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The first Indonesia–Singapore deep-sea expedition: South Java Deep-Sea (SJADES) Biodiversity Expedition 2018

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Abstract. The SJADES (South Java Deep-Sea) Biodiversity Expedition was conducted from 23 March to 5 April 2018, surveying the deep waters of the Sunda Strait and southwestern Java. This is the first joint deep-water expedition organised by Indonesia and Singapore, and the team of 31 research scientists and support staff from the two countries sampled a total of 63 stations, reaching depths exceeding 2,000 m. To date, 36 technical papers have been published using the biological samples collected, with one new genus, 27 new species and over 260 new records for Indonesia reported thus far.

Key words. deep-water survey, macrofauna, meiofauna, Indonesia–Singapore collaboration, background, outcomes

INTRODUCTION

In Indonesia, like in most parts of Southeast Asia, scientific studies of the deep-sea marine life, particularly of the sea floor, have been few and far between (APFIC, 2009; Sukramongkol, 2011). Historically, the English CHALLENGER Expedition visited the Moluccas briefly in 1874 on its way to Hong Kong through the Torres Strait but its route did not include Java or Sumatra (Tizard et al., 1885). Similarly, the Dutch SIBOGA Expedition (1899–1900) sampled extensively in the Banda Sea but only came eastwards as far as Madura in east Java and did not survey the Indian Ocean (Anonymous, 1900; Weber, 1902; Van Aken, 2005). The German VALDIVIA Expedition (1898–1899) on the other hand, sampled in the southern Indian Ocean, travelling northwards, passing the Cocos-Keeling Islands and onwards to the west coast of Sumatra, but missed the main island of Java (Chun, 1900, 1902–1903). The Danish expedition to the Kei Islands (Mortensen, 1923) in eastern Indonesia in 1922 sampled nearly 60 stations in the vicinity of Jakarta and within Sunda Strait on its return journey from the Arafura Sea, but no samples were collected off southern Java. It was only later, during another Danish expedition, the GALATHEA, in 1952 that passed the sea off southern Java and sampled in the Sunda Trench (surveying 14 stations between depths of 2,030 and 7,160 m with only five obtaining specimens, cf. Bruun, 1957). In recent years, deep-sea surveys have tended to focus on resources like fish and shrimp stocks (APFIC, 2009). A joint Korean–Indonesian fishery survey examined shrimp stocks in southern Java (Anonymous, 1973, 1975; Sumiono & Iskandar, 1993) but the benthic biodiversity was not reported. Indonesian and French researchers on the KARUBAR Expedition in 1991 on board *Baruna Jaya I* examined the fauna of the deep-sea benthos off the Kai and Tanimbar Islands but this is far east of Java (Crosnier et al., 1997). The most recent survey off southern Java and its environs was a survey by Japanese and Indonesian fishery departments in 2005 (Anonymous, 2006) focussing on exploratory fishing and preliminary stock assessments of various fish and shrimp species. Many of the species, however, have yet to be formally reported (but see Suman et al., 2008; Sumiono, 2009; Ho et al., 2016).

BACKGROUND TO THE CRUISE

The 2018 expedition to southern Java was conceptualised by scientists from the Research Center for Oceanography, Indonesian Institute of Sciences (LIPI); and the Lee Kong Chian Natural History Museum (LKCNHM) and Tropical Marine Science Institute (TMSI), both from the National University of Singapore (NUS). In 2002, marine biologists from the two countries successfully mounted an expedition to the waters around the Anambas and Natuna Islands (Ng et al., 2004a, b), but as this was in the Sunda Shelf, only shallow waters were sampled. The idea of mounting a deep-sea expedition in Indonesian waters started in 2012. The authors were both deeply involved in two large biodiversity surveys in the Philippines organised by the French in 2004 and 2005 (Bouchet et al., 2009; Richer de Forges et al., 2009), and another with Ryukyus in Japan organised by the Japanese (Naruse et al., 2012). All involved the sampling of deep-sea fauna, with the 2005 exercise (PANGLAO 2005) a dedicated deep-water cruise. For all three, the

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Fig. 1. The research team of SJADES 2018: (from left to right) Indra Bayu Vimono, Riyana Subandi, Teguh Peristiwady, Chim Chee Kong, Jose Christopher Escaño Mendoza, Tan Heok Hui, Lim Swee Cheng, Chan Tin-Yam, Tan Siong Kiat, Dharma Arif Nugroho, Muhammad Masrur Islami, Selvia Oktaviyani, Tan Koh Siang, Ismiliana Wirawati, Eko Burhanuddin, Gan Bin Qi, Peter Ng Kee Lin, Nurul Fitriya, Praditya Avianto, Bertrand Richer de Forges, Yang Chien-Hui, Dwi Listyo Rahayu, Samantha Tong Jia Wen, Ernawati Widyastuti, Rene Ong Sheue Lin, Chuar Cheah Hoay, Hadiyanto Hadiyanto, Muhammad Dzaki bin Safaruan, Feri Gultom, Lin Chia-Wei. Not in picture: Iffah binte Iesa (who took the photograph).

National University of Singapore were co-organisers. All deep-sea expeditions in Southeast Asia have previously been conceptualised, organised and led by more developed countries, the situation being no different for Indonesia (see above). As such, the authors started to explore how researchers from the two countries can plan and mount a deep-sea survey on their own, and build up their manpower capabilities for the future.

