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PANGLAO 2005 – SURVEY OF THE DEEP-WATER BENTHIC FAUNA OF THE BOHOL SEA AND ADJACENT WATERS

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ABSTRACT. **–** Following the successful completion of the PANGLAO 2004 expedition, PANGLAO 2005 was organized to fill in the gap to explore and research the deep-sea fauna of the Bohol and Sulu Seas between 18 May 2005 and 3 June 2005. Methods used on board the Philippines fisheries research vessel MV DA-BFAR are recorded and results arising from the expedition are discussed.

KEY WORDS. **–** PANGLAO 2005, marine, deep-sea, expedition, Philippines.

INTRODUCTION

The PANGLAO 2005 deep-sea cruise is an extension of the very successful PANGLAO 2004 expedition, where a team of some 70 marine biologists from 12 countries surveyed the marine molluscs and crustaceans of Panglao Island in the Bohol Sea, Central Philippines. The 2004 venture was organized primarily by the Muséum national d'Histoire naturelle (MNHN, Paris, France), University of San Carlos (USC, Cebu, Philippines) and the Raffles Museum of Biodiversity Research (RMBR, National University of Singapore). In 2004, the scientists spent six weeks (May–June 2004) sampling the intertidal areas as well as depths of up to 200 m. Involving 70 participants in total from 16 countries, the team sampled molluscs and crustaceans intertidally, by SCUBA, and by trawling using a 1.2 m beam trawl. The area surveyed covers about 15,000 hectares (150 km²) of the municipal waters of Panglao, Dauis, Cortes, Tagbilaran and Baclayon. A record 1,200 species of decapod crustaceans and 6,000 species of molluscs were sampled, many being new to science. By comparison, the whole fauna of Japan has ca. 1,700 species of decapods and the whole Mediterranean has 2,020 species of molluscs. This reflected the diversity of the collecting techniques used, as well as the variety of skills of all the participants involved in collecting, sieving and fractioning, and sorting.

In view of this rich diversity of marine fauna obtained and many new species potentially remaining to be discovered, it was generally agreed among the organizers and participants of the PANGLAO 2004 expedition (see Bouchet et al., 2007 in this supplement) that a follow-up expedition to the Bohol Sea

should be conducted at the earliest possible date. In particular, the deeper waters (below 200 m) should be sampled. If this could be done, a more detailed biodiversity map of the area could be revealed. This would be important not only for a better understanding of the fauna there but also has serious conservation and fisheries implications. In December 2004, the Philippine Bureau of Fisheries and Aquatic Resources (BFAR, Manila, Philippines) and MNHN discussed the possibility of launching such a follow-up expedition using a modern Philippine research boat, the MV DA-BFAR, for the purpose. The project gelled in February 2005 with the necessary permits being obtained and the expedition became formally known as PANGLAO 2005: 'Survey of the deep-water benthic fauna of Bohol Sea and adjacent waters.' The expedition would be led by Dr. Philippe Bouchet (MNHN), Ms. Ludivina Labe (BFAR) and Dr. Peter K. L. Ng (RMBR); and planning for its implementation started. The Philippine government authorized the use of their boat without charge; and MNHN and RMBR then sought funding to pay for manpower costs, fuel, sampling equipment and preservation material. It was finally decided that the expedition would last 14 days (10 working days) and with the help of the fishing crew on board the ship, a party of 30 French, Singaporean, Philippine, Taiwanese and Russian scientists to collect samples down to 2,000 meters in the Bohol-Mindanao-Cebu triangle, which is essentially the Bohol/Sulu Sea area.

The expedition formally started on 18 May 2004, when the French, Philippine and Taiwanese scientists gathered in Manila and the research vessel set sail. The boat met up with the rest of the team from the Philippines, Russia and Singapore in Cebu on 21 May 2005. This cruise essentially filled the 'gaps' from the PANGLAO 2004 expedition which had targeted shallower waters. At the end of the cruise, we had sampled almost 80 stations in the municipal waters of Panglao and Baclayon, open waters between Bohol and Siquijor, and between Bohol and Cebu; as well as a section of the Bohol/Mindanao Sea.

METHODOLOGY

The MV DA-BFAR was fitted with a Warén dredge and a 4.2-metre beam trawl, designed and used in previous expeditions executed by the MUSORSTOM expeditions in the Pacific. Samples of both dredge and trawl were sent two months before the start of the expedition for duplication in Taiwan (by T.-Y Chan) and the Philippines (by N. Saguil). Two complete sets were constructed in Taiwan, with another additional two sets replicated in the Philippines. Additional beams and nets were also procured before the start of the expedition in the Philippines. In addition, 10 specially designed deep-sea traps were made in Taiwan and shipped to Philippines to be equipped with deep-sea tackles, rope and gear. A sample of the trap used during the PANGLAO 2004 expedition, which probably belonged to the Institut de recherche pour le développement (IRD) in Nouméa, was used to fabricate 20 similar traps in the Philippines.

All material collected by all the different gears were photographed as a whole when the samples were first hauled up onto the deck. All samples localities were recorded by Geographic Information System (GIS); and a database was generated to include GIS readings, station number, date of collection, depth of station, and method (type of implement used) of collection, substrate present, key species obtained and other general ecological notes. Material was then sieved thoroughly and sorted on the deck of the research vessel by the scientists. Any material identified as of interest or value was then dispatched to the photography unit to be photographed and/or tissues were specially prepared for future molecular work. After the initial processing and preservation on board the vessel, the collected samples were placed in drums before being shipped from Manila to the laboratory where further studies were conducted. Final taxonomic work on all samples will be shared and/or has been sent to the specialists of the MUSORSTOM, MNHN and RMBR network from 24 countries. Scientific results can then be published in the Tropical Deep-Sea Benthos series, an internationally recognized official scientific publication of the MNHN dedicated to deep-sea expeditions, and/or other journals like the Raffles Bulletin of Zoology.

ORGANIZATION

Duties and Responsibilities of the Scientific and Investigation Team

The participants involved in the scientific and investigation aspects of the expedition were divided into different groups and tasked to ensure the collection, description, treatment and preservation of specimens were executed according to taxa. This was to ensure that organisms belonging to the same taxa and/or requiring similar fixation and preservation techniques were accorded the correct treatment.

The groups were:

Group 1: Gear preparation, echo sounding and bottom assessment
Group 2: Station description and sample description
Group 3: Sieving and fractioning
Group 4: Sorting
Group 5: Wood and wood associated animals
Group 6: Fish
Group 7: Echinoderms and associates
Group 8: Crustacea
Group 9: Molluscs
Group 10: Other taxa

1. Gear preparation, echo sounding and bottom assessment

This group performed virtual reconnaissance of the sea bottom and to make decisions with regards to what type of gear is to be used for specimen collection. They assisted in coordinating with the ship's fishermen in laying down particular fishing gear. Three types of gear were used namely:

traps, dredges and beam trawls. Members of this group were Bertrand Richer de Forges, Dennis Tanay, Benigno Magno, Rudo von Cosel and Jo Arbasto.

2. Station description and sample description

This group recorded the station data in terms of longitude/latitude, characteristics of the haul and general description of catch before the samples were sorted to different groups. With each haul, this group assigned a station code consisting of two capital letters (representing the gear code) followed by four numbers (in continuation of the MUSORSTORM expedition sampling series). The gear codes used are: CP – beam trawl, DW – dredge and CA – traps. This expedition series began with the station number: 2331, hence the first trawling activity was assigned the station code CP2331. Ecological descriptions on the assemblage were made which included the bottom community/ecology, looking at bottom fauna at depths of 300, 500, 800, 1,000, 1,500 metres and so on. Photographs of the catch were also made on the deck. This group included Bertrand Richer de Forges, Pierre Velasco, Simon Tillier, Val Manlulu and S. H. Tan.

3. Sieving and fractioning

This group took care of cleaning the samples with seawater while ensuring that nothing is lost. Fractions of same size classes were prepared and mud removed for the succeeding groups to sort their assigned animals. Finally, small fractions (i.e. unsortable without magnification) were also preserved. This group included Philippe Maestrati, Noel Saguil, Dave Valles, Joerem Yllana, Jun Javier, Pierre Velasco and Jo Arbasto.

4. Sorting

This group segregated organisms according to phyla and ensured that animals associated with whatever organism or object was captured before they disintegrated under the tropical sun or were misplaced. This is done on two white, wooden tables on the deck laid with plastic square basins of different sizes half-filled with seawater and crushed seawater-ice. Using forceps and bare hands, if necessary, different organisms were sorted accordingly making sure that none were missed. The rest of the debris was thrown over-board. Both tables were cleaned with seawater after every batch of samples had been sorted to ensure no mixing of specimens from different stations. Sorted specimens were transferred to the lower deck for documentation and preservation.

