, and that any benefits derived should be equally enjoyed by the same.

Conditions:

The following conditions shall apply:

- All developments pertaining to the taking of living marine organisms with customary fishing right areas in the Fiji Islands shall be subjected to consent by the custodian resource owners.
- Any removal of live marine organisms (biological material) or materials derived therefrom as specimens out of the country for the purpose of scientific research work will require formal certification from the Fisheries Department and all samples extracted would be less than 1 kilogram in weight from any endangered species are prohibited from exportation.
- Relevant copies of reports on their scientific research work will be made available to Fisheries Department and customary fishing right owners as and when required for their information, reference and record.
- Permission must be obtained from the Permanent Secretary (in Agreement, Fisheries and Forests) before the samples covered in this agreement are conveyed to any third party or any commercial use is made of the samples except for taxonomic identification purposes only.
- Any scientific research work undertaken on state specimens for commercial purposes should have a definite benefit sharing mechanism in place for the customary fishing right owners, the Government and the country as a whole.
- A local sample collection center shall be set up in Fiji, with the assistance of Institute of Applied Sciences, University of the South Pacific.

Acknowledged and agreed on:

the Tuesday 18th day of April 2007.

Jacques CHARMES
Director of Département
"Sociétés et Santé"
1) Institute for Research and
Development, Paris, France



WAGUELOVA
YANUVA
TUMAKALA
GIVEN O.K. to DIVE/SURVEY

[Signature]



MINISTRY OF FISHERIES & FORESTS
DEPARTMENT OF FISHERIES

MOU between 1) Institute for Research and Development, Paris, France 2) the people of Bua Province and 3) Fisheries Department of the Ministry of Fisheries and Forests.

This Memorandum of Understanding (MOU) is a binding agreement between 1) Institute for Research and Development, Paris, France 2) the people of the Bua Province - as owners of customary fishing right areas and 3) Fisheries Department of the Ministry of Fisheries and Forests - as representative of Fiji Government, pertaining to the taking of living marine organisms within Fiji fisheries waters for the general purpose of research work.

Summary:

The Intellectual Property Right Unit (IPRU) of the Ministry of Fisheries and Forests is in place, where its primary purpose is fully covered under the provisions in the Convention of Biological Diversity, which Fiji is ratified. The role of the IPRU is to ensure the protection of indigenous rights and resources from the exploits of outside forces and demands.

Conditions:

The following conditions shall apply:

- All developments pertaining to the taking of living marine organisms within customary fishing right areas in the Fiji Islands shall be subjected to consent by the custodian resource owners.
- Any removal of live marine organisms (biological material) or materials derived therefrom as specimens out of the country for the purpose of scientific research work will require formal certification from the Fisheries Department.
- Relevant copies of reports on these scientific research work will be made available to Fisheries Department and customary fishing right owners as and when required for their information, reference and record.
- Permission must be obtained from the Permanent Secretary for Fisheries and Forests before the samples covered in this agreement are conveyed to any third party or any commercial use is made of the samples except for taxonomic identification purposes only.
- Any scientific research work undertaken on these specimens for commercial purposes should have definite benefit sharing in place for the customary fishing right owners, the Fisheries Department and the country as a whole.

Acknowledged and agreed on:

this day of 20

Jacques CHARMES
Director of Département
"Sociétés et Santé"
1) Institute for Research and
Development, Paris, France

Adi Ama Salamabasi
2) People of Bua Province
GONE MAMBA NA TUA GUM.

3) Chief Executive Officer for
Fisheries and Forests



I qoli qoli

Signature

* NB: LOGMAN VUNGE GUM
GIVEN O.K. to DIVE/SURVEY

[Signature]



GOVERNMENT OF FIJI
 Ministry of Agriculture, Fisheries and Forests
FISHERIES DEPARTMENT
 P.O.Box 2218, Government Buildings, Suva, Fiji Islands
 Telephone: (679) 330 1011 Facsimile: (679) 331 8769

Permit No: C422/2007

EXPORT PERMIT

Special Case of _____
 A/E Code: _____ and TIN Code: _____ is/are hereby authorised under
 Section 64 of the Customs Act 1986 to export from Fiji to New Caledonia

Quantity	Product Name	Description	Tariff Code	Stats Code
198 kg	Marine Invertebrates	Frozen		
816 No	Algae	Dried		

This licence is not transferable and is valid only for goods to be shipped to Noumea
 on 27 May 2007 or before 03 June 2007
 This licence is subject to the following terms or condition

Conditions
 For research purpose: Prof. Claude Payri.



République Française

GOVERNEMENT DE LA NOUVELLE-CALÉDONIE

SERVICE D'INSPECTION VÉTÉRINAIRE, ALIMENTAIRE ET PHYTOSANITAIRE

PERMIS D'IMPORTATION

Importateur : Catherine HARTMANN
Fonctions : Administratrice du Centre IRD Nouméa
Adresse : IRD , 101 Promenade Roger Laroque, Nouméa
 Tel : 26 10 00 Fax : 26 43 26

Exportateur : Pr Claude PAYRI
Fonctions : Chercheur IRD
Adresse : Université du Pacifique Sud, Fisheries Department, Suva, Fidji

Moyen de transport : ALIS

Port d'entrée : Port autonome de Nouméa

Vous êtes autorisé à importer les marchandises,

Nom des Produits : Algues et éponges marines séchées, congelées et dans l'alcool
Présentation : Sachets, bocaux, herbiers sur feuilles Canson

Aux conditions suivantes :

1. Ces produits doivent être déclarés et présentés aux agents du SIVAP à l'aéroport de Tontouta
2. Le traitement par acidification de ces échantillons à fin d'analyse, doit permettre de détruire leur phase organique.
3. Ce permis d'importation est valable 6 mois et il doit être présenté à chaque importation de ces produits

Date : 27/04/07



Frédéric GIMAT
 Inspecteur sanitaire aux frontières

Appendix 3: List of algae and marine spermatophytes and their distributions at the various stations prospected

CLASS	Genus	Species	Authority	suva2	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31			
Chlorophyta	<i>Avrainvillea</i>	<i>erecta</i>	(Berkeley) A. and E. S. Gepp			1																	1		1														
Chlorophyta	<i>Avrainvillea</i>	<i>hollenbergii</i>	Trono																													1							
Chlorophyta	<i>Avrainvillea</i>	<i>lacerata</i>	Harvey ex J. Agardh			1		1							1		1						1												1				
Chlorophyta	<i>Avrainvillea</i>	<i>longicaulis</i>	(Kützing) G. Murray and Boodle			1														1																			
Chlorophyta	<i>Avrainvillea</i>	<i>rotumensis</i>	A.D.R. N'Yeurt, D.S. Littler and M.M. Littler																			1			1														
Chlorophyta	<i>Boodlea</i>	<i>composita</i>	(Harvey) F. Brand												1																								
Chlorophyta	<i>Boodleopsis</i>	<i>pusilla</i>	(F.S. Collins) W.R. Taylor, A.B. Joly and Bernatowicz																																				
Chlorophyta	<i>Bornetella</i>	<i>nitida</i>	Sonder																						1														
Chlorophyta	<i>Bryopsis</i>	<i>pennata</i>	Lamouroux						1		1		1		1		1									1												1	
Chlorophyta	<i>Bryopsis</i>	<i>sp. inedit</i>		1																																			
Chlorophyta	<i>Bryopsis</i>	<i>vestita</i>	J. Agardh																																				
Chlorophyta	<i>Caulerpa</i>	<i>bikinensis</i>	W. R. Taylor			1																	1		1														
Chlorophyta	<i>Caulerpa</i>	<i>brachypus</i>	Harvey						1	1														1															
Chlorophyta	<i>Caulerpa</i>	<i>cupressoides</i>	(Vahl) C. Agardh			1																			1														1
Chlorophyta	<i>Caulerpa</i>	<i>fastigiata</i>	Montagne																		1																		
Chlorophyta	<i>Caulerpa</i>	<i>lentillifera</i>	J. Agardh												1										1														
Chlorophyta	<i>Caulerpa</i>	<i>microphysa</i>	(Weber-van Bosse) Feldmann										1								1	1																	
Chlorophyta	<i>Caulerpa</i>	<i>nummularia</i>	Harvey ex J. Agardh						1	1	1													1	1		1											1	
Chlorophyta	<i>Caulerpa</i>	<i>opposita</i>	Coppejans and Meinesz																					1		1													
Chlorophyta	<i>Caulerpa</i>	<i>racemosa</i>	(Forsskål) J. Agardh			1			1	1										1	1	1	1		1	1											1		
Chlorophyta	<i>Caulerpa</i>	<i>sedoides</i>	C. Agardh						1	1												1	1																
Chlorophyta	<i>Caulerpa</i>	<i>serrulata</i>	(Forsskål) J. Agardh			1			1			1	1	1																									1
Chlorophyta	<i>Caulerpa</i>	<i>sertularioides</i>	(S.G. Gmelin) Howe			1																																	
Chlorophyta	<i>Caulerpa</i>	<i>sp. inedit</i>																																					
Chlorophyta	<i>Caulerpa</i>	<i>taxifolia</i>	(Vahl) C. Agardh			1																																1	
Chlorophyta	<i>Caulerpa</i>	<i>urvilleana</i>	Montagne																		1	1		1	1	1													
Chlorophyta	<i>Caulerpa</i>	<i>webbiana</i>	Montagne							1																													1
Chlorophyta	<i>Caulerpella</i>	<i>ambigua</i>	(Okamura) Prud'homme van																																				