Funding was eventually secured in 2016 whereby planning started to move at a faster pace, notably on the selection of a suitable site for the deep-sea survey. Bilateral meetings and planning workshops took place in Jakarta throughout 2016 and 2017 to understand the bathymetry and geology of various sites, logistics, manpower needs, legal requirements, etc. It was only in April 2017 that it was agreed that the cruise would take place in southern Java. In 2017, the governments of Indonesia and Singapore started the "RISING 50" bilateral initiative to commemorate 50 years of diplomatic relations. Although the proposed deep-sea cruise was planned independently of the RISING 50 initiative, the Ministry of the Foreign Affairs (Singapore) and the Indonesian Embassy in Singapore (Ministry of Foreign Affairs, Indonesia) requested that it be placed on the calendar of upcoming events for the bilateral initiative. LIPI and NUS agreed as the cruise encapsulates all the values and intentions of RISING 50 and will bring a new generation of young scientists from the two countries together in a spirit of expanded collaborations.

SELECTION OF SITE: SOUTHWESTERN JAVA

The island of Java lies at the southern edge of the Sunda Shelf where it abuts the Java (or Sunda) Trench, plunging some 7,000 m below the sea surface less than 300 km off the south coast of the island. From the steep beaches along the wind-swept coastline encompassing the towns of Pelabuhan Ratu to Cilacap and eastwards to Teluk Grajagan, the seabed dips steeply southwards for nearly 2,000 m before rising again to form a deep trough (the Sunda Trough) that forms the northern edge of the Java Trench. The Sunda Trough itself is over 600 km long and some 3,000 m deep, defined by northern and southern ridges that rise to 1,000 m below sea level. At the western limit of this trough lies the relatively shallow Sunda Strait, a busy waterway that separates Java from Sumatra, and also separates the South China Sea from the Indian Ocean. The volcanic island of Krakatau was formed in the Sunda Strait after a huge volcanic eruption more than a century ago.

As discussed in the introduction, despite its proximity to Jakarta, there have been surprisingly few attempts to explore the biodiversity of the deep waters in western Indonesia, with the sea off the southern coast of Java being a particularly glaring exception. As noted earlier, there have only been three fishery resource cruises in this area by Korea and Japan in 1993, 1995, and 2006 (Anonymous, 1973, 1975, 2006), but none of them documented at length the benthic biodiversity and most of the taxonomic results have not been studied and/or published.

The selection of southwestern Java as the expedition site will help redress the historical sampling bias east of the Weber Line, and produce baseline systematic biodiversity information for the deeper waters off the southwestern coast of Java. This is important not just for marine science in general, our knowledge of the deep-sea benthos, but also to understand the deep-water biodiversity of southern Java, and Indonesia, and allow the country to better manage the resources there.

Once a final decision was made on the survey site, the expedition was named the South Java Deep-Sea (SJADES) Biodiversity Expedition 2018.

RESEARCH TEAM

For the cruise, the two chief scientists from the two countries were the authors. A total of 31 berths were available for scientists and support staff (Fig. 1, Table 1). Four scientists from France and Taiwan were also specially invited to join the expedition. They were Prof. Bertrand Richer de Forges (previously from the Institut de Recherche pour le Développement [IRD] in Nouméa, Nouvelle-Calédonie), and Prof. Chan Tin-Yam, Dr Lin Chia-Wei, and Dr Yang Chien-Hui (National Taiwan Ocean University [NTOU] from Keelung, Taiwan). Prof. Richer de Forges has led dozens of cruises and participated in hundreds of deep-water expeditions over the last 40 years throughout the Indo-Pacific (e.g., see Richer de Forges, 2013) and his experience and expertise was very useful during the cruise. Prof. Chan and his team have been part of many French expeditions over the last decade, and he is also one of the lead biologists for the Taiwanese deep-sea programme, having substantial experience with trawls and associated gear. Indonesia provided one geologist to assist with the mapping as well as one representative from the Tentara Nasional Indonesia Angkatan Laut (Navy) to help with security matters (if the need arose). Indonesian and Singaporean scientists were selected on the basis of matching expertise (as far as possible) as joint publications were planned early on. Youth was also a factor (more than half the participating scientists were below the age of 40), with future ties and collaborations in mind.

TAXA SAMPLED

With regard to the taxonomic groups studied, the expedition sampled all macro- and meiobenthos that were collected by the various pieces of equipment. The two focus taxa were Crustacea and Mollusca, mainly because the international Census of Marine Life and various other studies have demonstrated that the highest discovery rate and number of new taxa are from these groups (see Ausubel et al., 2010; Bouchet et al., 2008; Richer de Forges et al., 2013). Detailed collections of these two groups, together with detailed taxonomic studies of the species will allow the team to make comparisons with other areas and better understand the biodiversity of the Sunda Trough. Porifera, Polychaeta, Echinodermata, Porifera, fishes, etc., were also collected.

CRUISE DETAILS

The research vessel deployed for SJADES 2018 was *Baruna Jaya VIII* (Fig. 2). Details of the methods and material used for the cruise are elaborated on by Chim et al. (2021, this volume). The duration of the 2018 cruise was 14 days (23 March–5 April 2018), starting from and ending at the port of Muara Baru in Jakarta (Figs. 3, 4). The three days before the expedition were spent getting *Baruna Jaya VIII* ready for the cruise. Equipment sent in from Singapore and other gear brought in by LIPI were assembled and readied. Getting the trawls, dredges, and nets ready took two days. The time was also used to get familiar with the crew, chain of command, ship-board equipment, as well as for the vessel to be fully fuelled and food to be brought in.