5. Wood and wood associated animals

This group was tasked with searching for organisms that adhere to or are found burrowing in wood obtained from the trawls and dredges. Some of these organisms may form symbiotic relationships with chemotropic bacteria. This group included Simon Tillier, Olivier Gros, Marivene Manuel-Santos and S. H. Tan.

6. Fish

This group gathered all fish specimens, identified them to family level, collected muscle tissue samples (to be preserved in absolute alcohol for bar-coding), and preserved the remaining specimens in formalin. They were tasked to ensure proper documentation, photography and keeping track of other organismal associations that were found. This group included the late Mamerto Rionales, Joseph Rayos, Ariel Arizabal and Simon Tillier.

7. Echinoderms and associations

This group consolidated echinoderm specimens to document and preserve them. They made sure that representative samples are preserved for every sample while making separate repository for those showing special associations as echinoderms are known to be hosts for small invertebrates. Specific associations to be noted are those involving holothurians together with molluscs like eulimids or with crustaceans. These were handled in a way ensuring they did not get detached from their hosts. These were preserved by packing in perforated plastic bags followed by immediate soaking in 80% alcohol. The alcohol concentration of containers was checked periodically and topped up with fresh alcohol stock to maintain their concentration at 80%. Specific labels were made for the associations observed and added to the relevant lots of specimens. This group included Ludivina Labe, Rhoda Servidad, Euriphedes Osorio and Philippe Bouchet.

8. Crustacea

This group sorted crustaceans obtained from each station on deck and selected those requiring special treatment for bar-coding or photography to be processed in the laboratory. Crustaceans for bar-coding and DNA work were sampled for muscle tissue and preserved in absolute alcohol, while the rest of the specimens were kept in 80% alcohol. Shrimps and hermit crabs were packed together in perforated plastic bags and soaked in 80% alcohol. Crabs were separated to family level and packed. Specimens of crustaceans without previously known fresh colour images were photographed as were other specimens of taxonomic interest. Specimens were usually rendered immobile by soaking in cold freshwater (10–20 seconds for shrimps and one to five minutes for crabs). This group included Joelle Lai, Marivene Manuel-Santos, Peter Ng, S. H. Tan, Tin-Yam Chan and Chia-Wei Lin.

9. Molluscs

This group was tasked to segregate and process molluscs specimens collected from each sampling station. Two sections fall under this group: specialized treatment and general preservation. The specialized treatment section collected tissue samples from various species of gastropod for bar-coding. They employed cold 5–8% magnesium chloride solution for the relaxation of specimens to successfully cut foot tissue samples without the organism retracting into its shell. For samples that did not relax or come out, one

specimen was cracked or drilled (1 mm hole) while another was kept as a voucher specimen. Tissue for DNA analysis was suspended in absolute ethanol while the rest of the body and shell were kept in 80% ethanol.

Bivalves were also relaxed in cold magnesium chloride solution until they opened spontaneously and were preserved in absolute ethanol. Specimens that did not relaxed had their adductor muscles gently sliced through and opened to ensure alcohol penetration. Tissue samples of selected specimens of chitons, nudibranchs and ophistobranchs were obtained for bar-coding. The use of cold magnesium chloride on these specimens was dependent on the condition of the specimens. For cephalopods, preservation was done by properly arranging the specimen inside perforated plastic bags followed by soaking in 80% ethanol. Once fixed, they were removed and stored in bulk-storage containers. Cephalopods for bar-coding were brought to the specialized treatment section for tissue sampling while interesting specimens were brought to photography section for photography. For general preservation: Philippe Bouchet, Rudo von Cosel, Philippe Maestrati and Euriphedes Osorio. For specialized treatment: Simon Tillier, Yuri Kantor and Frank Haralde.

10. Other Taxa

This group took care of other organisms not previously listed and these included: corals by Pierre Velasco; octocorals and brachiopods by Jennifer Viron; sponges by Val Manlulu; tunicates, hydroids, actinarians and others by Simon Tillier. Other large specimens to be dried and not usable for anatomy or bar-coding were handled by Rudo von Cosel.

The corals were preserved by packing in perforated plastic bags followed by soaking in 80% alcohol. The same method was used for octocorals, branchiopods, sponges, tunicates, hydroids and actinarians. Each specimen type was placed in designated plastic drums containing 80% alcohol where the specimens were soaked. These were checked periodically and replenished with absolute alcohol to ensure that the concentration remains at about 80% throughout the expedition.

General photography

This section took photographs of small but fresh samples as well as the larger ones unloaded on deck. This section included Chan Tin-Yam Chan and Lin Chia-Wei, with assistance from Peter Ng, S. H. Tan and Joelle Lai.

Maintenance of supplies, preparation of fixatives and freezing

This section assured the constant supply of fixatives like formalin (10%) treated with borax, 80% ethanol and absolute ethanol. They ensured the availability of sorting trays, plastic vials and bags, rationing of large storage drums, paper for labelling and other supplies. They also took care of coordinating the use of the blast freezer and the making of seawater-ice for sorting purposes on main deck. This group included Dave Valles, Jennifer Viron, Rhoda, Jun Javier and Philippe Maestrati.

A list of participants of PANGLAO 2005 is listed in the Appendix.

SPECIMEN LABELS

The specimen label bears the following information:

PANGLAO 2005
Gear Code & Station Number_Person Code & Sample Number
Taxon Name
Date (DD/MM/YY)

Example:

PANGLAO 2005
DW2353_LL243
Octocoral
22/05/05

For gastropods, bar-coded specimens bore the letters BC for the Person Code and only specimens for anatomy bear the individual person code like YK for Yuri Kantor, FH for Frank Heralde and OG for Olivier Gros. The other personal codes were: ST for Simon Tillier on fish specimens, LL for Ludivina Labe on echinoderms, MM for Marivene Manuel-Santos and JL for Joelle Lai for crustaceans.

OPERATIONAL PROGRAM

Day 00 – 18 May 2005.	Gathering of main team (French, Philippine, Taiwanese) in Manila; supplies and research vessel preparation.
Day 01 – 19 May 2005.	Research vessel leaves Manila to Cebu.
Day 02 – 20 May 2005.	Enroute to Cebu (36 hours); Cebu contingent (Philippine, French, Russian, Singaporean) gathers.
Day 03. – 21 May 2005.	Stop over in Cebu. Load remaining equipment and embarkation of remaining scientific party (Cebu contingent).
Day 04. – 22 May 2005.	Bathymetric survey of Panglao waters.
Day 05. – 23 May 2005.	Transect in Panglao straits, trawl at 600–800 m.
Day 06. – 24 May 2005.	Dredge passage between Panglao and Balicasag.
Day 07. – 25 May 2005.	Transect off Baclayon to Mindanao Sea, 150–1500 m.
Day 08. – 26 May 2005.	Transect off Sulu Sea and Aliquay Island, 1–2,000m.
Day 09. – 27 May 2005.	Dredge/Trawl straits between Negros/Cebu and Cebu/Bohol.

Day 10. – 28 May 2005.	Dredge/Trawl outside Balicasag Island.
Day 11. – 29 May 2005.	Dredge/Trawl outside Balicasag Island; bathymetric mapping of Balicasag Island.
Day 12. – 30 May 2005.	Dredge/Trawl in Maribojoc Bay.
Day 13. – 01 June 2005.	Stop over in Cebu. Unload equipment and samples. Disembarkation of participants.
Day 14. – 02 June 2005.	Sail to Manila.
Day 15. – 03 June 2005.	Arrival in Manila. Remaining scientific party disembarks.

Figure 1 indicates the stations sampled during the expedition. Figure 2 is the bathymetric profile of Balicasag Island that was performed on 29 May 2005 to explore the submarine contours of the Island. Figure 3 is a group photograph of the expedition members and the expedition ship, MV DA-BFAR. Figure 4 shows the beam trawl and dredge used in the expedition. Figure 5 is a montage of some of the interesting specimens obtained from the expedition.

OCEANOGRAPHIC CHARACTERISTICS OF BOHOL AND SULU SEAS

The Bohol Sea is centred in the Philippines at about 9°S and 124°E. Surrounded by the islands of Mindanao to the southeast, and Negros, Bohol and Leyte to the northwest, it is connected to the Sulu Sea to the west via a passage between Negros and Mindanao, the Visayan Sea to the north via the Tanon Strait, the Camotes Sea to the north via the Bohol Strait and a passage between Bohol and Leyte, and to the Leyte Gulf to the northeast via the Surigao Strait. Distinguishing geographic features of the Bohol Sea include the islands of Siquijor, Camiguin and Sogod (in Leyte), Gingoog, Macajalar and Iligan (in Mindanao) Bays.