Rhodophyta	<i>Lithothamnion</i>	<i>prolifer</i>	Foslie		1		1																					
Rhodophyta	<i>Lithothamnion</i>	<i>prolifer</i>	Foslie																									
Rhodophyta	<i>Lomentaria</i>	<i>corallicola</i>	Børgesen							1				1														
Rhodophyta	<i>Martensia</i>	<i>fragilis</i>	Harvey											1		1	1											
Rhodophyta	<i>Melobesia</i>										1																	
Rhodophyta	<i>Microphyllum</i>	<i>borneense</i>	Weber-van Bosse								1		1															
Rhodophyta	<i>Microphyllum</i>	<i>borneense</i>	Weber-van Bosse																									
Rhodophyta	<i>Neogoniolithon</i>	<i>brassica-florida</i>	(Harvey) Setchell and L.R. Mason											1														
Rhodophyta	<i>Neogoniolithon</i>	<i>frutescens</i>	(Foslie) Setchell and L.R. Mason																							1		
Rhodophyta	<i>Neomartensia</i>	<i>flabelliformis</i>	(Harvey ex J. Agardh) Yoshida and Mikami																								1	
Rhodophyta	<i>Neurymenia</i>	<i>fraxinifolia</i>	(Mertens ex Turner) J. Agardh																									1
Rhodophyta	<i>Nitophyllum</i>	<i>adhaerens</i>	M.J. Wynne														1											
Rhodophyta	<i>Palisada</i>	<i>parvipapillata</i>	(C.K. Tseng) Nam									1				1												
Rhodophyta	<i>Peyssonnelia</i>	<i>inamoena</i>	Pilger				1					1								1			1				1	
Rhodophyta	<i>Peyssonnelia</i>	sp.										1	1															1
Rhodophyta	<i>Peyssonnelia</i>	sp. encroutante												1														
Rhodophyta	<i>Phacelocarpus</i>	<i>neurymenioides</i>	N'Yeurt, Keats and R. E. Norris										1		1			1								1		
Rhodophyta	<i>Pinnatiphycus</i>	<i>menouana</i>	N'Yeurt, Payri and Fredericq													1						1						
Rhodophyta	<i>Platoma</i>	sp.					1																					
Rhodophyta	<i>Platycladia</i>	<i>palmatifida</i>	N'Yeurt and Payri																									1
Rhodophyta	<i>Plocanium</i>	sp.					1															1						
Rhodophyta	<i>Pneophyllum</i>																									1		
Rhodophyta	<i>Polysiphonia</i>	<i>delicatula</i>	Hollenberg											1														
Rhodophyta	<i>Portieria</i>	<i>hornemannii</i>	(Lyngbye) Silva		1	1	1	1	1						1	1												
Rhodophyta	<i>Predaea</i>	<i>weldii</i>	Kraft and I.A. Abbott													1		1	1							1		
Rhodophyta	<i>Prionitis</i>	<i>angusta</i>	(Okamura) Okamura	1																								
Rhodophyta	<i>Ptilophora</i>	<i>pectinata</i>	(A. Gepp and E.S. Gepp) R.E. Norris										1		1												1	
Rhodophyta	<i>Rhizophyllis</i>	sp.																										1

Rhodophyta	<i>Rhodymenia</i>	sp. 1		1																																	
Rhodophyta	<i>Rhodymenia</i>	sp. 2				1	1														1																
Rhodophyta	<i>Rhodymenia</i>	sp. 3						1																1							1						
Rhodophyta	<i>Sarcodia</i>	<i>marginalis</i>	(Kützing) Millar	1																																	
Rhodophyta	<i>Spirocladia</i>	<i>barodensis</i>	Børgesen		1																																
Rhodophyta	<i>Sporolithon</i>																								1												
Rhodophyta	<i>Spyridia</i>	<i>filamentosa</i>	(Wulfen) Harvey (Zanardini) K. M.Drew												1																						
Rhodophyta	<i>Stylonema</i>	<i>alsidii</i>	(J. Agardh) J. Agardh													1																					
Rhodophyta	<i>Taenioma</i>	<i>perpusillum</i>																											1								
Rhodophyta	<i>Titanoderma</i>																																				
Rhodophyta	<i>Titanoderma</i>																																				
Rhodophyta	<i>Titanophora</i>	<i>weberae</i>	Børgesen			1																															
Rhodophyta	<i>Tolypocladia</i>	<i>glomerulata</i>	(C. Agardh) F. Schmitz													1	1																				
Rhodophyta	<i>Tricleocarpa</i>	<i>fragilis</i>	(Linnaeus) Huisman and Townsend																					1										1	1		
Rhodophyta	<i>Vanvoorstia</i>	<i>spectabile</i>	Harvey																																		
Rhodophyta	<i>Wrangelia</i>	<i>argus</i>	Montagne (Sprengel) Feldmann and G. Hamel																																		
Rhodophyta	<i>Wurdemannia</i>	<i>miniata</i>	(Reinsch) Komárek and Anagnostidis																																		
Cyanobacteria	<i>Cyanocystis</i>	<i>olivacea</i>																																		1	
Cyanobacteria	<i>Lyngbya</i>	<i>majuscula</i>	(Dillwyn) Harvey		1																																
Cyanobacteria	<i>Lyngbya</i>	sp.																																			
Cyanobacteria	<i>Spirulina</i>	<i>subtilissima</i>	Kützing																																	1	
Magnoliophyta	<i>Halodule</i>	<i>pinifolia</i>	(Miki) den Hartog			1																															
Magnoliophyta	<i>Halodule</i>	<i>uninervis</i>	(Forsskål) Aschers; in Boissier													1																					
Magnoliophyta	<i>Halophila</i>	<i>ovalis</i>	(R. Brown) J.D. Hooker																																	1	
Magnoliophyta	<i>Syringodium</i>	<i>isoetifolium</i>	(Ascherson) Dandy																																	1	

Appendix 4a: List and description of sponge and ascidian specimens sampled at the 31 stations prospected

Specimens	Station	Date	Location	Min. depth	Max depth	Shape	Biotope/ substrate	Consistency	Colour in situ	Colour in air	Photo in situ	Photo ex situ	Total wet mass collected in kg
FJ07-001	Fiji-01	10/05/07	Vanua Levu west of Cakaula Island	4	10	one or two upright fingers, visible osculum	coral head slab	flexible, soft	green	green	yes	yes	2.1
FJ07-002	Fiji-01	10/05/07	Vanua Levu west of Cakaula Island	5	16	leafy	coral head slab	flexible, tough	pinkish grey	pinkish	yes	yes	0.7
FJ07-003	Fiji-01	10/05/07	Vanua Levu west of Cakaula Island	3,5	6	in thick, somewhat pyramid-shaped patches	coral head slab (Axinellide)	coral head slab (Axinellide)	orange	golden yellow	yes	yes	0
FJ07-004	Fiji-01	10/05/07	Vanua Levu west of Cakaula Island	20	22	conjoined prickly fingers	sandy bottom with <i>Halimeda</i> segments	flexible, tough	purple grey	purple	yes	yes	1.45
FJ07-005	Fiji-01	10/05/07	Vanua Levu west of Cakaula Island	20	22	interlaced climbing fingers	sandy bottom with <i>Halimeda</i> segments	sandy bottom with <i>Halimeda</i> segments	light purple	brown purple	yes	yes	0.9
FJ07-006	Fiji-01	10/05/07	Vanua Levu west of Cakaula Island	20	22	slightly flattened prickly fingers	sandy bottom with <i>Halimeda</i> segments	soft, flaccid, sticky	purple	purple	yes	yes	0.9
FJ07-007	Fiji-01	10/05/07	Vanua Levu west of Cakaula Island	5	5	In balls, small oscula on top	reef slope, on slab	reef slope, on slab	dark brown, yellow inside	idem	yes	yes	2.48
FJ07-008	Fiji-01	10/05/07	Vanua Levu west of Cakaula Island	6	16	in half-spheres with moon-shaped oscula	on coral heads	soft, stringy (cf <i>Cynachira</i>)	beige, dirty brown	dirty brown	yes	yes	1.55
FJ07-009	Fiji-02	10/05/07	Northern side Laukotolailai Reef	21	23	in mounds with many conical towers and oscula at end	coral sand	coral sand	white	white	yes	yes	0
FJ07-010	Fiji-02	10/05/07	Northern side Laukotolailai	21	21	large thin sheets 5 to 8 mm thick	on coral heads	firm, tears like cardboard	purple brown	brown	yes	yes	2.7

Specimens	Station	Date	Location	Min. depth	Max depth	Shape	Biotope/ substrate	Consistency	Colour in situ	Colour in air	Photo in situ	Photo ex situ	Total wet mass collected in kg
			Reef										
FJ07-011	Fiji-02	10/05/07	Northern side Laukotolailai Reef	15	18	cone-shaped tubes with no holes at ends	on limestone slab	on limestone slab	white	white	yes	yes	0.47
FJ07-012	Fiji-02	10/05/07	Northern side Laukotolailai Reef	15	16	in massive, slightly flattened mounds with a few big oscula	on coral heads in crevices	plastic foam	pinkish purple	idem	no	yes	0.6
FJ07-013	Fiji-02	10/05/07	Northern side Laukotolailai Reef	10	12	in balls riddled with oscula	on coral heads (cf Phakellia cavernosa?)	on coral heads (cf Phakellia cavernosa?)	orangish red	idem	no	yes	1.35
FJ07-014	Fiji-02	10/05/07	Northern side Laukotolailai Reef	15	19	in slightly flattened branching fingers and clearly visible small oscula	on coral heads	flexible	beige	beige	yes	yes	0.4
FJ07-015	Fiji-02	10/05/07	Northern side Laukotolailai Reef	6	15	club-like ball on stem	on coral heads	firm, tough and rubbery	orangish red	idem	yes	yes	1.35
FJ07-016	Fiji-02	10/05/07	Northern side Laukotolailai Reef	10	16	cone-shaped tubes with no holes at ends	on coral heads (cf Aka)	rigid, brittle	orange	golden yellow	no	yes	0.2
FJ07-017	Fiji-02	10/05/07	Northern side Laukotolailai Reef	6	15	in thick sheets with prominent oscula	under coral head overhangs (looked like Dorypleres splendens)	flexible	orangish red	idem	yes	yes	0.98
FJ07-018	Fiji-02	10/05/07	Northern side Laukotolailai Reef	10	16	balls with oscula that looked like lunar craters	on coral heads (cf Cinachyrella tenuiviolaacea)	firm, stringy	dirty beige	purple	no	yes	1.23
FJ07-019	Fiji-02	10/05/07	Northern side Laukotolailai	10	15	upright, fairly palmate, prickly	on coral heads (Axinellide)	on coral heads (Axinellide)	orange	idem	no	yes	3