The main sampling gear were the rectangular dredge and beam trawl for larger fauna, and the box corer and multicorer for smaller fauna. Four kinds of equipment were deployed: trawl (coded as CP) (Fig. 5), Warèn dredge (coded as DW), box corer (coded as BC), and multicorer (coded as MC). For operational efficiency, the expedition was focused solely on the deep-sea benthos.

SJADES 2018 started on 23rd March, with the *Baruna Jaya VIII* sailing from the berthing port Muara Baru at 1800 hours. The seas in Jakarta Bay that evening were relatively calm but as the vessel entered the Sunda Strait in the coming morning, the weather worsened and the waters became very choppy because the area was affected by the strong tailwinds from Cyclone Marcus in northern Australia. Despite this, the first trawl went out as planned on 24th March at 1000 hours, with the first catch coming in just before lunch.

Daily briefings by the chief scientists were conducted in the communal dining area of *Baruna Jaya VIII* (either at night after dinner or just after breakfast) to summarise the day's events, challenges and problems faced, how the issues can be dealt with, what the daily discoveries and major findings were, the kind of surveys to be done the next day, etc. These briefings were important to share notes and prepare for the next day.

The cruise track was pre-determined by the chief scientists, LIPI and NUS researchers before the start, and worked on the principle of a zone system with proposed stations embedded inside (Fig. 3). As *Baruna Jaya VIII* sailed through each zone,

Fig. 2. *Baruna Jaya VIII* research vessel, sailing through the Sunda Strait into the Indian Ocean (March 2018). The logo for the expedition is on the top right corner.

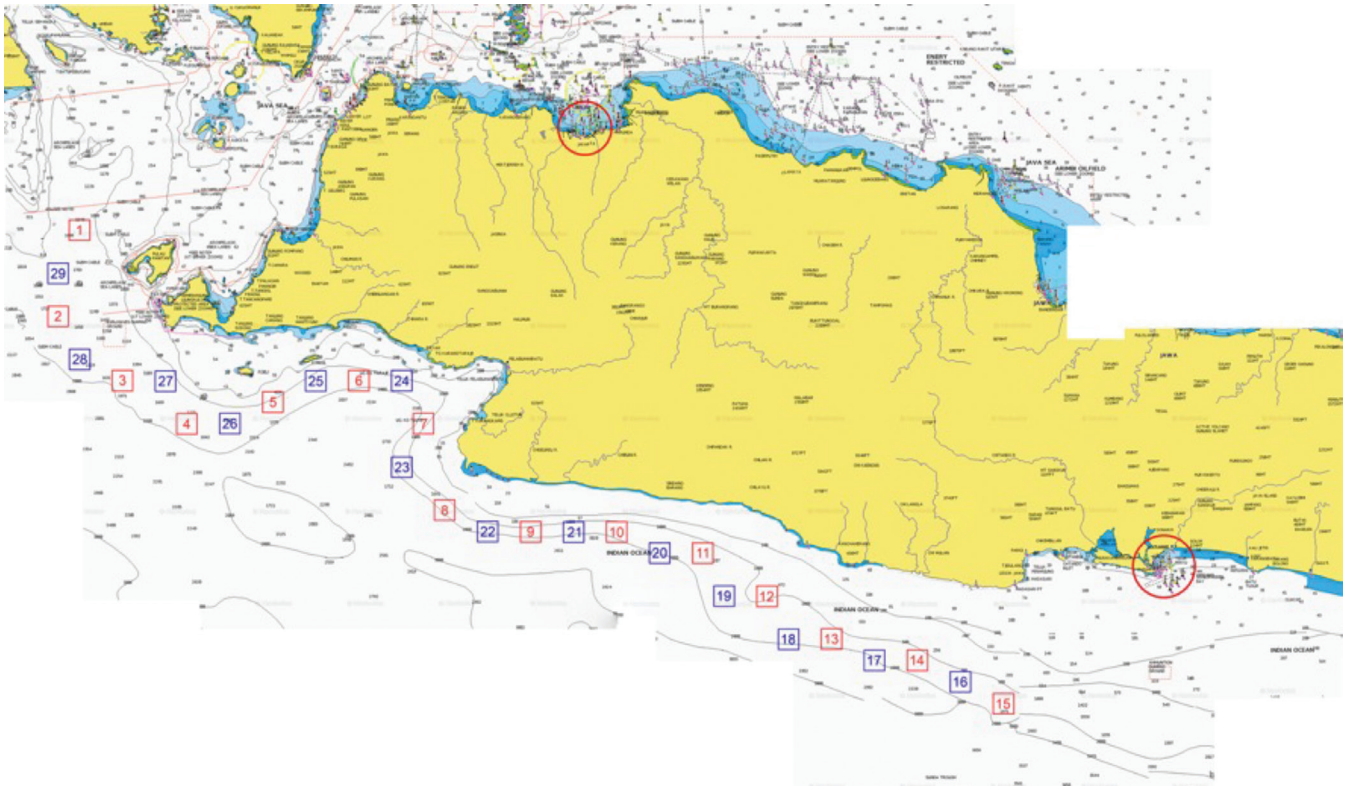

Fig. 3. Originally proposed sampling stations off the southern coast of West Java. The top and bottom red circles indicate the locations of Jakarta and Cilacap, respectively.