The Sulu Sea is a regional sea of the Philippines at the southwestern edge of the Pacific Ocean and contained within the Australasian Mediterranean Sea. It is situated at about 8°N 120°E and connected to the Bohol Sea to the east, and Mindoro, Linapacan, North Balabac and Balabac Straits in northwest. It borders the Philippine islands of Mindanao, Negros, and Panay to the east; Mindoro and the Calamin Group to the north; Palawan to the west; and the Sulu Archipelago to the southeast. Oceanographic data shows that the Sulu Sea is practically a closed basin. There are surface currents during winter months running north to south from the South China Sea (Maes, 1996; Metzer & Hurlburt, 1996). Wyrtky (1961) described a continuous transport of water originating from the North Equatorial Current into the Sulu Basin. From May to September, this transport is weak because it is opposed by prevailing wind conditions. The maximum inflow occurs in February, when the North Equatorial Current is strongest. The water invading the Sulu Basin has to pass another sill of about 420 m west of Panay. In the Sulu Basin the temperature minimum was observed at a depth of 1,000 m, which is considerably below the sill. Salinity is 34.48% and oxygen values are low. The average precipitation on the Sulu Sea is 2,000 mm/year. The minimum temperature observed in the Sulu Basin was 10.07°C and in the Bohol Basin of 11.70°C.

RESULTS

A total of 79 collecting operations were performed involving 58 beam trawls, 16 dredges and five attempts at trapping from depths ranging from 60 m to 2,300 m. Table 1 lists station details for all 79 stations. Figures 1 and 2 illustrate the sampling sites and the bathymetry of Balicasag Island, respectively.

Table 2 describes the catch obtained from each station. This is the first modern intensive survey of the deep-sea of the Bohol Sea and nearby areas after the first two MUSORSTOM expeditions (Forest, 1981; 1986; 1989), and adds a whole new dimension to the marine biology knowledge of the area. A total of 20 drums of specimens were obtained from the cruise. Initial estimates suggest that some 10,000 lots of specimens were obtained, representing several thousand molluscs species, 600 species of crustaceans, over one hundred species of echinoderms, and possibly over a hundred species of fish. Many species that were collected were previously regarded as rare to very rare. These included species previously unknown from the Philippine or Southeast Asian biogeographic zone.

Trawl Results

Coconuts were found in almost all trawls with the substrate being mainly mud or sand, with occasional rocks and rarely dead corals. There were a few occasions where the dredge swept through sponge beds (CP2359) and gorgonian fields. One trawl obtained a saw-tooth shark that was identified as a *Pristiophorus* species (CP2380). This shark could possibly even be an undescribed species (Compagno, 1998). Deep-sea sharks, lantern fishes and deep-sea gulpers were frequently encountered due to the depths at which the gears were deployed. One trawl obtained large numbers of the bivalve *Acesta barschi* (CP2388). The rare bivalve *Archarax* was also obtained at several stations. The octopus *Vampyroteuthis infernalis* was obtained from at least two stations (CP2389, CP2397). The large polychaete worm *Aphrodite* was obtained at CP2399. With regards to crustaceans, one of the most interesting observations was that good numbers of specimens was collected from two relatively rare crab families, the Retroplumidae and Tymolidae. Also noteworthy was that this cruise brought in many specimens of deep-water spider crabs belonging to the genera *Cyrtomaia* and *Platymaia*.

The trawl also brought up sizable amount of trash, which demonstrates the human impact on an environment that many believe is remote from human activities. As such, some consideration could be devoted to educating the lay person with regards to the effects of throwing rubbish directly into the sea.

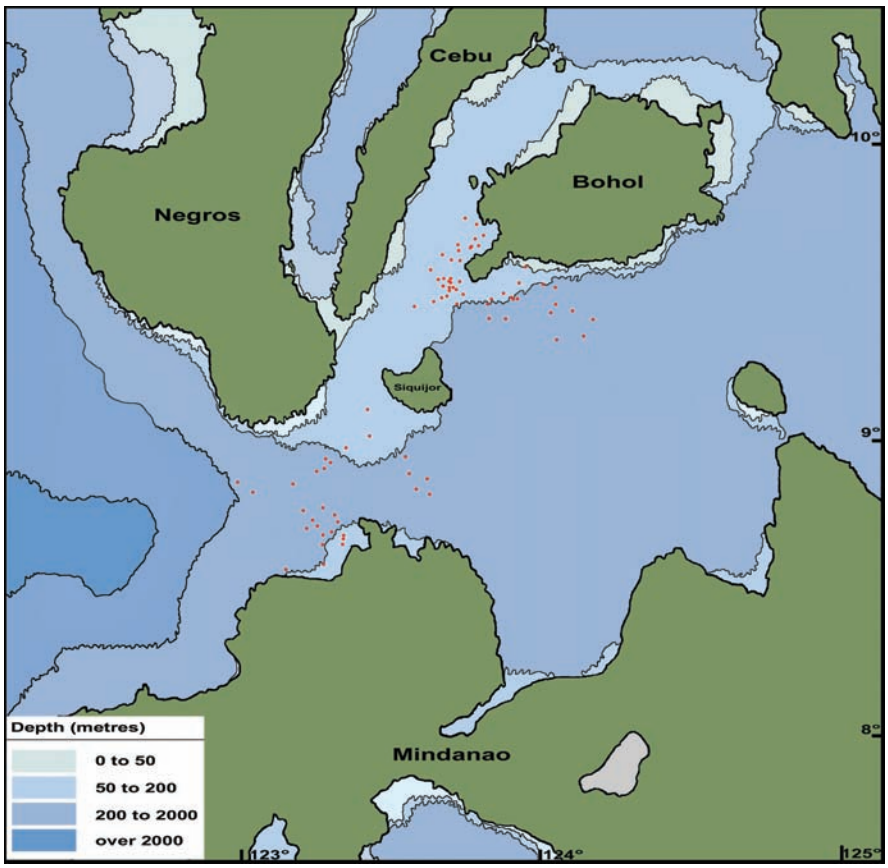

Fig. 1. Map of sampled area during the PANGALO 2005 expedition. The red dots represent the sites sampled by the expedition.

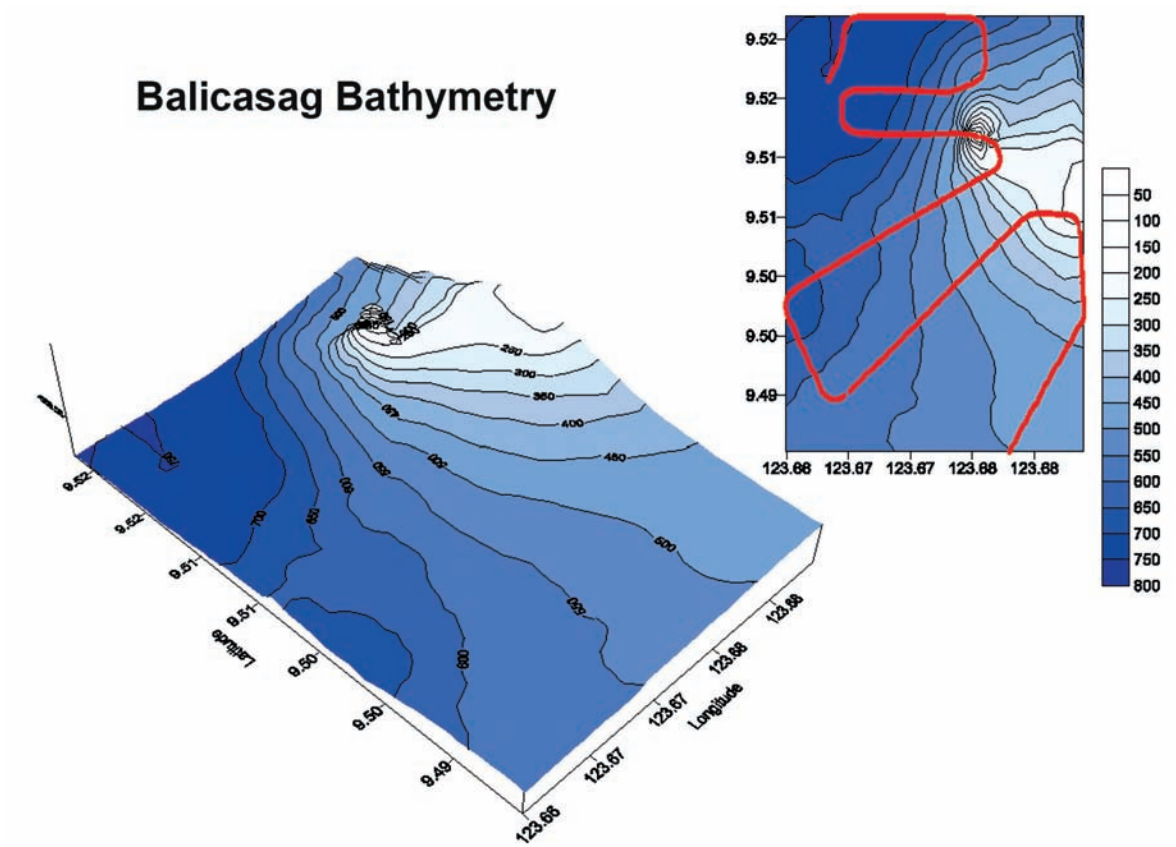

Fig. 2. Bathymetric map of Balicasag island based on bathymetric soundings performed around the island on 28 May 2005 exploring the submarine contours of the island.