Specimens	Station	Date	Location	Min. depth	Max depth	Shape	Biotope/ substrate	Consistency	Colour in situ	Colour in air	Photo in situ	Photo ex situ	Total wet mass collected in kg
			Reef										
FJ07-020	Fiji-02	10/05/07	Northern side Laukotolailai Reef	10	25	massive, many-sided mound	on coral heads	solid	chocolate brown	dark brown	yes	yes	7.6
FJ07-021	Fiji-02	10/05/07	Northern side Laukotolailai Reef	14	15	upright, fairly palmate, prickly, oscula	on coral heads	rough	pink	pink	yes	yes	3
FJ07-022	Fiji-02	10/05/07	Northern side Laukotolailai Reef	15	15	upright, palmate, prickly	coral heads (Axinellide)	rubbery	orange	orange	no	yes	0
FJ07-023	Fiji-03	11/05/07	Reef in channel between Lawake Island and Namoli Reef	10	25	in flat patches	on bare slab of rubble coral heads	soft	black	greenish black stained hands	yes	yes	3.3
FJ07-024	Fiji-03	11/05/07	Reef in channel between Lawake Island and Namoli Reef	6	25	climbing fingers, attached in many places	on bare slab of rubble coral heads	flexible, tears easily	yellowish in shallows to brown at bottom	idem	yes	no	1.65
FJ07-025	Fiji-03	11/05/07	Reef in channel between Lawake Island and Namoli Reef	25	25	small coral heads	under overhangs of rubble coral heads	firm, compact, downy surface	whitish	idem	no	yes	3.7
FJ07-026	Fiji-03	11/05/07	Reef in channel between Lawake Island and Namoli Reef	26	26	ball 60 cm in diameter	on mud floor near coral heads (<i>Ircinia</i>)	rubbery, flexible	greyish black to brown	grey and beige	yes	yes	0.8
FJ07-027	Fiji-03	11/05/07	Reef in channel between	25	25	protuberant massive with big	on big rubble boulder at	flexible and spongy	bright orange	idem	yes	yes	2

Specimens	Station	Date	Location	Min. depth	Max depth	Shape	Biotope/ substrate	Consistency	Colour in situ	Colour in air	Photo in situ	Photo ex situ	Total wet mass collected in kg
			Lawake Island and Namoli Reef			finger buds	bottom of reef edge						
FJ07-028	Fiji-03	11/05/07	Reef in channel between Lawake Island and Namoli Reef	18	26	in fairly thick sheets or coats on various surfaces, prominent oscula	on coral head overhangs or ledges	soft, rough	beige grey slightly bluish	idem	yes	yes	0.95
FJ07-029	Fiji-03	11/05/07	Reef in channel between Lawake Island and Namoli Reef	25	26	cone-shaped many-sided prickly patches	on various surfaces	soft and sticky (like <i>Dendrylla</i>)	black	idem	no	yes	0.2
FJ07-030	Fiji-03	11/05/07	Reef in channel between Lawake Island and Namoli Reef	25	26	sausage-like or in balls	under overhangs	spongy, compact	wine purple, lemon yellow inside	idem	no	yes	0.7
FJ07-031	Fiji-03	11/05/07	Reef in channel between Lawake Island and Namoli Reef	25	25	in very open balls	on rubble coral heads	soft, light	orangish red	red	yes	yes	0
FJ07-032	Fiji-03	11/05/07	Reef in channel between Lawake Island and Namoli Reef	25	25	in rounded protuberances with oscula at end	under small ledges	spongy, soft	brown light purple yellowish inside	idem	yes	yes	0.1
FJ07-033	Fiji-03	11/05/07	Reef in channel between Lawake Island and Namoli Reef	25	25	forked branches big oscula	on rubble coral heads	soft, light	pinkish beige	idem	yes	yes	0

Specimens	Station	Date	Location	Min. depth	Max depth	Shape	Biotope/ substrate	Consistency	Colour in situ	Colour in air	Photo in situ	Photo ex situ	Total wet mass collected in kg
FJ07-034	Fiji-03	11/05/07	Reef in channel between Lawake Island and Namoli Reef	22	25	flat mound	under small ledges	flexible, compact	brown dark violet yellow inside	idem	no	yes	0
FJ07-035	Fiji-04	12/05/07	"Great Barrier Reef" west of Ravi Ravi pass Barrier Reef outer slope	45	45	shapeless, many-sided patch	under ledges	soft, crisp (cf eggshell <i>Anomoianthella</i>)	yellow with brown stripes	yellow	no	yes	0.26
FJ07-036	Fiji-04	12/05/07	"Great Barrier Reef" west of Ravi Ravi pass Barrier Reef outer slope	40	40	small (2 cm) mushroom-shaped heads	under ledges	spongy	purple brown, almost black	blackish	no	yes	0.11
FJ07-037	Fiji-04	12/05/07	"Great Barrier Reef" west of Ravi Ravi pass Barrier Reef outer slope	45	45	small, shapeless, prickly dropping	under ledges	soft	yellow	idem	no	yes	0.1
FJ07-038	Fiji-04	12/05/07	"Great Barrier Reef" west of Ravi Ravi pass Barrier Reef outer slope	40	40	fan-shaped leaf	on slab	flexible	purple on outer surface, beige purple on inner surface	idem	no	yes	0
FJ07-039	Fiji-04	12/05/07	"Great Barrier Reef" west of Ravi Ravi pass Barrier Reef outer slope	40	40	in corolla attached by a foot	under slab	flexible	light purple	idem	no	yes	0.01

Specimens	Station	Date	Location	Min. depth	Max depth	Shape	Biotope/ substrate	Consistency	Colour in situ	Colour in air	Photo in situ	Photo ex situ	Total wet mass collected in kg
FJ07-040	Fiji-04	12/05/07	"Great Barrier Reef" west of Ravi Ravi pass Barrier Reef outer slope	45	50	oblong mass with big osculum at end	in reef crevices	hard, firm	beige yellow-green	idem	no	yes	0.25
FJ07-041	Fiji-04	12/05/07	"Great Barrier Reef" west of Ravi Ravi pass Barrier Reef outer slope	40	40	small, black, prickly dropping	under slab	spongy	black	cream	no	yes	0
FJ07-042	Fiji-04	12/05/07	"Great Barrier Reef" west of Ravi Ravi pass Barrier Reef outer slope	8	12	crested	on summit plateau slab	hard, firm	whitish grey	idem	yes	yes	0.28
FJ07-043	Fiji-04	12/05/07	"Great Barrier Reef" west of Ravi Ravi pass Barrier Reef outer slope	40	40	in shapeless patches	in reef crevices	spongy, sticky	brown black	black	yes	yes	1.4
FJ07-044	Fiji-04	12/05/07	"Great Barrier Reef" west of Ravi Ravi pass Barrier Reef outer slope	8	9	sausage-like, with low protuberances	summit plateau slab	spongy, firm	coal black	grey	yes	yes	2.7
FJ07-045	Fiji-04	12/05/07	"Great Barrier Reef" west of Ravi Ravi pass Barrier Reef outer slope	35	40	digitate (cf Hyrtios)	on hard floor along reef edge		greenish grey	idem	no	yes	3.55

Specimens	Station	Date	Location	Min. depth	Max depth	Shape	Biotope/ substrate	Consistency	Colour in situ	Colour in air	Photo in situ	Photo ex situ	Total wet mass collected in kg
FJ07-046	Fiji-04	12/05/07	"Great Barrier Reef" west of Ravi Ravi pass Barrier Reef outer slope	35	40	in fairly thick sheets	along the walls, climbing, attached in a few spots	flexible	orange	idem	yes	yes	3.05
FJ07-047	Fiji-04	12/05/07	"Great Barrier Reef" west of Ravi Ravi pass Barrier Reef outer slope	30	50	in lobed fingers	under ledges		beige wine-coloured	beige with wine-coloured areas	no	yes	0.15
FJ07-048	Fiji-04	12/05/07	"Great Barrier Reef" west of Ravi Ravi pass Barrier Reef outer slope	32	50	small prickly fingers	in talus	<i>Dendrylla</i> type	greenish	idem	no	yes	0
FJ07-049	Fiji-04	12/05/07	"Great Barrier Reef" west of Ravi Ravi pass Barrier Reef outer slope	6	15	small flat droppings	on the slab		black	black	no	yes	0
FJ07-050	Fiji-04	12/05/07	"Great Barrier Reef" west of Ravi Ravi pass Barrier Reef outer slope	20	35	thick tubular doughnuts, big oscula with small pinnacles around edges	in hollows in the spur groove zone	flexible, spongy	beige brown	idem	no	yes	0
FJ07-051	Fiji-04	12/05/07	"Great Barrier Reef" west of Ravi Ravi pass Barrier Reef outer slope	8	15	small flat droppings	on dead coral heads and especially on slab		spice-cake brown	brown	yes	yes	2.13