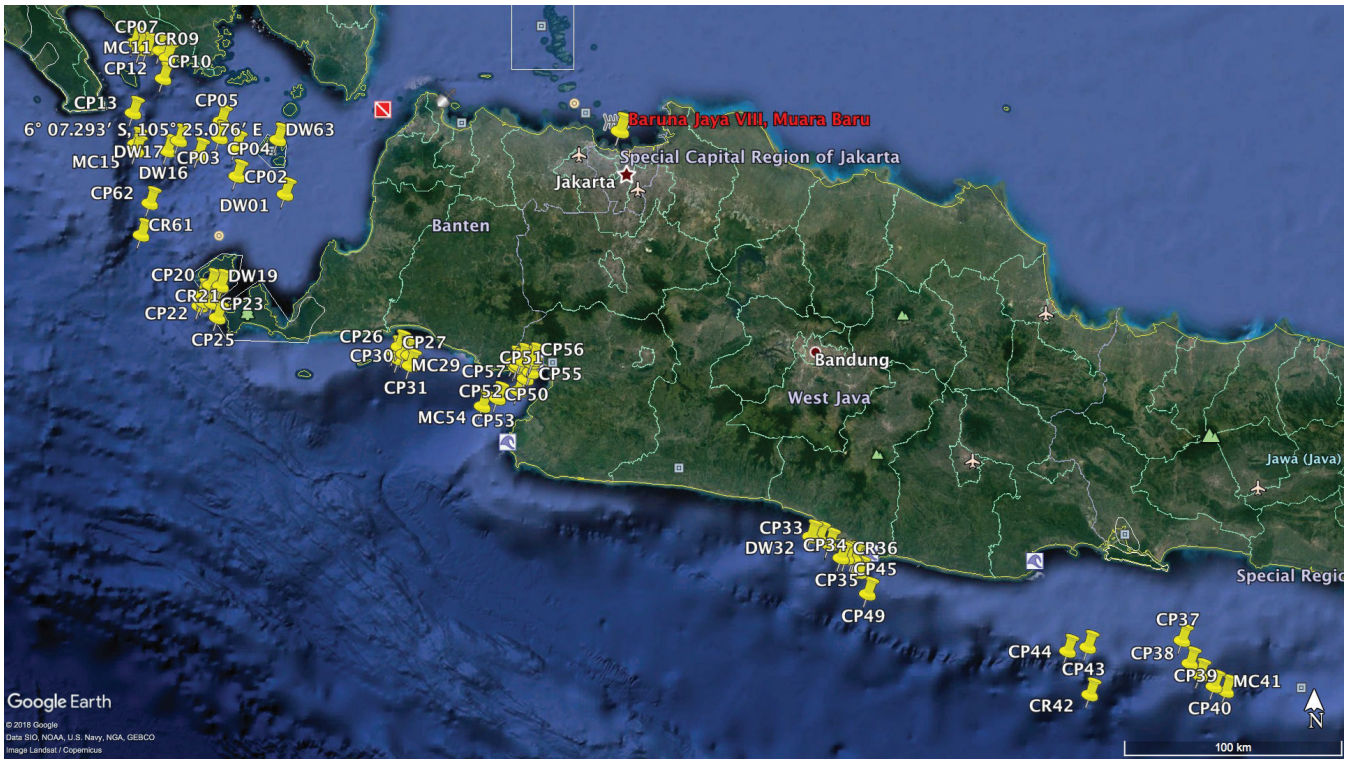

Fig. 4. The final 63 stations of SJADES 2018 on a Google Map as initially plotted by the expedition mapper (see also Chim et al., 2021, this volume, for details).

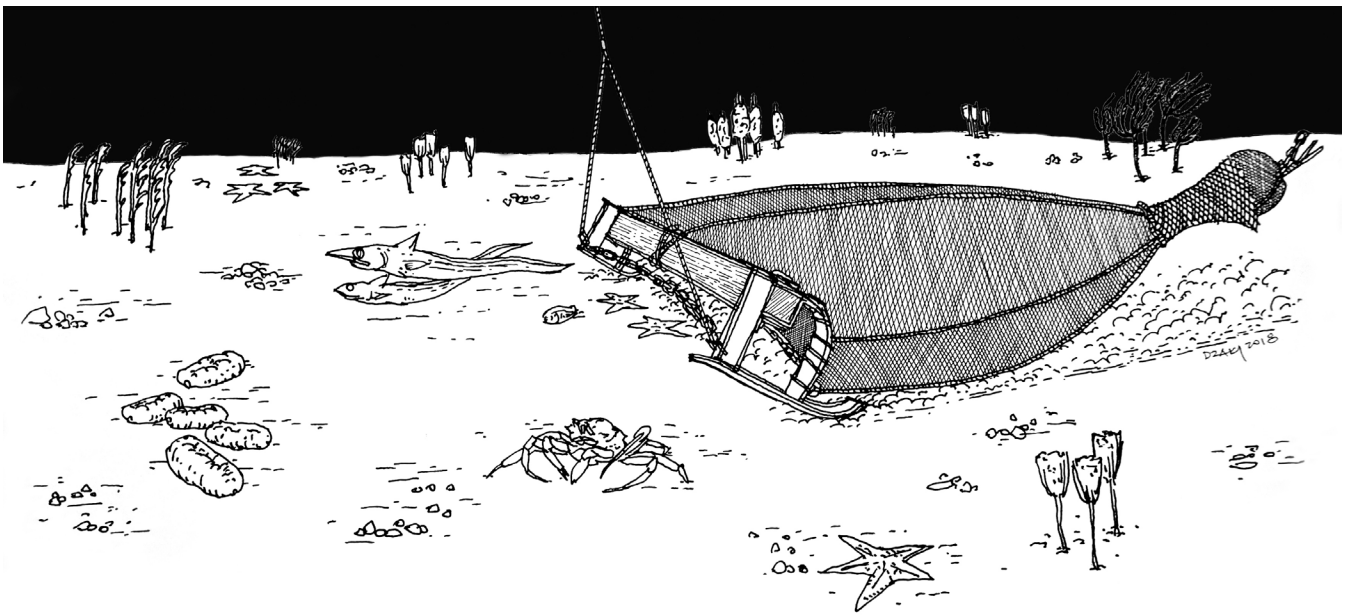

Fig. 5. Artist's impression of the trawl at work on the ocean benthos. (M. Dzaki)