Dredge Results

The dredge, being smaller than the trawl, resulted in a smaller catch than the trawl. Nevertheless, the dredging operations had obtained some good specimens, including a large gorgonian measuring 1.5 m in width and 1.2 m in height (DW2402). The dredge was also used on one occasion to retrieve traps on their first deployment when we were unable to retrieve them. Dredging operations in one site turned up numerous brachiopods (DW2364).

Traps Results

Only four trappings were carried out successfully and as the strong currents in the Bohol and Sulu Seas caused

Fig 3. A, Group photograph of the PANGLAO 2005 expedition members; B, Expedition ship for PANGLAO 2005: MV DA-BFAR

the traps to drift after deployment, making it difficult to retrieve them. All traps were lost on the fifth deployment. Two kinds of bait were used for the traps viz. squid, and an experimental mix of stale bread and prawn paste (bagoong). There was no perceptible difference between the two kinds of bait. Both were equally effective in attracting crabs, shrimps, giant nudibranchs, sea-stars, sea-urchins and brittle-stars. It has been suggested that different bait like frogs could be used, which had been reported by the local fishermen to be effective in attracting organisms like the chambered nautilus. An interesting observation was that the giant isopod, *Bathynomus*, was seldom found in the traps. These crustaceans were reported to be the most common captured organism when traps were used in the Taiwan series of MUSORSTOM expeditions (Chan Tin-Yam, personal observations).

LEARNING POINTS FROM THE EXPEDITION

Beam Trawl

The wooden beams used for the beam trawls in the initial phase of the expedition were too small in cross-section and were rather fragile, which resulted in several beams being found broken after the trawl was deployed. The second set of beams purchased in Bohol proved to be more durable. These beams were bigger and heavier because they were made of stronger wood. Fortunately, Chan Tin-Yam (NTOU) provided five full sets of beam trawl nets that allowed us to construct replacement beam trawls when the trawls were retrieved damaged after deployment.

Fig. 4. A, B: Beam trawl on deck after deployment; C, D, Dredge on deck after deployment.

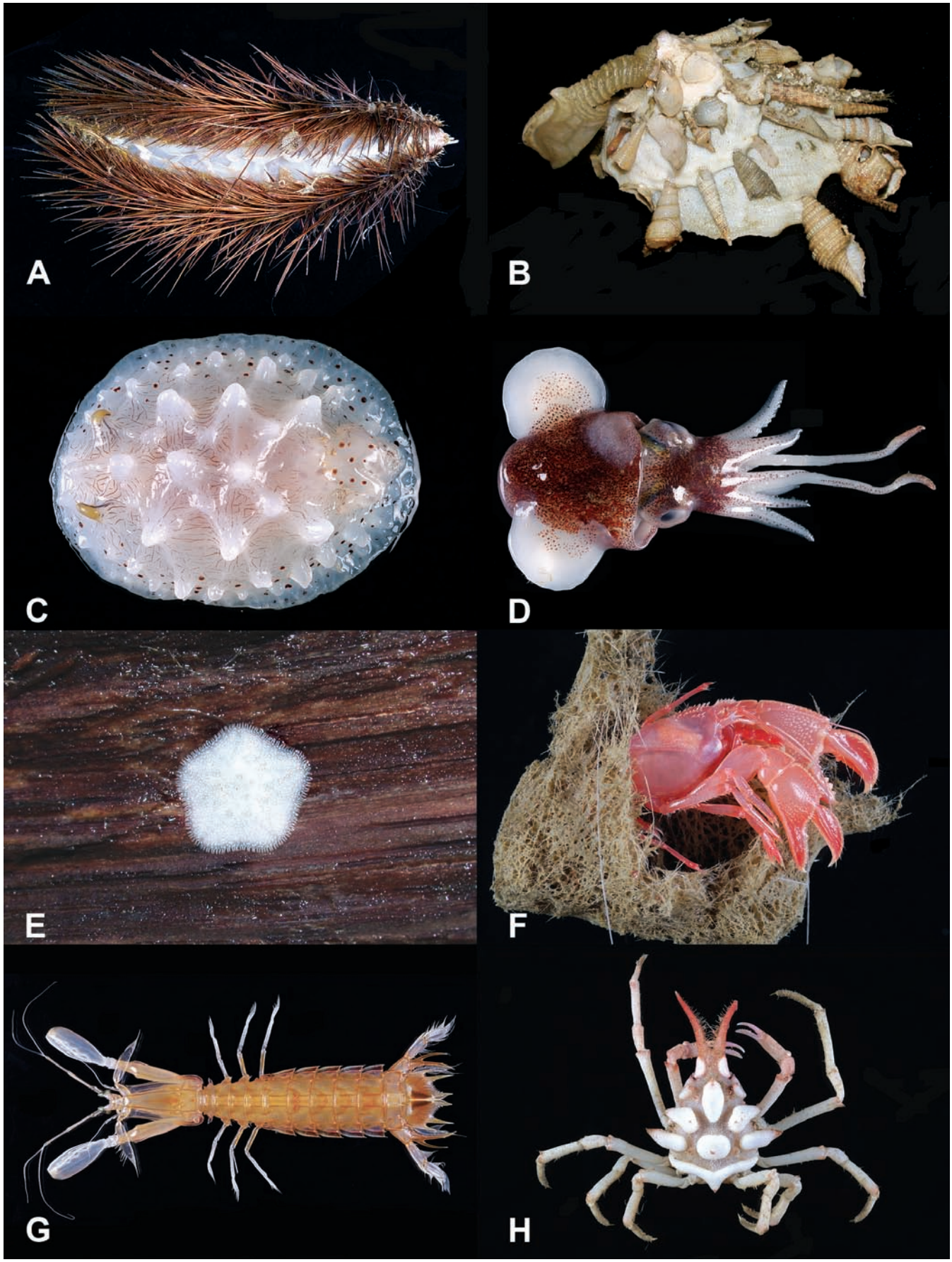

Fig. 5. Some interesting specimens obtained from PANGLAO 2005: A, Polychaete worm; B, molluscs, gastropod Xenophoridae; C, mollusc, opistobranch; D, molluscs, cephalopod; E, sea-star living on sunken wood; F, *Spongiaxius brucei* (Sakai, 1987) (Spongicolidae) in a hexactinellid sponge; G, *Squilloides leptosquilla* (Brooks, 1886) (Stomatopoda); H, *Oxypleurodon sanctaeclausi* Richer de Forges & Ng, 2009 (Brachyura: Majidae).