Specimens	Station	Date	Location	Min. depth	Max depth	Shape	Biotope/ substrate	Consistency	Colour in situ	Colour in air	Photo in situ	Photo ex situ	Total wet mass collected in kg
FJ07-052	Fiji-04	12/05/07	"Great Barrier Reef" west of Ravi Ravi pass Barrier Reef outer slope	8	8	forking fingers	summit plateau slab	flexible, fragile	black greyish interior	idem	yes	yes	0
FJ07-053	Fiji-04	12/05/07	"Great Barrier Reef" west of Ravi Ravi pass Barrier Reef outer slope	12	13	in prickly pillow (Jack fruit)	plateau slab along coral heads	compact, spongy	green yellow	yellow inside, purple brown outside	yes	yes	5.55
FJ07-054	Fiji-05	12/05/07	Ravi Ravi channel edge of pass	8	10	fan-shaped leaf	on bare slab of summit plateau and along reef edges	flexible	pinkish grey	idem	yes	yes	2.3
FJ07-055	Fiji-05	12/05/07	Ravi Ravi channel edge of pass	8	13	in balls with protuberances	in grooves and along summit plateau	crisp (<i>Leucetta</i>)	goose-dropping green lemon yellow inside	idem	yes	yes	0.45
FJ07-056	Fiji-05	12/05/07	Ravi Ravi channel edge of pass	8	13	in irregular doughnuts	in grooves on summit plateau	crisp	lemon yellow	idem	yes	yes	1.88
FJ07-057	Fiji-05	12/05/07	Ravi Ravi channel edge of pass	10	10	club-shaped	in grooves on summit plateau on dead coral	rubbery, leathery	wine-coloured brown yellow inside	idem	no	yes	0
FJ07-058	Fiji-05	12/05/07	Ravi Ravi channel edge of pass	8	10	small shapeless mass , multi-sided surface	on slab floor	flexible, sticky	pinkish grey	grey black	yes	yes	0,2

Specimens	Station	Date	Location	Min. depth	Max depth	Shape	Biotope/ substrate	Consistency	Colour in situ	Colour in air	Photo in situ	Photo ex situ	Total wet mass collected in kg
						with prominent oscula							
FJ07-059	Fiji-05	12/05/07	Ravi Ravi channel edge of pass	9	9	in small sheet with pitted surface of large reticulated oscula	in grooves on summit plateau	rubbery, tough	grey beige	idem	no	yes	0
FJ07-060	Fiji-05	12/05/07	Ravi Ravi channel edge of pass	8	12	in grainy sheets	in grooves on summit plateau on bare slab	rough, adhesive (<i>Dysidea</i>)	grey	idem	yes	yes	0
FJ07-061	Fiji-05	12/05/07	Ravi Ravi channel edge of pass	9	12	one finger	on hard bottoms	flexible, brittle (<i>Hyrtios</i>)	grey	grey	no	yes	0
FJ07-062	Fiji-05	12/05/07	Ravi Ravi channel edge of pass	9	9	in grainy sheets	in grooves on summit plateau	rigid hard	grey brown	idem	no	yes	0
FJ07-063	Fiji-05	12/05/07	Ravi Ravi channel edge of pass	9	13	in irregular doughnuts	in grooves on summit plateau on dead coral and slab	rigid brittle	water green	green white	yes	yes	3.65
FJ07-064	Fiji-06	13/05/07	West Kakauvalu Reef	20	33	small coral head with oscula	in reef crevices	downy, compact but tears easily	whitish with wine-coloured spots	idem	no	yes	1.3
FJ07-065	Fiji-06	13/05/07	West Kakauvalu Reef	45	50	sausage-like fingers	on slab at bottom of reef edge	soft and tears easily	grey	blackish grey	yes	yes	1.18
FJ07-066	Fiji-06	13/05/07	West Kakauvalu Reef	45	50	small coral head, with oscula	on slab at bottom of reef edge	porous, flexible	grey blackish	idem	no	yes	1
FJ07-067	Fiji-06	13/05/07	West Kakauvalu Reef	12	35	flat, slightly prickly, raised fingers	along reef edge	rough and flexible	whitish beige	pinkish beige	yes	yes	0.19

Specimens	Station	Date	Location	Min. depth	Max depth	Shape	Biotope/ substrate	Consistency	Colour in situ	Colour in air	Photo in situ	Photo ex situ	Total wet mass collected in kg
FJ07-068	Fiji-06	13/05/07	West Kakauvalu Reef	15	25	small prickly ball	under overhangs	compact	cream white	bluish beige	no	yes	0,07
FJ07-069	Fiji-06	13/05/07	West Kakauvalu Reef	35	52	digitate, raised	slab of spurs		grey black	idem	no	yes	0.27
FJ07-070	Fiji-06	13/05/07	West Kakauvalu Reef	45	45	shapeless with many sides	slab along reef edge	flexible, rubbery, difficult to tear	grey	beige grey	no	yes	0.3
FJ07-071	Fiji-07	13/05/07	1/4 mile east of Mali channel outer slope	4	8	crusty, fairly fleshy, bubble-like oscula	crust on slab and dead coral		red bright orange	red bright orange	yes	yes	1.1
FJ07-072	Fiji-08	14/05/07	Kakauvalu Reef north side east of Kia Island (in bend)	15	35	oblong, hollow, big oscula	on slab of vertical drop-off	brittle, flexible	lemon yellow	idem	yes	yes	3.7
FJ07-073	Fiji-08	14/05/07	Kakauvalu Reef north side east of Kia Island (in bend)	50	55	massive, raised with fat protuberances and big oscula	on slab at threshold of and along reef edge		green	green grey	yes	yes	3.85
FJ07-074	Fiji-08	14/05/07	Kakauvalu Reef north side east of Kia Island (in bend)	45	50	raised fingers resembling <i>Hyrtios</i>	on slab at threshold and ledges along reef edge	flexible, rough (tears)	grey	idem	no	yes	7.3
FJ07-075	Fiji-08	14/05/07	Kakauvalu Reef north side east of Kia Island (in bend)	45	55	big bubbles, small coral heads with prominent oscula	under overhangs and ledge cf R1689		whitish inside beige	white beige	yes	yes	8.9

Specimens	Station	Date	Location	Min. depth	Max depth	Shape	Biotope/ substrate	Consistency	Colour in situ	Colour in air	Photo in situ	Photo ex situ	Total wet mass collected in kg
FJ07-076	Fiji-08	13/05/07	Kakauvalu Reef north side east of Kia Island (in bend)	50	50	in climbing fingers	on slab along reef edge	flexible, rubbery, slightly sticky, resembling <i>Hyrtios</i> , but did not tear	grey	idem	yes	yes	0.9
FJ07-077	Fiji-08	14/05/07	Kakauvalu Reef north side east of Kia Island (in bend)	55	55	in small patches "fritters"	on the edge of second drop-off		brown pink	candy pink	yes	yes	1.22
FJ07-078	Fiji-08	14/05/07	Kakauvalu Reef north side east of Kia Island (in bend)	55	56	small, flat, branched form	at edge of reef flat at edge of second drop-off	flexible, downy	light purple	idem	yes	yes	0
FJ07-079	Fiji-09	14/05/07	Lagoon between Kakaulevu Reef and Vuata Reef	5	7	crusty, a bit fleshy with oscula	on side with coral heads		bright red	red	no	yes	0
FJ07-080	Fiji-10	15/05/07	Northern edge Kakaulevu Reef east of Kia Island (in hollow of bend)	5	12	in prickly doughnuts	in crevices and on ledges	firm, rough, a bit rigid	red brown	red	yes	yes	0.7
FJ07-081	Fiji-09	14/05/07	Lagoon between Kakaulevu Reef and Vuata Reef	50	75	raised with one or two fingers	on slab at bottom of first drop-off		beige to orangish-brown (depending on the light)	red orange	yes	yes	7.5
FJ07-082	Fiji-10	15/05/07	Northern edge Kakaulevu Reef east of Kia Island (in hollow of the bend)	7	7	rounded doughnuts	on reef flat slab at bottom of first drop-off	compact	orange	orange	yes	yes	0.08

Specimens	Station	Date	Location	Min. depth	Max depth	Shape	Biotope/ substrate	Consistency	Colour in situ	Colour in air	Photo in situ	Photo ex situ	Total wet mass collected in kg
FJ07-083	Fiji-12	16/05/07	Outer slope of barrier reef west of Sau Sau pass	35	35	sausage-like, climbing	on reef flat slab at bottom of first drop-off (cf <i>Ex psammaphysilla</i>)		orange	orange, turned black in air	no	yes	1.52
FJ07-084	Fiji-12	16/05/07	Outer slope of barrier reef west of Sau Sau pass	8	12	bears' ear	under ledges and overhangs	flexible, rough (<i>Dysidea</i>)	light purple to bluish grey	blue grey	no	yes	1.21
FJ07-085	Fiji-12	16/05/07	Outer slope of barrier reef west of Sau Sau pass	35	35	cone-shaped with big osculum at end	on reef edge under an overhang		brown	brown	no	yes	0
FJ07-086	Fiji-12	16/05/07	Outer slope of barrier reef west of Sau Sau pass	30	30	shapeless, embedded in reef	in crevices	flexible	orange	orange with reddish areas	no	yes	0
FJ07-087	Fiji-12	16/05/07	Outer slope of barrier reef west of Sau Sau pass	25	25	in oblong ball	under ledges, in reef edge crevices		pinkish beige	idem	no	yes	0
FJ07-088	Fiji-12	16/05/07	Outer slope of barrier reef west of Sau Sau pass	12	12	in shapeless patch	outer reef slope on bare slab	hard	black	black	no	yes	0
FJ07-089	Fiji-13	17/05/07	Tip of Cakaunikuita barrier reef 5.5 nautical miles west of pass	55	65	raised with one or more fingers	at edge of second drop-off on bare slab	flexible	red	orangish red	no	yes	0.01