the chief scientists, consultants, and captain worked together to decide which would be the actual sites to be sampled, the gear that would be deployed, etc. Final sampling sites were decided based on depth, terrain, bathymetry, and risk to the equipment. As such, the final 63 stations sampled differed slightly from the original plan (Fig. 4).

During the cruise, the GPS co-ordinates, bathymetric depth, depth, terrain, and whenever possible substrate type and/or faunistic characteristics of every station were logged. Each station was coded by consecutive numbers, with the kind of equipment used attached as the prefix. The station data was collated by a joint team of Indonesian and Singapore scientists who shared the data for the two chief scientists on a daily basis. Biological samples were sorted onboard (as far as possible), indicative specimens photographed, preserved, labelled, assigned RCO-LIPI numbers, placed in bags (packed by stations), and put into large drums (usually

Fig. 6. A, washed batches of specimens are spread out on trays, kept chilled using bottles of ice, awaiting sorting; B, C, material is meticulously sorted by hand to separate out even the small organisms; D, large pieces of sunken wood need to be slowly broken apart to collect isopods, polychaetes, and other animals burrowed inside; E, fish specimens need to be pinned to spread out the fins and treated with formalin so they will preserve well; F, sorted specimens packed in plastic bags and vials before storage in drums.

Fig. 7. A, specimens of the rare goneplacid *Carcinoplax abyssicola* (station CP8); B, a large catch of mostly lobsters, *Nephropsis andamanicus* (Nephropidae, station CP34); C, most of this catch were zoanthid associated hermit crabs (*Sympagurus villosus*, Parapaguridae, station CP37); D, a collection of sea stars and brittle stars (station CP22); E, a large trawl of stalked crinoids (*Teliocrinus springeri liliaceus*, Cainocrinidae, station CP51); F, a large 30-cm deep-water holothurian collected (*Benthothuria funebris*, Synallactidae, station 24); G, a lot of bamboo stems and twigs were collected, many of them containing symmetrical hermit crabs like *Parapylocheles scorpio* (Pylochelidae, station CP51); H, in some of the samples, large quantities of plastics were collected even up to 2,000 m deep, testament to the terrible pollution in our seas.