Table 1. Station data for PANGLAO 2005

Station	Date	Latitude (N)		Longitude (E)		Depth (min.) (m)	Depth (max.) (m)	Substrate
		Deg.(°)	Min. (')	Deg. (°)	Min. (')			
CP2331	22 May 2005	9	39.2	123	47.5	256	263	Muddy
CP2332	22 May 2005	9	38.8	123	45.9	418	477	Muddy
CP2333	22 May 2005	9	38.2	123	43.5	596	566	Muddy
CP2334	22 May 2005	9	37.5	123	40.2	631	659	Sandy
CP2335	22 May 2005	9	34.3	123	37.8	733	743	Sandy/Muddy
CP2336	22 May 2005	9	32.4	123	39.3	757	729	Sandy
CA2337	22 May 2005	9	31.5	123	41.7	–	336	Sandy/Muddy
DW2338	23 May 2005	9	30.7	123	42.4	347	342	Sandy/Muddy
DW2339	23 May 2005	9	31.9	123	43.7	164	173	Sandy/Muddy
CP2340	23 May 2005	9	29.4	123	44.4	318	291	Sandy/Muddy
CP2341	23 May 2005	9	24.5	123	49.7	712	888	Sandy/Muddy
CP2342	23 May 2005	9	24.4	123	52.9	1,258	1,239	Sandy/Muddy
CP2343	23 May 2005	9	27.4	123	49.4	273	302	Sandy/Muddy
CP2344	23 May 2005	9	28.4	123	50.1	128	155	Sandy/Muddy
CA2345	23 May 2005	9	28.3	123	54.1	–	276	Sandy/Muddy
DW2346	24 May 2005	9	28.4	123	54.5	261	280	Sandy/Muddy
DW2347	24 May 2005	9	28.7	123	54.2	198	171	Sandy/Muddy
CP2348	24 May 2005	9	29.6	123	52.5	196	164	Sandy/Muddy
CP2349	24 May 2005	9	31.6	123	55.7	240	229	Sandy/Muddy
CP2350	24 May 2005	9	31.4	124	0.6	738	798	Sandy/Muddy
CP2351	24 May 2005	9	30.7	124	3.0	810	830	Muddy
CP2352	24 May 2005	9	27.3	124	3.1	1,260	1,761	Muddy
CP2353	25 May 2005	9	25.6	124	2.1	1,767	1,767	Muddy
CP2354	25 May 2005	9	26.0	124	6.5	1,773	1,775	Muddy
CP2355	25 May 2005	9	24.3	124	10.7	1,764	1,764	Muddy
CP2356	25 May 2005	9	20.9	124	8.7	1,764	1,756	Muddy
CP2357	25 May 2005	9	20.1	124	3.3	1,762	1,762	Muddy
CP2358	26 May 2005	8	52.1	123	37.1	569	597	Sandy
CP2359	26 May 2005	8	49.9	123	34.9	437	443	Sandy
CP2360	26 May 2005	8	48.9	123	37.6	357	364	Sandy
CP2361	26 May 2005	8	53.1	123	33.5	543	613	Sandy
CP2362	26 May 2005	8	56.5	123	32.7	679	684	Sandy
CP2363	26 May 2005	9	6.0	123	25.0	437	380	Sandy
DW2364	26 May 2005	9	0.7	123	25.5	427	429	Sandy/Muddy
DW2365	26 May 2005	8	58.3	123	20.8	303	383	Sandy/Muddy
CA2366	26 May 2005	8	53.8	123	16.4	–	64	Sandy/Muddy
DW2367	27 May 2005	8	55.3	123	17.6	269	280	Sandy
CP2368	27 May 2005	8	56.1	123	16.6	318	316	Sandy
CP2369	27 May 2005	8	53.6	123	14.8	267	337	Rock/Sand
DW2370	27 May 2005	8	33.7	123	8.6	96	100	Sandy/Muddy
DW2371	27 May 2005	8	34.8	123	16.2	175	187	Sandy/Muddy
CP2372	27 May 2005	8	38.7	123	16.0	255	231	Sandy/Muddy
CA2373	27 May 2005	8	42.4	123	13.4	–	123	Sandy/Muddy
DW2374	28 May 2005	8	43.7	123	14.0	109	101	Sandy/Muddy
DW2375	28 May 2005	8	42.5	123	15.0	95	91	Sandy/Muddy
DW2376	28 May 2005	8	40.7	123	16.1	219	212	Sandy/Muddy
CP2377	28 May 2005	8	40.6	123	20.3	85	82	Sandy
CP2378	28 May 2005	8	38.8	123	20.1	65	63	Sandy

Table 1. Continued.

Station	Date	Latitude (N)		Longitude (E)		Depth (min.) (m)	Depth (max.) (m)	Substrate
		Deg.(°)	Min. (')	Deg. (°)	Min. (')			
CP2379	28 May 2005	8	39.9	123	20.2	72	69	Sandy
CP2380	28 May 2005	8	41.3	123	17.8	163	271	Sandy/Muddy
CP2381	28 May 2005	8	43.3	123	19.0	280	275	Sandy
CA2382	28 May 2005	8	45.6	123	12.1	–	501	Sandy/Muddy
CP2383	29 May 2005	8	44.7	123	18.5	351	376	Sandy
CP2384	29 May 2005	8	46.2	123	16.1	647	613	Sandy
CP2385	29 May 2005	8	51.0	123	10.0	982	1040	Sandy
CP2386	29 May 2005	8	49.3	123	1.9	2,149	2,217	Sandy
CP2387	29 May 2005	8	51.3	122	58.9	2,307	2,150	Sandy
CP2388	30 May 2005	9	26.9	123	34.5	762	767	Sandy/Muddy
CP2389	30 May 2005	9	27.9	123	38.4	784	782	Sandy
CP2390	30 May 2005	9	27.4	123	43.1	627	613	Rock/Sand/Corals
DW2391	30 May 2005	9	30.3	123	43.0	323	312	Sandy
CP2392	30 May 2005	9	29.0	123	41.1	400	436	Sandy/Muddy
CP2393	30 May 2005	9	30.1	123	41.6	396	414	Sandy/Muddy
CP2394	30 May 2005	9	28.6	123	40.0	566	787	Sandy/Muddy
CP2395	31 May 2005	9	36.2	123	43.8	434	532	Sandy
CP2396	31 May 2005	9	36.3	123	42.0	673	715	Sandy
CP2397	31 May 2005	9	34.9	123	41.7	669	712	Sandy
CP2398	31 May 2005	9	32.6	123	40.5	731	741	Sandy
CP2399	31 May 2005	9	31.7	123	41.9	309	270	Rock/Sand/Corals
DW2400	31 May 2005	9	32.5	123	41.8	111	163	Rock/Sand/Corals
DW2401	31 May 2005	9	31.0	123	40.4	397	453	Rock/Sand/Corals
DW2402	31 May 2005	9	30.8	123	41.5	101	349	Rock/Sand/Corals
CP2403	31 May 2005	9	31.0	123	40.3	463	756	Rock/Sand/Corals
CP2404	1 Jun 2005	9	39.4	123	43.3	481	479	Rock/Sand/Corals/Mud
CP2405	1 Jun 2005	9	39.0	123	46.1	387	310	Sandy/Muddy
CP2406	1 Jun 2005	9	40.6	123	46.8	389	379	Rock/Sand/Corals
CP2407	1 Jun 2005	9	41.3	123	48.5	256	204	Sandy/Muddy
CP2408	1 Jun 2005	9	43.5	123	47.1	137	153	Sandy/Muddy
CP2409	1 Jun 2005	9	44.8	123	44.8	257	269	Sandy/Muddy

Legend:
CP: Beam-trawl (chalut à perches)
DW: Warén dredge (drague Warén)
CA: Traps (casiers)

There was a lack of tools to maintain and construct beam trawls. Spare-parts for the beam trawl such as shackles, swivels, metal chains, steel cables for attaching the net, strong thin ropes. Spare pieces of thin mesh to protect the inside, and strong mesh to protect the outside of the beam trawl were in short supply.

One several occasions, it was found that substantial damaged was sustained when the beam trawl got entangled with large concrete blocks used by local fishermen as sinkers to keep their fishing nets in position. Care must be taken in future expeditions to ensure that trawls are not deployed or moved through local fishing areas as to avoid damage to the trawls and fishing nets.

Traps

On two occasions, we had difficulties findings traps set the previous night because the buoys attached to the traps were pulled under the water surface by strong tidal currents. As a result, much fuel was expanded to search for the traps and precious time was lost not executing more sample collections. A detection system for the traps should be considered for future expedition to expedite the search for the traps and to pinpoint their location.

The full series of traps (N=19) was lost on its fifth deployment. It is uncertain why the traps were lost and it was speculated that the rope that was connecting the buoys to the traps might

Table 2. Description of station samples.