Specimens	Station	Date	Location	Min. depth	Max depth	Shape	Biotope/ substrate	Consistency	Colour in situ	Colour in air	Photo in situ	Photo ex situ	Total wet mass collected in kg
FJ07-090	Fiji-13	17/05/07	Tip of Cakaunikuita barrier reef 5.5 nautical miles west of pass	30	35	half-sphere ball	under overhangs in crevices of coral drop-off	limp	yellowish	yellowish with brown spots	no	yes	0.01
FJ07-091	Fiji-13	17/05/07	Tip of Cakaunikuita barrier reef 5.5 nautical miles west of pass	18	20	webbed fingers, side oscula	in crevices		beige	idem	no	yes	0
FJ07-092	Fiji-13	17/05/07	Tip of Cakaunikuita barrier reef 5.5 nautical miles west of pass	35	38	shapeless in patches	in reef crevices	soft	pinkish wine-coloured	idem	no	yes	0.45
FJ07-093	Fiji-13	17/05/07	Tip of Cakaunikuita barrier reef 5.5 nautical miles west of pass	40	48	small prickly raised fingers	in talus along reef edge		greyish	grey brown	no	yes	0
FJ07-094	Fiji-13	17/05/07	Tip of Cakaunikuita barrier reef 5.5 nautical miles west of pass	40	60	half-spheres with raised attached fingers	on slab at bottom of reef edge	flexible, quite leathery, spongy	grey	idem (rather smelly)	no	yes	0.4
FJ07-095	Fiji-15	18/05/07	“Nagelelevu lagoon” atoll Northwest tip of barrier reef	5	8	crusty, rather fleshy	talus slope summit plateau	talus slope summit plateau	brown	brown	no	yes	0.4
FJ07-096	Fiji-15	18/05/07	“Nagelelevu lagoon” atoll Northwest tip of barrier reef	35	60	in big, thick slice	on underside of deep spurs	leathery surface, prickly, smelled like <i>Ircinia</i>	blue grey	grey	no	yes	2.55

Specimens	Station	Date	Location	Min. depth	Max depth	Shape	Biotope/ substrate	Consistency	Colour in situ	Colour in air	Photo in situ	Photo ex situ	Total wet mass collected in kg
FJ07-097	Fiji-15	18/05/07	“Nagelelevu lagoon” atoll Northwest tip of barrier reef	3	8	climbing, sausage-like,	along reef edge from 20 to 60 m on dead coral	alveolate inside (<i>Speudoceratina</i> or <i>Anamoianthella</i>)	yellow to yellow brown	idem	yes	yes	0.72
FJ07-098	Fiji-15	18/05/07	“Nagelelevu lagoon” atoll Northwest tip of barrier reef	40	60	club-shaped, raised	all along reef edge (cf R3006 Solomons) on slab and dead coral	leathery, spicules, aggressive	yellow green	yellow green turning black	yes	yes	12.6
FJ07-099	Fiji-15	18/05/07	“Nagelelevu lagoon” atoll Northwest tip of barrier reef	20	60	crusty, in doughnuts on dead coral	along reef edge from de 20 à 60 m	alveolate inside (<i>Speudoceratina</i> or <i>Anamoianthella</i>)	yellow to yellow brown	idem	yes	yes	5.52
FJ07-100	Fiji-15	18/05/07	“Nagelelevu lagoon” atoll Northwest tip of barrier reef	35	35	doughnuts with rounded protuberances and oscula	under overhangs along reef edge	soft, spongy but solid	brown brownish outside, orange inside	idem	yes	yes	0.35
FJ07-101	Fiji-15	18/05/07	“Nagelelevu lagoon” atoll Northwest tip of barrier reef	8	8	crusty with raised growths	at the top of the pinnacles (cf <i>Dysidea</i> sp)	flexible and soft	grey to blue grey	idem	no	yes	0
FJ07-102	Fiji-15	18/05/07	“Nagelelevu lagoon” atoll Northwest tip of barrier reef	45	60	half-sphere with osculum at end	on slab along reef edge	soft, sticky, mucus but solid	spice-cake brown	idem	yes	yes	2.55
FJ07-103	Fiji-16	18/05/07	“Nagelelevu lagoon” atoll Rendell Channel	6	8	shapeless, rather thick sheet	at top of pinnacles	compact and spongy	grey	idem	yes	yes	2
FJ07-104	Fiji-16	18/05/07	“Nagelelevu lagoon” atoll Rendell Channel	16	24	in large (1 m) pillow	under overhangs along reef edge	compact, firm	green yellow	idem	no	yes	4.9

Specimens	Station	Date	Location	Min. depth	Max depth	Shape	Biotope/ substrate	Consistency	Colour in situ	Colour in air	Photo in situ	Photo ex situ	Total wet mass collected in kg
FJ07-105	Fiji-16	18/05/07	“Nagelelevu lagoon” atoll Rendell Channel	23	24	crusty with rounded protuberances	on rubble boulder	soft, sticky, flimsy, crumbly	dark brown	blackish (stained hands)	yes	yes	4.1
FJ07-106	Fiji-16	18/05/07	“Nagelelevu lagoon” atoll Rendell Channel	16	24	shapeless	under overhangs along reef edge	a bit crisp	whitish	idem	no	yes	0
FJ07-107	Fiji-16	18/05/07	“Nagelelevu lagoon” atoll Rendell Channel	23	24	shapeless	on rubble boulders	soft, flimsy (<i>Mirmekioderma</i>)	bluish grey	beige	no	yes	0
FJ07-108	Fiji-16	18/05/07	“Nagelelevu lagoon” atoll Rendell Channel	23	23	in sacs , larger upper osculum	under overhangs along reef edge	flexible	bluish grey	idem	yes	yes	0.65
FJ07-109	Fiji-17	19/05/07	“Nagelelevu lagoon” atoll Toulalia Island northeast outer slope	45	55	fairly webbed fingers	on reef edge	flexible, spongy, rubbery	blackish grey	idem	no	yes	0.9
FJ07-110	Fiji-17	19/05/07	“Nagelelevu lagoon” atoll Toulalia Island northeast outer slope	20	30	in flattened mound	outer slope, on slab of reef edge	solid, leathery, flexible	grey	grey cream	no	yes	1.05
FJ07-111	Fiji-18	19/05/07	“Nagelelevu lagoon” atoll Lagoon floor	27	30	upright stalactites	lagoon floor on fairly dead coral heads	rough, brittle, came off base fairly easily	cream pink	cream light pink	no	yes	2.9

Specimens	Station	Date	Location	Min. depth	Max depth	Shape	Biotope/ substrate	Consistency	Colour in situ	Colour in air	Photo in situ	Photo ex situ	Total wet mass collected in kg
FJ07-112	Fiji-18	19/05/07	“Nagelelevu lagoon” atoll Lagoon floor	27	29	fairly oblong ball or half-sphere	lagoon floor, In coral head crevices	soft but solid, similar to <i>Phakellia</i> , less airy than <i>P. cavernosa</i>	orange	orange	no	yes	0.68
FJ07-113	Fiji-18	19/05/07	“Nagelelevu lagoon” atoll Lagoon floor	27	30	raised finger with fairly large upper part and big osculum at the end	lagoon floor on fairly dead coral heads	soft, flexible	light blue	idem	no	yes	0.2
FJ07-114	Fiji-18	19/05/07	“Nagelelevu lagoon” atoll Lagoon floor	26	30	in fairly spread-out and fleshy bunch	lagoon on coral heads	very soft and bloated	orangish brown	orange brown	yes	yes	1
FJ07-115	Fiji-18	19/05/07	“Nagelelevu lagoon” atoll Lagoon floor	27	30	flat fingers	on coral heads and branching coral	rather rigid	cream	idem	no	yes	0.4
FJ07-116	Fiji-18	19/05/07	“Nagelelevu lagoon” atoll Lagoon floor	27	29	in hairy ball	on broken-down coral heads covered with sediment	soft but compact	black	black	no	yes	0.15
FJ07-117	Fiji-19	20/05/07	“Nagelelevu lagoon” atoll outer slope north of island	35	50	mound with protuberances and oscula	on coral spurs	spongy, solid, flexible	brown orangish red inside orange	idem	no	yes	12.6
FJ07-118	Fiji-19	20/05/07	“Nagelelevu lagoon” atoll outer slope north of island	45	49	warty doughnuts	on coral spurs	soft but compact	brown violet and cream	idem	yes	yes	0.1
FJ07-119	Fiji-19	20/05/07	“Nagelelevu lagoon” atoll outer slope north of island	45	50	raised, attached fingers with cleft ends	on coral spurs	rubbery, solid, flexible	greenish grey	idem	yes	yes	3.2

Specimens	Station	Date	Location	Min. depth	Max depth	Shape	Biotope/ substrate	Consistency	Colour in situ	Colour in air	Photo in situ	Photo ex situ	Total wet mass collected in kg
FJ07-120	Fiji-19	20/05/07	"Nagelelevu lagoon" atoll outer slope north of island	45	55	in warty oblong balls big osculum at end	on coral spurs	soft but compact, rubbery	brown violet and cream	idem	yes	yes	7.1
FJ07-121	Fiji-20	21/05/07	Nukusemanu Reef Outer slope north of atoll	45	55	in patches with small, short, tubular oscula	under dark overhangs along reef edge	soft, mucus	yellow	yellow	no	yes	1
FJ07-122	Fiji-20	21/05/07	Nukusemanu Reef Outer slope north of atoll	60	70	in ball with big osculum at end , surface slightly prickly	in talus zone at bottom of drop-off	firm but not hard (like <i>Pétrosia</i>)	pinkish beige	idem	no	yes	2,2
FJ07-123	Fiji-20	21/05/07	Nukusemanu Reef Outer slope north of atoll	40	50	big mushroom cap	under reef edge overhang	flexible, spongy	brown wine-coloured red lemon yellow inside	brown wine-coloured red	yes	yes	3.58
FJ07-124	Fiji-20	21/05/07	Nukusemanu Reef Outer slope north of atoll	15	15	climbing in thin sheet with small oscula	in crevices	soft, flexible (like <i>Callyspongia</i>)	light green	idem	no	yes	0
FJ07-125	Fiji-20	21/05/07	Nukusemanu Reef Outer slope north of atoll	50	50	many-sided coral head	under overhangs	soft, hollow but easy to tear	yellow with blackish spots	blackish with yellow patches	no	yes	0
FJ07-126	Fiji-21	21/05/07	Edge of coast at northern tip of Yacuna Island	10	25	raised simple or joined fingers about 20 to 25 cm tall	on reef edge, sparse	flexible, soft	bluish, pink under the light of flash	pinkish beige	yes	yes	0.25
FJ07-127	Fiji-22	22/05/07	"Bud reef" Lagoon pinnacle in line with Yavu	40	40	crusty in thin film	on dead coral	soft but impossible to sample	greenish	dark green	yes	yes	0