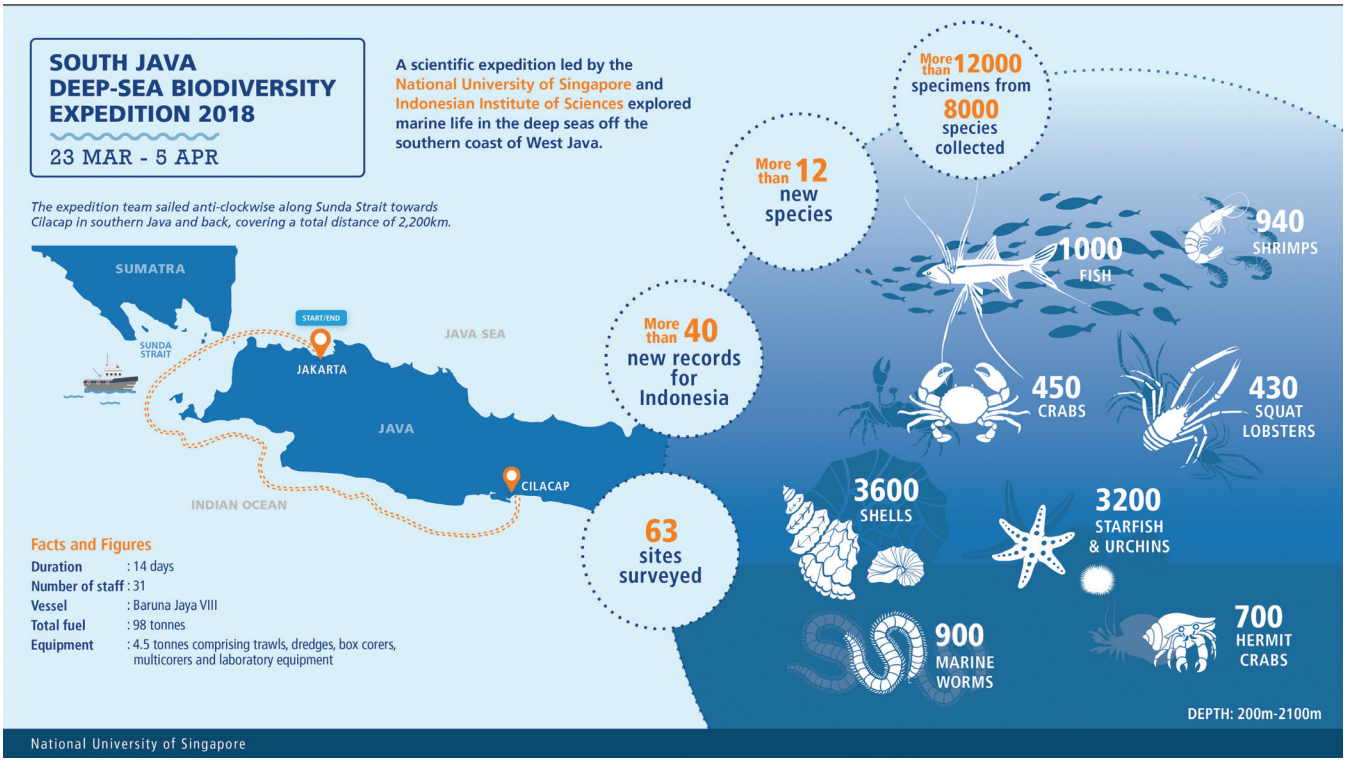

Fig. 8. An infographic prepared by the Singapore newspaper 'The Straits Times' summarising the initial findings of the cruise.

with 75% ethanol). Fish and echinoderms, however, were preserved in 10% formalin after tissue samples were taken. Each museum number is linked with one set of specimens (some are mixed but most are sorted individually whenever possible) and recorded (Fig. 6). Records were kept on an Excel file and photographs taken with their associated RCO-LIPI numbers. Photographs were sorted daily to ensure a complete database of images. A total of 63 stations were conducted over the 12-day operations (excluding two days of sailing time). The full station data is listed in Chim et al. (2021).

A total of more than 12,000 specimens (Figs. 7, 8) were obtained and preserved from the 63 stations. During the cruise, material for immediate study were sorted by the lead scientists present, and material to be studied outside Indonesia were placed in separate drums to be prepared for loan to Singapore. These would then only be unpacked and re-sorted in Singapore together with the Indonesian lead scientists. Material that was not identified for immediate study (i.e., in the cases where no Indonesian or Singapore scientist is working on the material) were retained in LIPI for future joint activities.

RESEARCH OUTCOMES

The intention has always been that the samples collected from the cruise be studied and published in open-access journals. Once the samples were sorted, and reached the specialist undertaking the work, a period of three years was set for the results to be published as far as possible. A preliminary report of the expedition proceedings and findings was submitted to the research office in LIPI one year after the cruise (Rahayu & Ng, 2019) as required under Indonesian law.

The first two years after the expedition were busy with academic exchanges to work on the material. As part of the agreements, 11 Indonesian scientists spent 2–4 weeks at the LKCNHM or St John's Island Marine Laboratory (TMSI) to work on the samples with their Singaporean counterparts. This included bulk sorting of sediment samples for those working on the smaller fauna. The first scientist visited Singapore in late April 2018, and the last one (as of writing) on 18 June 2019. In addition, the museum arranged to also bring in some specialists from other countries to Singapore, to work on the samples with the expedition scientists; notably for the deep-sea fish and crustaceans (five experts from Taiwan and Japan), echinoderms (one expert from the U.K.), and some crabs (two experts from Australia and France).

The intention was to publish a volume of research papers arising from the samples from the cruise in early 2021, but because of challenges posed by the COVID-19 pandemic, this had to be delayed to the third quarter of 2021. This proceedings volume now includes 26 academic papers, written by 49 scientists from nine countries. Researchers who were able to finish their studies before 2021 were encouraged to publish their results in good journals nevertheless (11 have been published up to the present volume). As such, a total of 36 papers have been published from material collected by SJADES 2018 (Table 2). At the time of writing, one new genus and 27 new species have been reported (Figs. 9–11, Table 3). In addition, the reports have also increased the known biodiversity for Indonesian seas, with 265 new records so far. The overall numbers will undoubtedly increase as not all the material has been studied and some studies are still ongoing.