No.	Station. No.	Remarks	Status
1	CP2331	About 2 bags, muddy, net caught on trawl, net line overgrown with goose barnacles. Echinoderm: *Asthenosoma* sea-urchins, crinoids, sea-stars. Crustacea: sea spider, galatheids, *Metanephrops thomsoni*, *Paguropsis typica*, *Raninoides*, *Randallia*, *Homolomannia occlusa*, Stomatopoda. Mollusc: *Xenophora*, *Microcardium*, *Millfordia*, *Distorsio*, *Euciroa*, *Biplex*, Propeamussiidae, Terebridae, Lucinidae. Hexactinellid sponges. Fish: Triglidae, Moridae, Scorpaenidae, *Antigonia*.	Trawl
2	CP2332	One bag, muddy, coconuts, large globular hexactinellid sponges. Echinoderm: crinoids, sea-stars, ophiurids. Crustacea: galatheids, deep-sea alpheid, Stomatopoda, *Metanephrops*, *Heterocarpus sibogae*, *Tymolus*, Leucosiidae, *Myra major*, *Homolomannia sibogae*, *Cyrtomaia*, Xanthidae, Goneplacidae. Mollusc: *Argonaut* shell, Turridae, Propeamussiidae, Terebridae, Limidae, *Xenophora*, *Conus*, *Distorsio*, Scaphopods. Fish: Macrouridae.	Trawl
3	CP2333	Small bag, muddy, good number of shrimps. Echinoderm: large sea cucumbers. Crustacea: *Metanephrops*, *Platymaia*, *Randallia*, galatheids. Fish: *Halosaurs*, deep-sea fishes.	Trawl
4	CP2334	Half bag, hard bottom (sandy) with mud, coconuts. Echinoderm: crinoid. Crustacea: *Raninoides*, *Parilia major*, *Ethusa*, *Platymaia*, *Metanephrops*, *Hetercarpus*, *Solenocera*, *Tymolus*, white alpheid with blue ovaries. Mollusc: *Propeamussium*, squid. Fish: deep-sea shark, eel.	Trawl
5	CP2335	Half bag, small rocks/shelly bottom, little pieces of wood, sponges, *Velonciala*. Echinoderm: crinoids. Crustacea: *Munida*, *Homolochunia*, Axiidae, *Raninoides*, *Pylocheles*, *Platymaia*, hermit crabs, barnacles. Mollucs: *Propeamussium*, *Abra*, *Cardiolucina*, *Amalda*, *Mitra*, *Solemya*, *Galeoda*, *Bathyarca*, scallops. Ascidiacea. Cnidaria: large pink sea-anemones, red *Pennatula*, Zooantharia. Fish: deep-sea eel, deep-sea fishes.	Trawl
6	CP2336	One bag, rich in wood, bamboo, coconut, one fishing line covered with orange cirripeds. Echinoderm: large holothurian, sea-star, sea-urchin. Crustacea: *Solenocera*, Axiidae, *Pleistacantha*, *Cyrtomaia*, *Cymonomus*. Molluscs: *Thatcheria*, sea slugs, scallops, chiton. Cnidaria: pink sea anemone. Fish: Halosoridae, hatchet fish.	Trawl
7	CA2337	Twenty traps; Bait: squid and Bagoong (shrimp paste). Echinoderm: 4 large sea urchins: *Asthenosoma*, small brittle star. Crustacea: *Heterocarpus sibogae*, *Randallia pustulosa*, *Oxypleurodon luzonicus*, shrimps, 7 hermit crabs. Molluscs: large sea slugs Pleurobranchia.	Trap
8	DW2338	Small bag, dead coral substrate, coconut fragments. Echinoderms: big and small sea-cucumbers, brittle-star. Crustacea: Goneplacidae. Cnidarian: deep-sea coral polyps.	Dredge
9	DW2339	One bag, mud (greenish-brown), broken shells, dead coral. Echinoderms: sea-cucumbers, brittle-star. Crustacea: *Ommatocarcinus*, galatheids. Mollusc: task shell, miscellaneous small shells. Cnidaria: deep-sea coral polyps.	Dredge
10	CP2340	One-third bag, wood, coconuts, ophiuroid. Echinoderm: brittle-stars (many), heart-urchins. Crustacea: *Platymaia*, *Mursia Metanephrops*. Mollusc: *Acesta*. Cnidarian: sea pens. Fish: eel, globe fish.	Trawl
11	CP2341	Half bag, sponges, coconuts. Echinoderm: sea-urchin, crinoids, sea-stars, large gelatinous sea-cucumber. Crustacea: *Polycheles*, *Heterocarpus*, *Oxypleurodon*, *Platymaia*, *Ethusa*, *Homolochunia*, Goneplacidae. Mollusc: squid, *Conus*, *Acesta*, *Propeamussium*, large scaphopods. Cnidaria: deep-sea coral polyps. Fish: hatchet fish, viper fish.	Trawl
12	CP2342	Broken beam. One bag, a big piece of compact mud, small stones, coconuts. Echinoderm: sea cucumber. Crustacea: deep-sea shrimps. Mollusc: large squid. Fish: lantern fish.	Trawl
13	CP2343	Two to three bags, many stalked crinoids of two species. Echinoderm: large stalked crinoids (many), sea-stars, sea-urchins. Crustacea: great number of crabs, shrimps and galatheids, *Heterocarpus*, *Ethusa*, *Platymaia*, *Pleistacantha*, *Homolochunia*, *Homola*. Fish: flat-headed shark, eel, red globe fish.	Trawl
14	CP2344	Broken beam. One bag, mud. Echinoderm: sea urchin, small and large sea cucumbers. Crustacea: *Paramunida*. Mollusc: sea slugs, carrier shells.	Trawl
15	CA2345	Twenty traps. Echinoderm: sea urchins (many), brittle stars, large sea stars. Crustacea: *Homola orientalis*, Leucosiidae, *Munida*, Scyllaridae, *Parapaguropsis*, shrimps. Annelida: large polychete worms. Mollusc: pleurobranchia, Nassaridae. Fish: eel.	Trap
16	DW2346	One-third bag, coral gravel substratum, coconut. Echinoderm: sea-stars, brittle-stars. Crustacea: *Cyrtomaia*, *Iphiculus*, *Pleistacantha mirablis*, *Pleistacantha oryx*, *Oxypleurodon*, *Parathranites granosus*. Mollusc: bivalves, gastropods, *Distorsio*, *Fusus*, *Xenophora*. Sponges. Cnidaria: deep-sea coral polyps	Dredge
17	DW2347	One-quarter bag, mud, shells, coconut. Echinoderm: sea cucumber. Crustacea: *Platymaia*, stomatopod, small shrimps. Mollusc: bivalve. Cnidaria: deep-sea coral polyps	Dredge

Table 2. Continued.