Specimens	Station	Date	Location	Min. depth	Max depth	Shape	Biotope/ substrate	Consistency	Colour in situ	Colour in air	Photo in situ	Photo ex situ	Total wet mass collected in kg
			Island										
FJ07-128	Fiji-22	22/05/07	"Bud reef" Lagoon pinnacle in line with Yavu Island	40	55	fan-shaped 5 mm thick	under overhangs and ledges	flexible	pinkish beige	grey beige	yes	yes	3.93
FJ07-129	Fiji-22	22/05/07	"Bud reef" Lagoon pinnacle in line with Yavu Island	10	18	shapeless with very broken surface	under overhangs	hard, brittle (<i>Leucetta</i>)	light purple	light purple pink	yes	yes	0
FJ07-130	Fiji-26	24/05/07	Ngau Island Outer slope of barrier reef across from village	45	55	climbing or raised	under deep vaults	soft, brittle, tacky	whitish patches, slightly purple	whitish	yes	yes	1
FJ07-131	Fiji-26	24/05/07	Ngau Island Outer slope of barrier reef across from village	15	25	in fingers	on slope of slab of second drop-off	flexible, soft	green	blackish grey	no	yes	1.4
FJ07-132	Fiji-26	24/05/07	Ngau Island Outer slope of barrier reef across from village	50	55	in ball 35 cm in diameter	on slab floor	solid, rubbery	grey	blackish grey inside	yes	yes	4
FJ07-133	Fiji-26	24/05/07	Ngau Island Outer slope of barrier reef across from village	35	45	in shapeless patches	under overhangs	soft, easy to tear (<i>Pseudoceratina</i> ?)	yellow with wine-coloured spots	greenish yellow	no	yes	0

Specimens	Station	Date	Location	Min. depth	Max depth	Shape	Biotope/substrate	Consistency	Colour in situ	Colour in air	Photo in situ	Photo ex situ	Total wet mass collected in kg
FJ07-134	Fiji-28	25/05/07	Kandavu Galoa harbour outer slope detached coral head	25	55	big, candy-shape	under overhangs	soft	pink purple	idem	no	yes	0
FJ07-135	Fiji-28	25/05/07	Kandavu Galoa harbour outer slope detached coral head	40	40	bears' ears	under overhangs and ledges	flexible, firm	blue purple	blue	no	yes	0
FJ07-136	Fiji-28	25/05/07	Kandavu Galoa harbour outer slope detached coral head	30	55	sausage-shaped	in crevices	leathery	grey	idem	no	yes	0
FJ07-137	Fiji-28	25/05/07	Kandavu Galoa harbour outer slope detached coral head	35	35	sausage-shaped	under overhangs	rigid	grey	idem	no	yes	0
FJ07-138	Fiji-31	26/05/07	Kandavu Pearl Reef outer slope east	23	55	rounded, flat doughnuts	on dead coral	soft but firm sticky	black	black	yes	yes	0.5
FJ07-139	Fiji-31	26/05/07	Kandavu Pearl Reef outer slope east	23	28	crusty with fairly fleshy crests	on and under dead coral	soft but solid, firmly attached to surface	goose dropping yellow	orangish red	yes	yes	0
FJ07-140	Fiji-31	26/05/07	Kandavu Pearl Reef outer slope east	27	55	sausage-shaped and alveolate	slab and overhangs	rigid, brittle	grey	grey	yes	yes	0

Appendix 4b: List of sponges and ascidians and their distribution in the various stations prospected

Class	Genus	Species	Stations Ref																															
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Anthozoa	<i>Alcyonacea</i>	Alcyonacea	FJ07-082													1		1																
Calcarea	<i>Dendya</i>	1544	FJ07-087																															
Calcarea	<i>Leucetta</i>	2914	FJ07-072																															
Calcarea	<i>Leucetta</i>	chagosensis	FJ07-055																															
Calcarea	<i>Leucetta</i>	solida	FJ07-063																															
Calcarea	<i>Leucetta</i>	solida	FJ07-129																															
Calcarea	<i>Pericharax</i>	1543	FJ07-056																															
Demospongiae	<i>Acanthella</i>	cavernosa	FJ07-013		1	1																												
Demospongiae	<i>Acanthella</i>	cavernosa	FJ07-112																															
Demospongiae	<i>Acanthella</i>	sp nov	FJ07-022		1																													
Demospongiae	<i>Agelas</i>	sp nov	FJ07-031			1																												
Demospongiae	<i>Amphimedon</i>	sp nov	FJ07-134																															
Demospongiae	<i>Aplysilla</i>	1588	FJ07-006	1																														
Demospongiae	<i>Aplysilla</i>	2084	FJ07-107																															
Demospongiae	<i>Aplysinella</i>	1719	FJ07-099																															
Demospongiae	<i>Aplysinella</i>	1719	FJ07-125																															
Demospongiae	<i>Aplysinella</i>	1719	FJ07-133																															
Demospongiae	<i>Aplysinopsis</i>	3191	FJ07-044																															
Demospongiae	<i>Aplysinopsis</i>	3191	FJ07-058																															
Demospongiae	<i>Aplysinopsis</i>	3191	FJ07-066																															
Demospongiae	<i>Aplysinopsis</i>	3191	FJ07-088																															
Demospongiae	<i>Aplysinopsis</i>	3191	FJ07-093																															
Demospongiae	<i>Aplysinopsis</i>	3191	FJ07-096																															
Demospongiae	<i>Aplysinopsis</i>	3191	FJ07-136																															
Demospongiae	<i>Axinyssa</i>	3464	FJ07-090																															
Demospongiae	<i>Axinyssa</i>	sp nov	FJ07-010		1																													
Demospongiae	<i>Axinyssa</i>	sp nov	FJ07-027			1																												
Demospongiae	<i>Cacospongia</i>	2060	FJ07-036																															
Demospongiae	<i>Callyspongia</i>	3974	FJ07-028			1																												

Class	Genus	Species	Stations Ref																															
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Demospongiae	<i>Callyspongia</i>	4515	FJ07-021		1																		1		1									
Demospongiae	<i>Callyspongia</i>	sp nov	FJ07-033			1																												
Demospongiae	<i>Callyspongia</i>	sp nov	FJ07-047				1																											
Demospongiae	<i>Callyspongia (Euplacella)</i>	1847	FJ07-091												1																			
Demospongiae	<i>Callyspongia (Euplacella)</i>	1949	FJ07-050				1																											
Demospongiae	<i>Carterospongia</i>	contorta	FJ07-059					1																										
Demospongiae	<i>Chondrosia</i>	corticata	FJ07-138																															1
Demospongiae	<i>Chondrosia</i>	sp nov	FJ07-083											1						1		1			1				1					
Demospongiae	<i>Cinachyrella</i>	2646	FJ07-008	1		1																												
Demospongiae	<i>Cinachyrella</i>	australiensis	FJ07-034			1																												
Demospongiae	<i>Cinachyrella</i>	schulzei	FJ07-018		1	1																												
Demospongiae	<i>Clathria (Thalysias)</i>	hirsuta	FJ07-080												1																			
Demospongiae	<i>Coelocarteria</i>	singaporensis	FJ07-016		1	1																												
Demospongiae	<i>Coscinoderma</i>	matthewsi	FJ07-026			1																												
Demospongiae	<i>Coscinoderma</i>	matthewsi	FJ07-132																													1		
Demospongiae	<i>Crella (Grayella)</i>	papillosa	FJ07-071							1	1			1																				
Demospongiae	<i>Cribrochalina</i>	2080	FJ07-073								1		1			1					0													
Demospongiae	<i>Dactylia</i>	delicata	FJ07-113																			1												
Demospongiae	<i>Dactylospongia</i>	metachroma	FJ07-053				1		1	1	1			1																				
Demospongiae	<i>Dactylospongia</i>	metachroma	FJ07-104																	1			1											
Demospongiae	<i>Dactylospongia</i>	sp nov	FJ07-068						1	1				1									1				1	1						
Demospongiae	<i>Darwinella</i>	cf intermedia	FJ07-127																						1									
Demospongiae	<i>Diacarnus</i>	levii	FJ07-061					1																										
Demospongiae	<i>Diacarnus</i>	spinipoculum	FJ07-118																				1											
Demospongiae	<i>Diacarnus</i>	spinipoculum	FJ07-120																					1										
Demospongiae	<i>Dysidea</i>	2062	FJ07-084												1	1					1		1	1	1		1	1						
Demospongiae	<i>Dysidea</i>	2062	FJ07-128																						1							1		1
Demospongiae	<i>Dysidea</i>	arenaria	FJ07-115																				1											
Demospongiae	<i>Dysidea</i>	arenaria	FJ07-137																													1		
Demospongiae	<i>Dysidea</i>	cf avara	FJ07-004	1																														