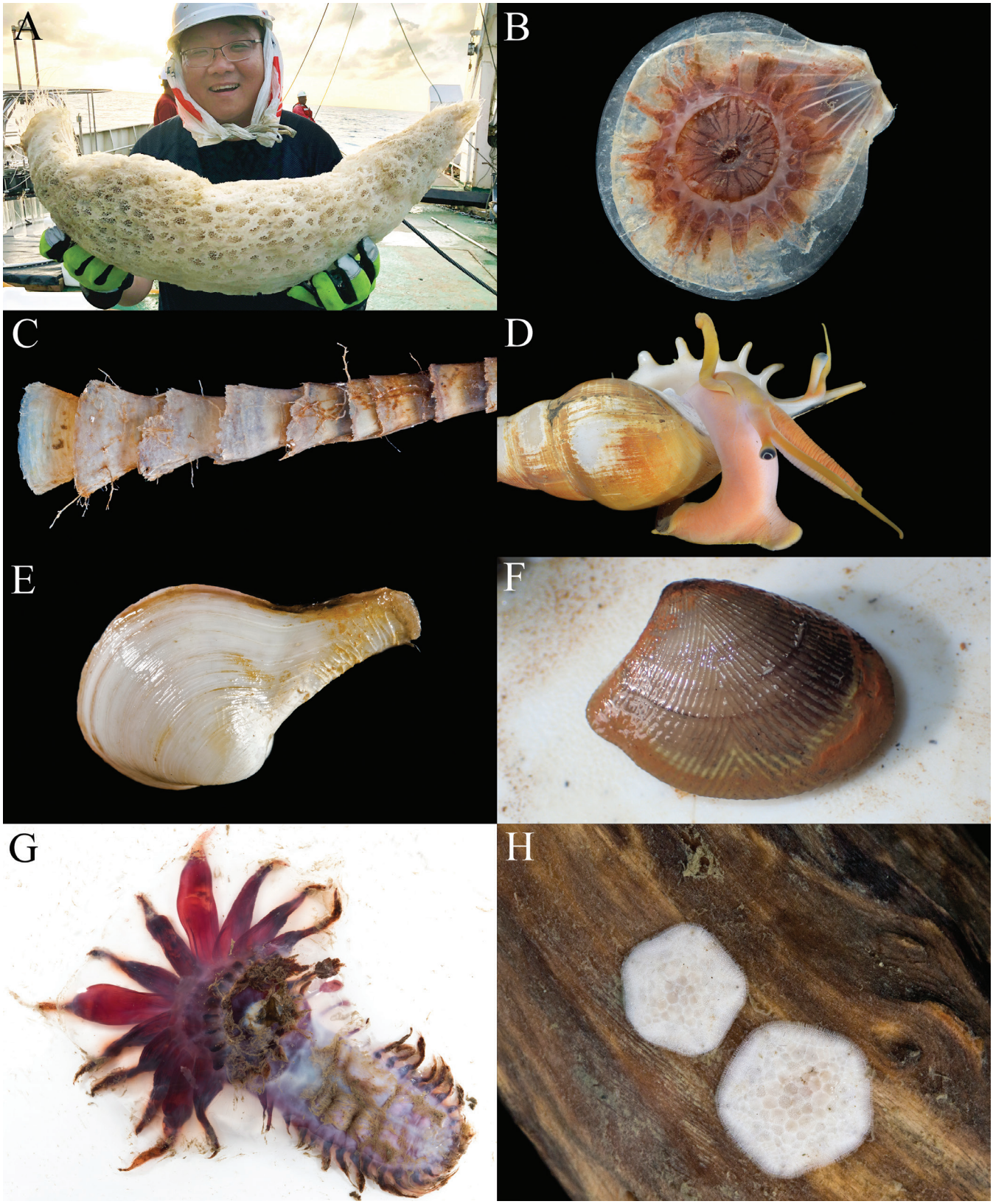

Fig. 9. A, new giant species of *Semperella* sponge (Pheronematidae, station CP23); B, unidentified sea anemone on a scallop (station CP04); C, hard tube of the polychaete worm *Paraescarpia echinospica* (Siboglinidae, station CP2); D, living *Tibia delicatula* (Rosterallidae, station CP56); E, *Cuspidaria* bivalve (Cuspidariidae, station CP14); F, deep-water clam *Acila fultoni* (Nuculidae, station CP55); G, freshly trawled swimming sea cucumber (Pelagoithuriidae, station CP33); H, wood-dwelling sea star *Caymanostella* (Caymanostellidae, station CP11).