No.	Station. No.	Remarks	Status
18	CP2348	One bag, mud, coconut. Echinoderm: brittle stars, sea-stars, sea-urchins. Crustacea: *Parapenaeus*, *Iphiculus*, *Parapaguropsis*, galatheids, axiids, *Platymaia*, *Mursia*, *Retropluma* (many), goneplacid, stomatopod, Pylochelidae. Mollusc: squid, *Xenophora*. Fish: pufferfish, mermaid's purse.	Trawl
19	CP2349	Two bags, mud. Echinoderm: brittle-stars. Crustacea: *Metanephrops*, axiid, galatheids, *Retropluma* (many), *Carcinoplax*, *Iphiculus*, *Pleistacantha*, *Homolochunia*, *Oxypleurodon sphenocarcinoides*. Fish: large angler fish, deep-sea fishes.	Trawl
20	CP2350	Half bag, wood, coconuts. Echinoderm: crinoids, brittle-stars. Crustacea: *Munida*, *Cyrtomaia horrida*, *Rochinia*, galatheids. Fish: deep-sea shark, gulper, eel.	Trawl
21	CP2351	Half bag, mud, wood, clay. Crustacea: *Raninoides*, *Ethusa*, *Trachycarcinus*, *Polycheles*. Cnidaria: deep-sea coral polyps.	Trawl
22	CP2352	Half bag, wood, coconuts, coral rocks. Crustacea: *Ethusa*. Mollusc: *Acesta*	Trawl
23	CP2353	One bag, coconuts, wood mud. Echinoderm: sea cucumbers, brittle stars. Crustacea: *Polycheles*, *Thaumastocheles japonicus*, Goneplacidae. Mollusc: *Acharax*, *Amygdalum*.	Trawl
24	CP2354	One bag, coconuts, wood. Echinoderm: sea cucumbers. Crustacea: galatheids, *Munidopsis*, *Hephthopelta*, *Ethusa*. Mollusc: bivalves, chiton, *Amygdalum*. Sipuncla.	Trawl
25	CP2355	One bag, coconuts. Echinoderm: sea-stars, sea-urchins, brittle-stars. Crustacea: *Polycheles*, galatheids. Mollusc: bivalves, *Acharax* (small). Fish: gulpers.	Trawl
26	CP2356	Two bags, wood, coconut, large piece of wood with fauna (two species of Cocculinidae, Leptochiton, Mytilidae, Concentrocycloidea). Echinoderm: sea-urchin, brittle-star. Crustacea: *Polycheles*, *Pylocheles*, *Munida*, *Cyrtomaia*, *Ethusa*, one odd isopod with long "rostrum". Mollusc: squid, chiton. Porifera: glass sponge.	Trawl
27	CP2357	Two bags, coconut, wood, large block of wood. Echinoderm: large sea-cucumber. Crustacea: *Cyrtomaia*, *Polycheles*, Thallassinids. Mollusc: *Acharax*. Fish: deep-sea shark, gulper.	Trawl
28	CP2358	Two bags, coconuts, wood, bamboo. Echinoderm: sea star, sea urchin, large sea-cucumber. Crustacea: *Randallia*, *Ethusa*, *Rochinia*, *Carcinoplax*, *Eurixanthops*, *Heterocarpus*, *Metanephrops*, *Pylocheles*, galatheids. Fish: eels, shark, frog fish, gulper.	Trawl
29	CP2359	Two cubic metres, many sponges. Echinoderms: heart-urchins. Crustacea: *Cyrtomaia*, *Platymaia*, *Homola*, axiid, *Metanephrops*, *Heterocarpus*, crangonid, hermit crabs, *Porcellanopagurus*. Fish: shark.	Trawl
30	CP2360	One bag, coconut, wood. Echinoderms: many sea-cucumbers. Crustacea: *Psopheticus*, *Cymonomus* (many), numerous polychelids. Cnidaria: coral polyps.	Trawl
31	CP2361	One bag, sponge, wood, coconut. Echinoderm: large heart-urchin. Crustacea: *Platymaia* (large), axiid. Cnidaria: coral polyps. Fish: eels.	Trawl
32	CP2362	One bag, broken coral, sand, coconut, wood. Echinoderm: Psolidae (with Eulimidae). Crustacea: *Oxypleurodon auritum* (12 specimens, pink in color).	Trawl
33	CP2363	One bag, wood, coconut. Echinoderm: gelatinous sea-cucumber. Crustacea: lobster, *Polycheles*, *Heterocarpus*, *Metanephrops*, axiid in hexactinellid sponges, *Maja*, *Ethusa*, *Iphiculus*, *Euryxanthops*. Mollusc: tusk shells. Fish: frog fish, shark.	Trawl
34	DW2364	One bag, coarse sand and mud, stones. Echinoderm: brittle star. Crustacea: *Homola*. Brachiopods. Cnidaria: dead coral polyps.	Dredge
35	DW2365	One-third bag, hard bottom, coconuts, wood, small rocks. Crustacea: *Homola*, leucosids, galatheids.	Dredge
36	CA2366	Crustacea: hermit crab, *Thalamita*, *Charybdis*, *Naxoides*, scyllarid. Mollusc: *Fusus*.	Trap
37	DW2367	Echinoderm: sea-stars. Crustacea: Tymolidae, *Cyrtomaia*, *Mursia*	Dredge
38	CP2368	One-quarter bag, sponges, coconuts (beam broken). Echinoderm: sea-stars, brittle-stars. Crustacea: *Plesionika*	Trawl
39	CP2369	After 20 min, the beam trawl was stuck. Chain was broken and the beam trawl lost.	Trawl LOST
40	DW2370	One bag, black mud. Crustacea: *Ketamaia*, *Heteropilumnus*, *Upogebia*, stomatopod.	Dredge
41	DW2371	Mud	Dredge
42	CP2372	Wood with fauna, coconut. Crustacea: goose barnacles, giant barnacles, *Parila major*, *Maja*, *Pleistacantha oryx*, *Moloha major*, *Homolochunia*, *Ethusa*, *Tymolus*, *Heterocarpus*, galatheid, *Metanephrops*, crangonid, stomatopod, *Parapaguropsis*, *Plesionika*.	Trawl
43	CA2373	Crustacea: *Plesionika gangis*, *Homola orientalis*, *Carcinoplax*, *Periclimenes alcocki*, *Heterocarpus sibogae*, galatheid, isopod. Mollusc: giant sea-slugs (many)	Trap

Table 2. Continued.

No.	Station. No.	Remarks	Status
44	DW2374	One bag, rocks, corals. Sponges (? *Corallistes*) with Pylochelidae. Crustacea: small xanthids, galatheids. Cnidaria: coral colonies. Numerous brachiopods (*Thecedellina* sp.)	Dredge
45	DW2375	One-quarter bag, sand, stone, sponges.	Dredge
46	DW2376	Rocks, stones, sponges. Numerous brachiopods (2 species).	Dredge
47	CP2377	Half bag, wood, coconuts. Echinoderm: sea stars, sand dollar; Cnidaria: octacorallaria, Pennatulids, Crustacea: *Charybdis miles*, *Iphiculus* sp., stomatopods. Fish: frog fish, angler fish, *Platycephalus*, flat fish (many).	Trawl
48	CP2378	One bag, mud, sponge bowls, coconut, wood. Echinoderm: sand-dollars. Crustacea: *Stenopus*, *Phalangipus*, portunids. Fish: skate	Trawl
49	CP2379	River stones, sponges, coconuts. Fish: porcupine fishes, *Platycephalus*, sargassum fish, scorpaenids, skate	Trawl
50	CP2380	Two bags, very rich sample. Echinoderm: sea-cucumber. Crustacea: many shrimps, crabs, scyllarids, hermit crabs. Molluscs. Fish: saw-tooth shark (*Pristiophorus*).	Trawl
51	CP2381	Four bags, mud, coconuts, wood. Crustacea: goose barnacles on rope, many shrimps, *Eumunida*, possibly new white and red galatheid. Fish: angler fish, trumpet fish, flat fish.	Trawl
52	CA2382	All traps lost.	Traps
53	CP2383	Two bags. mud, wood, coconuts. Echinoderm: gelatinous sea-cucumber. Mollusc: large Mitridae, scaphopods, *Gemmula*, Terebridae, *Pseudolatirus*, cephalopods. Crustacea: pycnogonid, large pagurid, *Xylopagurus*, scyllarid, *Homola*, *Parilia major*, lobster, *Cymonomus*, Ethusinae, Xanthidae, *Metanephrops*, shrimps. Fish: frog fish (yellow spots).	Trawl
54	CP2384	Two bags, sandy mud, coconuts, large piece of rock (hard-mud). Crustacea: *Metanephrops*, *Spongiocola*, *Alpheus*.	Trawl
55	CP2385	One bag, mud wood, coconut. Crustacea: *Metanephrops neptunus*, *Munidopsis andamanicus*. Mollusc: 3 rare turrids. Cnidaria: sea anemone on plastic bag. Fish: eels.	Trawl
56	CP2386	One bag, mud, wood, coconuts. Echinoderm: gelatinous sea-cucumber. Crustacea: pycnogonids, *Munidopsis*, *Carcinoplax*, *Trachycarcinus* (2 spp.). Fish: deep-sea shark, eels.	Trawl
57	CP2387	Half bag, mud, mud pellets, coconuts (top wire of trawl snapped). Echinoderm: crinoid, brittle-star, sea-star. Crustacea: *Bathynomus*, *Polycheles*, *Munidopsis*, *Trachycarcinus*. Cnidaria: life deep-sea coral polyps.	Trawl
58	CP2388	One bag, wood, mud, coconuts. Echinoderm: sea-cucumber, sea-star. Mollusc: *Acesta* (many), *Acarax* (small), squid. Crustacea: *Cyrtomaia echinata*, *Raninoides*, *Spongiocola*, *Polycheles*, *Munida*, *Trachycarcinus*, *Ethusa*, pinnotherid in sea cucumber *Molpadia* (2 females). Fish: *Hoplostethus*.	Trawl
59	CP2389	One bag, wood, coconut. Echinoderm: sea-cucumber. Crustacea: *Cyrtomaia echinata*, pinnotherid in sea cucumber.. Mollusc: *Acesta*, *Propeamussium*, *Cardiolucina*, *Vesicomya*. Fish: *Hoplostethus*.	Trawl
60	CP2390	One bag, mud, wood, coconuts. Echinoderm: crinoid, many sea-cucumbers, sea-stars. Mollusc: deep-sea octopus (*Vampyroteuthis*?). Crustacea: *Cyrtomaia horrida*, *Polycheles*, *Raninoides*, *Randallia pustulosa*, axiid, *Nephropsis*, *Acanthephyra*. Cnidaria: sea-pen. Fish: large angler fish, small frog fish, Lophiidae.	Trawl
61	DW2391	Half bag, wood, mud and block, polychaete tubes. Echinoderm: sea-cucumbers. Mollusc: scaphopods, *Lucina*. Porifera: glass sponge. Sipunculid. Cnidaria: *Penatula*. Lophophorata: Brachiopoda, *Thecedellina*	Dredge
62	CP2392	One bag, mud, wood, coconuts. Echinoderm: sea-urchin, sea-stars (a large orange foliated species). Crustacea: *Platymaia remifera*, *Cyrtomaia horrida*, *Pleistacantha*, *Randallia pustulosa*, *Lyeridus tridentata*, *Iphiculus*, *Maja kuminatoensis*. Mollusc: *Acesta barschi*.	Trawl
63	CP2393	Wood, coconut, sandy mud. Echinoderm: crinoid. Mollusc: *Acesta barschi*, cuttlefish. Crustacea: *Parilia major*, *Platymaia barschi*, lobster	Trawl
64	CP2394	One bag, mud, sponge, coconut, small wood block. Echinoderm: sea-stars with eulimid, crinoid (many). Crustacea: large isopod, *Randallia pustulosa*, *Cyrtomaia* (small), *Aristeus*, *Heterocarpus*, stomatopod.	Trawl
65	CP2395	One bag, rocks and polychetes tubes, sponges, hard with holes, wood, coconuts, mud, polychaete tubes covered of brachiopods. Echinoderm: gelatinous sea cucumber. Mollusc: cuttlefish. Crustacea: *Parilia major*, *Ladomedeaus*, *Pleisthacantha*, *Munida*. Lophophorata: Brachiopoda (2 species). Fish: lantern fish, *Gargariscus*.	Trawl