Class	Genus	Species	Stations Ref																																	
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31		
Demospongiae	<i>Dysidea</i>	cf avara	FJ07-048				1																													
Demospongiae	<i>Dysidea</i>	cf pallescens	FJ07-037				1		1																											
Demospongiae	<i>Dysidea</i>	cf pallescens	FJ07-067						1					1										1												
Demospongiae	<i>Dysidea</i>	cf pallescens	FJ07-106														1																			
Demospongiae	<i>Dysidea</i>	cf pallescens	FJ07-111																			1												1		
Demospongiae	<i>Dysidea</i>	cf pallescens	FJ07-135																												1					
Demospongiae	<i>Dysidea</i>	lizardensis	FJ07-042				1	1																												
Demospongiae	<i>Dysidea</i>	lizardensis	FJ07-101														1																			
Demospongiae	<i>Echinochalina (Protophlitaspongia)</i>	sp nov	FJ07-086											1																						
Demospongiae	<i>Echinochalina (Protophlitaspongia)</i>	sp nov	FJ07-139																															1		
Demospongiae	<i>Echinodictyum</i>	2088	FJ07-116																			1														
Demospongiae	<i>Epipolasis</i>	1879	FJ07-025			1																														
Demospongiae	<i>Epipolasis</i>	1879	FJ07-064						1	1																										
Demospongiae	<i>Epipolasis</i>	1879	FJ07-075							1	1																									
Demospongiae	<i>Epipolasis</i>	1879	FJ07-103															1																		
Demospongiae	<i>Fascaplysinopsis</i>	2071	FJ07-020	1													1	1																		
Demospongiae	<i>Fascaplysinopsis</i>	sp nov	FJ07-070						1																											
Demospongiae	<i>Gelliodes</i>	2086	FJ07-124																				1													
Demospongiae	<i>Halichondria (Halichondria)</i>	2404	FJ07-130																									1								
Demospongiae	<i>Haliclona</i>	sp nov	FJ07-005	1																																
Demospongiae	<i>Hyrtios</i>	1547	FJ07-062					1																												
Demospongiae	<i>Hyrtios</i>	2449	FJ07-052				1			1																										
Demospongiae	<i>Hyrtios</i>	2449	FJ07-069						1							1																				
Demospongiae	<i>Hyrtios</i>	2449	FJ07-119																				1													
Demospongiae	<i>Hyrtios</i>	3404	FJ07-076							1	1																									
Demospongiae	<i>Ircinia</i>	1228	FJ07-065						1					1			1		1																	
Demospongiae	<i>Jaspis</i>	sp nov	FJ07-123																				1	1					1							
Demospongiae	<i>Lamellodysidea</i>	herbacea	FJ07-060					1																												
Demospongiae	<i>Leiosella</i>	4180	FJ07-078								1	1																								
Demospongiae	<i>Leucetta</i>	solida	FJ07-077								1	1				1										1		1								

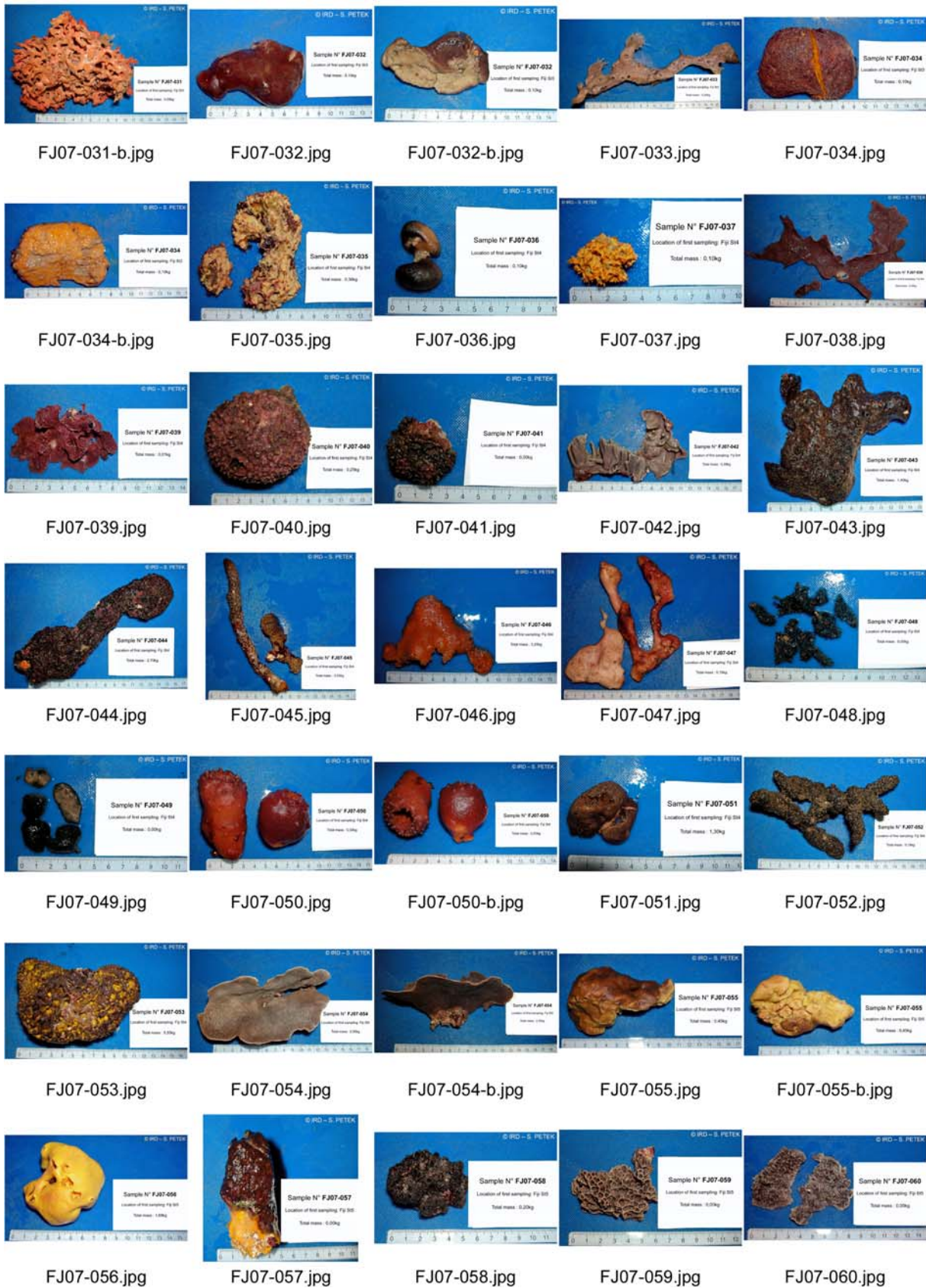
Class	Genus	Species	Stations Ref																															
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Demospongiae	<i>Melophlus</i>	2079	FJ07-100														1		1															
Demospongiae	<i>Melophlus</i>	2079	FJ07-117																		1													
Demospongiae	<i>Neofibularia</i>	hartmani	FJ07-051				1	1	1						1																			
Demospongiae	<i>Neofibularia</i>	hartmani	FJ07-102														1		1															
Demospongiae	<i>Niphates</i>	1569	FJ07-131																												1			
Demospongiae	<i>Niphates</i>	1592	FJ07-001	1																														
Demospongiae	<i>Niphates</i>	1757	FJ07-046				1		1		1		1	1				1	1			1	1					1		1				
Demospongiae	<i>Niphates</i>	sp nov	FJ07-014	1																														
Demospongiae	<i>Oceanapia</i>	2120	FJ07-009	1									1		1																			
Demospongiae	<i>Oceanapia</i>	2120	FJ07-011	1	1																													
Demospongiae	<i>Oceanapia</i>	sp nov	FJ07-121																															
Demospongiae	<i>Petrosaspongia</i>	nigra	FJ07-109																															
Demospongiae	<i>Petrosia</i>	2621	FJ07-122																															
Demospongiae	<i>Petrosia</i>	2867	FJ07-085														1																	
Demospongiae	<i>Petrosia</i>	3098	FJ07-012	1	1																													
Demospongiae	<i>Phyllospongia</i>	papyracea	FJ07-002	1																														
Demospongiae	<i>Phyllospongia</i>	papyracea	FJ07-038				1																											
Demospongiae	<i>Phyllospongia</i>	papyracea	FJ07-039				1																											
Demospongiae	<i>Phyllospongia</i>	papyracea	FJ07-054						1	1									1															
Demospongiae	<i>Plakinastrella</i>	mammillaris	FJ07-032				1																											
Demospongiae	<i>Plakinastrella</i>	mammillaris	FJ07-110																															
Demospongiae	<i>Plakortis</i>	nigra	FJ07-049				1																											
Demospongiae	<i>Psammocinina</i>	bulbosa	FJ07-094																															
Demospongiae	<i>Psammoclemma</i>	sp nov	FJ07-140																															
Demospongiae	<i>Pseudoceratina</i>	1279	FJ07-029				1																											
Demospongiae	<i>Pseudoceratina</i>	1279	FJ07-095																															
Demospongiae	<i>Pseudoceratina</i>	1871	FJ07-035				1		1				1		1	1		1		1														
Demospongiae	<i>Pseudoceratina</i>	2058	FJ07-015	1	1	1		1							1																			
Demospongiae	<i>Pseudoceratina</i>	clavata	FJ07-098																															
Demospongiae	<i>Pseudoceratina</i>	purpurea	FJ07-024				1																											

Class	Genus	Species	Stations Ref																																		
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31			
Demospongiae	<i>Pseudoceratina</i>	verrucosa	FJ07-097														1																				
Demospongiae	<i>Ptilocaulis</i>	1640	FJ07-081										1			1			1			1		1		1											
Demospongiae	<i>Ptilocaulis</i>	1640	FJ07-089													1																					
Demospongiae	<i>Rhabdastrella</i>	globostellata	FJ07-007	1		1		1		1				1		1																					
Demospongiae	<i>Rhabdastrella</i>	globostellata	FJ07-030			1			1													1															
Demospongiae	<i>Rhabdastrella</i>	globostellata	FJ07-057					1																													
Demospongiae	<i>Spongia</i>	2728	FJ07-108																		1								1	1							
Demospongiae	<i>Spongia</i>	sp nov	FJ07-126																																		
Demospongiae	<i>Stelletta</i>	splendens	FJ07-017		1	1	1		1																												
Demospongiae	<i>Strongylacidon</i>	sp nov	FJ07-040				1														1																
Demospongiae	<i>Stylissa</i>	carteri	FJ07-019		1	1			1	1				1		1	1		1	1	1	1	1	1		1											
Demospongiae	<i>Stylissa</i>	massa	FJ07-003	1		1								1	1																	1					
Demospongiae	<i>Stylissa</i>	sp nov	FJ07-079										1																								
Demospongiae	<i>Thorecta</i>	2075	FJ07-041				1																														
Demospongiae	<i>Thorecta</i>	2075	FJ07-045				1		1						1	1																					
Demospongiae	<i>Thorecta</i>	2075	FJ07-074									1		1																							
Demospongiae	<i>Ulosa</i>	2925	FJ07-114																																		
Demospongiae	<i>Xestospongia</i>	2076	FJ07-043				1			1					1			1			1		1														
Demospongiae	<i>Xestospongia</i>	2076	FJ07-105																			1				1											
Demospongiae	<i>Xestospongia</i>	pacifica	FJ07-092																			1			1							1					
Demospongiae	<i>Zyzzya</i>	fuliginosa	FJ07-023			1																															
Ascidians			FJ07-141	1																																	
			FJ07-142	1																																	
			FJ07-143	1				1	1	1				1		1							1														
			FJ07-144	1																																	
			FJ07-145				1		1																												
			FJ07-146																																		

Appendix 5 (1/5): Ex situ photos of sponges and ascidians collected



Appendix 5 (suite 2/5): Ex situ photos of sponges and ascidians collected



Appendix 5 (suite 3/5): Ex situ photos of sponges and ascidians collected



Appendix 5 (suite 4/5): Ex situ photos of sponges and ascidians collected



FJ07-091-b.jpg

FJ07-092.jpg

FJ07-093.jpg

FJ07-094.jpg

FJ07-095.jpg



FJ07-096.jpg



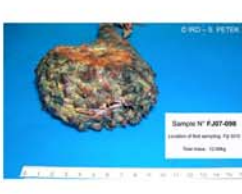
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FJ07-097.jpg



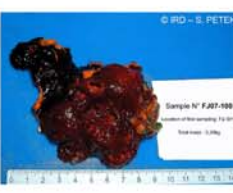
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FJ07-098-b.jpg



FJ07-099.jpg



FJ07-100.jpg



FJ07-101.jpg



FJ07-102.jpg



FJ07-103.jpg



FJ07-104.jpg



FJ07-104-B.jpg



FJ07-105.jpg



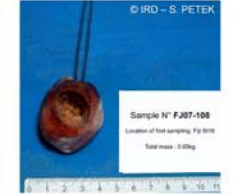
FJ07-106.jpg



FJ07-107.jpg



FJ07-108.jpg



FJ07-108-b.jpg



FJ07-109.jpg



FJ07-109-b.jpg



FJ07-110.jpg



FJ07-111.jpg



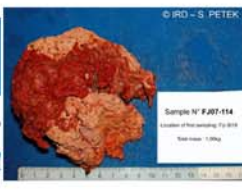
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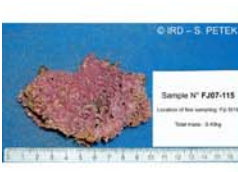
FJ07-113.jpg



FJ07-113-b.jpg



FJ07-114.jpg



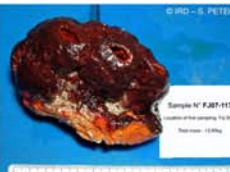
FJ07-115.jpg



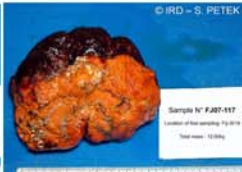
FJ07-116.jpg



FJ07-116-b.jpg



FJ07-117.jpg



FJ07-117-b.jpg

Appendix 5 (suite 5/5): Ex situ photos of sponges and ascidians collected



Appendix 6 a: In situ photos of specimens of Rhodophyta (red algae)



Acanthophora spicifera ST...



Amphiroa crassa st1-GL.jpg



Amphiroa ephedrae st4 JLM...



Amphiroa foliacea st8 JLM...



Amphiroa tribulus st2-JLM...



Asteronemia coalescens S...



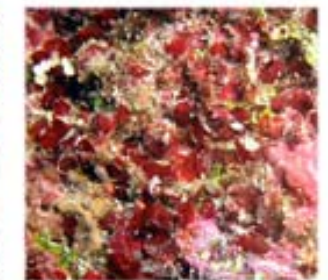
Callophycus serratus st 1...



Cheilosporum spectabile S...



Corynocystis prostrata st ...



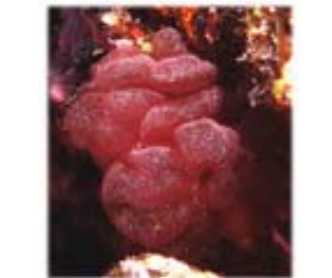
Cryptonemia umbraticola ...



Ganonema st 19-GL.jpg



Gelidiopsis scoparia st 8 J...



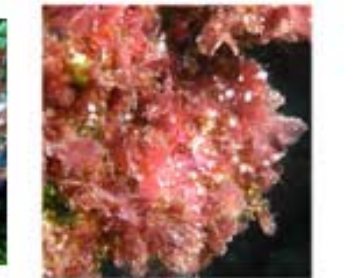
Gibsmithia dotyii st 15-GL...



Gibsmithia hawaiiensis st ...



Gloiophloea ST20-GL.jpg



Halolegma dupereyi st 19 ...

Appendix 6 b: In situ photos of specimens of Rhodophyta (red algae)



Halymenia floresia st1 JL...



Halymenia porphyraeformi...



Heterosiphonia crispella st...



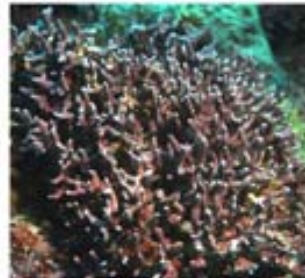
Hydrolithon craspedium st...



Hydrolithon gardnerii st15-...



Hydrolithon onkodes st 6 ...



Lithophyllum molluccense ...



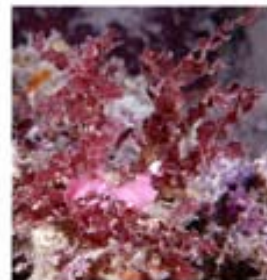
Martensia fiabelliformis st...



Mesophyllum erubescens ...



Peyssonnelia inamoena st...



Phacelocarpus neurymeno...



Platycladia palmatifida st ...



Portieria hornemannii st7J...



Predae weldii st 19-GL.jpg



Pilophora pectinata st 10-...



Titanoderma sp. st 17 - GL...

Appendix 6 c: In situ photos of specimens of Chlorophyta (green algae)



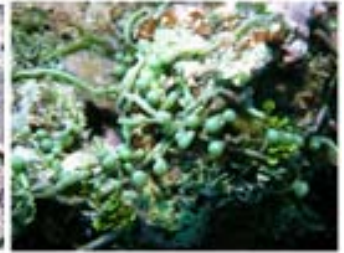
Avrainvillea longicaulis s...



Avrainvillea rotumensis ...



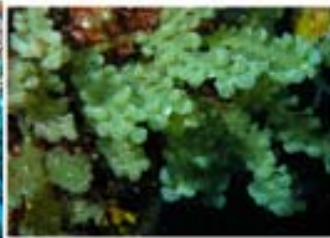
Boodlea composita-ST9-...



C. racemosa var. *lamou*...



C. racemosa var. *peltat*...



Caulerpa bikinensis st 2...



Caulerpa cupressoides s...



Caulerpa racemosa st 2...



Caulerpa sedoides st 26...



Caulerpa serrulata st 13...



caulerpa taxifolia st 1.jpg



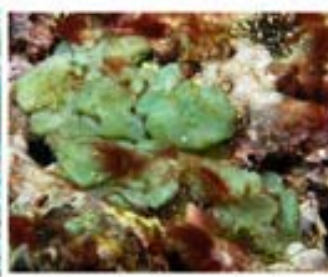
Caulerpa urvelliiana-ST2...



Chlorodesmis fastigiata ...



Dictyoshaeria cavemos...



Dictyoshaeria versluysii...



Halimeda borneensis st ...

Appendix 6 d: In situ photos of specimens of Chlorophyta (green algae)



Halimeda copiosa st 10.jpg



Halimeda distorta st 15.jpg



Halimeda fragilis st 15.jpg



Halimeda fragilis st 3.jpg



Halimeda gigas -ST2-Fidj...



Halimeda lacunalis st 4 ...



Halimeda macroloba st 9...



Halimeda macrophysa s...



Halimeda micronesica st...



Halimeda minima st 19.jpg



Halimeda-opuntia Fidji-S...



Rhipilia penicilloides -Gre...



Rhipilia sp2 ST15.jpg



Tydemanina expeditionis ...



Udotea geppiorum st 1.jpg



Udotea glaucescens st 1.j...

Appendix 6 e: In situ photos of specimens of Pheophyceae (brown algae)



Dictyota canalicula st 4 JLM.jpg



Sargassum polycystum st 14.jpg



Turbinaria ornata.jpg

ACKNOWLEDGEMENTS

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Noumea, 10 December 2007.