Table 2. Continued.

No.	Station. No.	Remarks	Status
66	CP2396	Two bags, coconuts, glass sponge, hard substrate. Echinoderm: big holothuria, stalked crinoids, crinoids, *Malpulea*. Mollusc: small scallops, *Gemmula* (Turridae). Crustacea: *Aristeus*, *Cyrtomaia echinata*, *Lyreidus*. Fish: deep-sea congers, flat-head deep-sea shark.	Trawl
67	CP2397	Two bags, mud, detritus, coconut. Echinoderm: stalked crinoids, holothurians. Crustacea: *Pleistacantha*, *Solenocera*, hermit crabs, *Ethusa*. Mollusc: *Vampyroteuthis*. Fish: deep-sea congers, *Halosaurs*.	Trawl
68	CP2398	One bag, mud, coconuts, wood, leaves of seagrasses. Echinoderm: purple sea-cucumber. Crustacea: *Cyrtomaia horrida*, *Munida*, *Munidopsis*. Fish: lantern fish, frog fish, angler fish.	Trawl
69	CP2399	Half bag, sea grass. Crustacea: *Cyrtomaia* (juv.), *Typhlosyrinx*. Polychaeta: Aphroditidae.	Trawl
70	DW2400	One bag, sand, gorgonians, *Alcyonaria*, rocks, sponges. Crustacea: portunids, hermit crabs, shrimps, Leucosiidae, Pilumnidae. Molluscs: Conidae, Cypaeidae.	Dredge
71	DW2401	Three bags, coarse sand with mud, coral pieces and coral slabs	Dredge
72	DW2402	One bag, mud and rubbles, gorgonians (1 very large specimen). Crustacea: *Rhinolambrus cybelis*, *Rhinolambrus hayamaensis*, Portunidae, *Munida*, hermit crabs, cirripeds on gorgonians.	Dredge
73	CP2403	Trawl caught on tangle-net, little in bag. Echinoderm: large stalked crinoid. Mollucs: *Xenophora*.	Trawl
74	CP2404	One bag, wood, coconuts. Echinoderm: stalked crinoid, sessile crinoids, brittle-star, sea-stars. Mollusc: scallops, *Lachivia mirabilis*. Crustacea: *Aristeus*, *Polycheles*, *Cyrtomaia*, *Munida*, *Munidopsis*, *Heterocarpus*, *Platymaia* (juv.), *Metanephrops*, Leucosiidae. Fish: lantern fish, deep-sea shark, deep-sea eel.	Trawl
75	CP2405	Two bags, net with big hole, mud, bamboo, bag of sand, large concrete sinkers with sponges. Echinoderm: yellow sessile crinoid. Crustacea: *Metanephrops*, *Xylopagurus*, *Aristeus*, *Heterocarpus*, *Alpheus*, hermit crabs, *Munida*, *Psopheticus*. Molluscs: *Xenophora*. Fish: lantern fish.	Trawl
76	CP2406	Two bags, large rocks, sponges, mud. Echinoderm: stalked crinoids, sea-urchin (red). Crustacea: *Parilia major*, *Platymaia*, *Metanephrops*, *Ethusa*, *Ladomedeaus*, *Mursia*, *Platypilumnus solae*, *Psopheticus insignis*, *Homolomannia sibogae.*	Trawl
77	CP2407	Half bag (caught on net), wood, coconut. Echinoderm: large red sea urchin; Crustacea: *Raninoides*, *Parilia major*, *Munida*, *Carcinoplax*, *Charybdis*, *Leucosia anatum*, *Plesionik*a, *Ethusa*, stomatopod. Fish: Agnatha, *Myxine*.	Trawl
78	CP2408	Net torn, sandy mud, shells, gorgonians. Crustacea: *Leucosia anatum*, *Rhinolambrus cybelis*, goneplacid, majid, cirriped on gorgonians, *Retropluma*, *Lupocyclus*, *Iphiculus*. Fish: flat fish.	Trawl
79	CP2409	One bag, wood, coconuts, many red sea-urchins. Echinoderms: red sea-urchin (many). Crustacea: *Cyrtomaia murrayi*, *Platymaia*, goneplacid, *Pleistacantha*, *Mursia*, *Oxypleurodon*, *Ibacus breviceps*, scyllarid, shrimps, stomatopod. Fish: flat fishes, star gazer; Trigliidae, eels.	Trawl

have been severed; or that the traps drifted into deeper waters and were not visible on the surface.

Dredge

The dredges made in Cebu did not conform to the original measurements. The series of small holes to attach the net onto the frame was not drilled, thus making attachment of the net imperfect. This issues must be noted to prevent a repeat of a similar incident in future expeditions.

Vessel

The MV DA-BFAR is a relatively heavy ship and its speed for most of the expedition averaged between 1.5 to 2 knots. If the trawling or dredging gears are stuck, the vessel has to immediately decrease the speed to 0 knots and simultaneously put out more wire into sea to avoid causing the wire and chains attached to the fishing gears to snap. The vessel will then have to turn around very slowly and tow in the opposite side (180° from the original trawling direction) to relieve the pressure on the fishing gear. The first beam trawl was lost because the trawling speed was for some reason far too high (about 3 knots). This was compounded by the increase in the strain on the fishing gear, which was unexpectedly being hauled up using the winches. The strain proved too much for the beam trawl to bear and as a result, the chain connected to the beam trawl broke. An inspection of the damaged chain was conducted and it was observed that the break occurred on the heavy chain connected directly to the winch, and not the wire connected to the beam trawl. This is curious as the heavy chain is supposed to be stronger than

the wire as it is much larger in diameter. It could possible that the chain broke due to fatigue but consideration must be given to whether better quality chains should be used for similar work in the future.

The length of available wire attached to the beam trawl was insufficient to work to depths of 2,000 m or more. Fortunately, the Fishing Master was able to add another piece of wire to the beam trawl, which enabled us to execute trawls up to 2,300 m. The heavy weight of the 24 mm wire compensated for its short length and it was found that it could withstand the stress applied on it for the deployment of the trawls. It is recommend that for future expeditions, an additional length of wire measuring 1,500 m should be obtained and used to give more flexibility to conduct deeper sampling.

Fuel

Due to unforeseen circumstances, the fuel quantity for the vessel was underestimated, which resulted in insufficient fuel to perform certain activities like bathymetry studies of the sampling sites in the night. It is recommended that fuel quantity could be recalculated more accurately to prevent similar events from occurring again in future expeditions.

Fishing Area Limitations

In order to sample the deep-sea biodiversity more comprehensively, it would be essential to work between 100 and 2,500 m. However, the expedition was unable to sample within 15 km of any land mass without prior permission from local authorities. This severely limited our sampling areas and depth range and leaves very limited areas in very restricted depths for sampling. Permits for near-shore sampling should be researched and obtained during the planning stage to avoid similar restrictions from happening in future expeditions.

RESULTS

Crustaean papers based on material obtained from this expedition can be found in the following citations:
Ahyong & Ng (2008, 2009); Castro & Ng (2008), Galil & Ng (2007); Lai et al. (2006), Mendoza. & Ng (2008); Li et al. (in press); Ng & Naruse (2007; Richer de Forges & Ng (2007a, 2007b, 2007c, 2009a, 2009b); Richer de Forges et al. (in press); Sin et al. (in press).

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APPENDIX

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