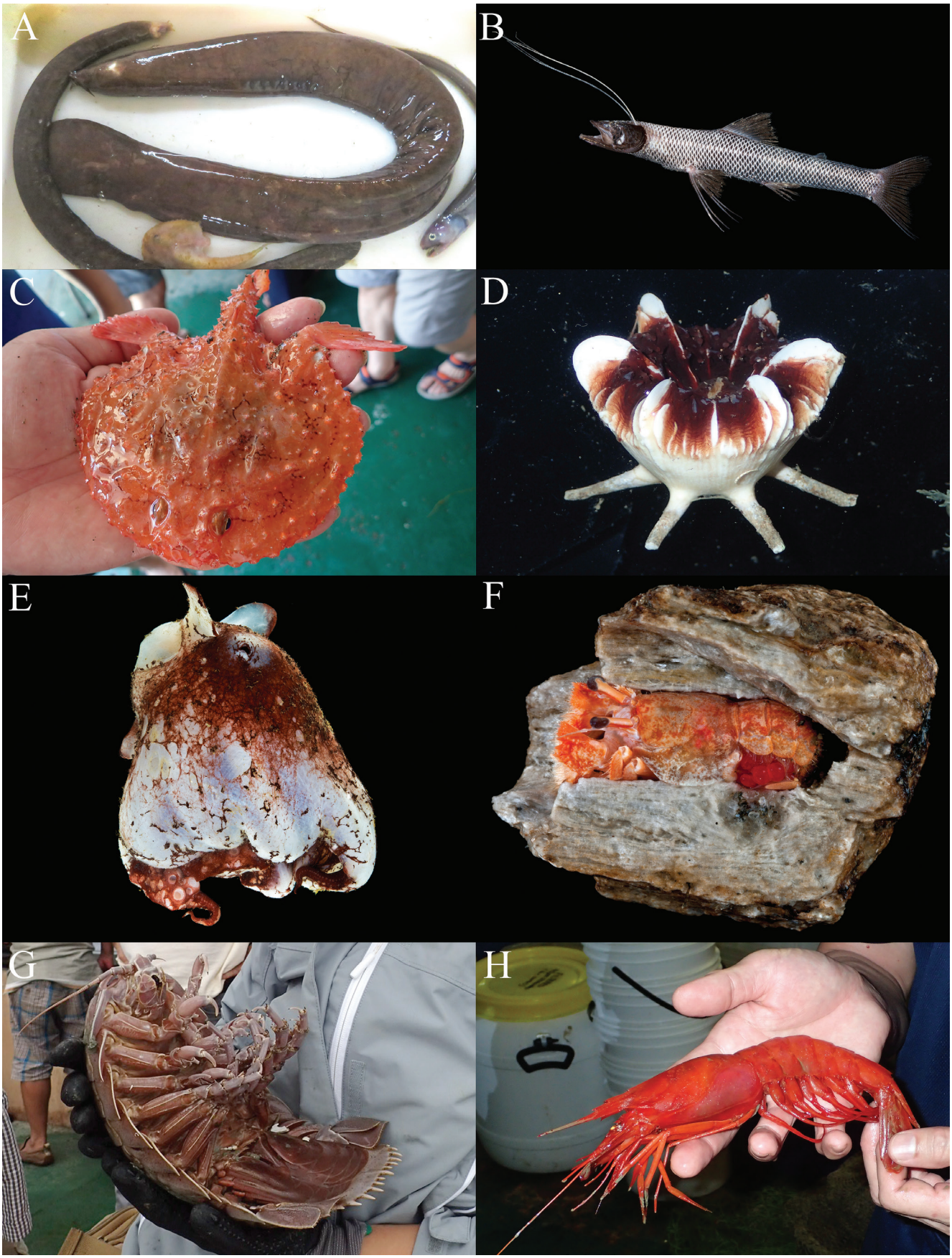

Fig. 10. A, large specimen of a myxinid hagfish (station CP47); B, fresh tripod fish (*Bathypterois atricolor*) (Ipnopidae, station CP25); C, fresh batfish *Halieutaea stellata* (Ogcocephalidae, station DW32); D, solitary deep-sea corals were common in some sites (*Stephanocyathus* sp., Caryophylliidae, station CP44); E, fresh specimen of dumbo octopus (probably *Grimpoteuthis* sp., Opisthoteuthidae, station CP25); F, *Bathycheles* sp., in a lump of limestone, they also use stone or bamboo for shelter (Pylochelidae, station CP7); G, freshly collected holotype male of *Bathynomus raksasa* (Bathynomidae, station CP13); H, large deep-water prawn, *Parahepomadus vaubani* (Aristeidae, station CP44).

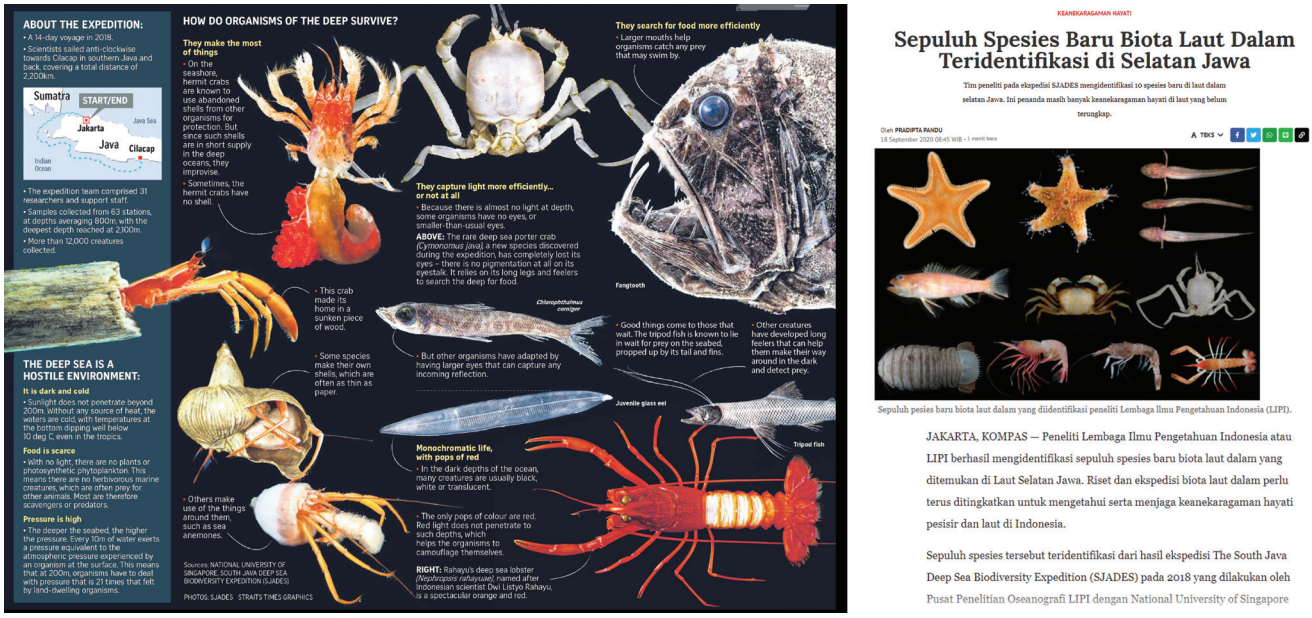

Fig. 11. Some of the interesting discoveries of the cruise as highlighted by a Singapore newspaper ('The Straits Times') in 2020 (left) and an Indonesian newspaper ('Kompas') in 2020 (right).

PUBLICITY

A commercial maritime satellite internet system using VSAT (very small aperture terminal) was set up on *Baruna Jaya VIII* for the duration of the expedition, which was in turn connected to a WiFi internet router on the boat. As such, the scientists on board could stay in close touch with their home institutions in the Research Center for Oceanography office at Ancol as well as LKCNHM and TMSI in Singapore. The system also allowed scientists to communicate with their families and other scientists as necessary. The chief scientists also established a small team of young and more media-savvy scientists to communicate with the press offices of their home country. This allowed scientific developments during the cruise as well as new discoveries to be shared regularly with schools and the general public. Over 20 formal broadcasts and articles were released (excluding the very extensive social media) during the cruise (Fig. 11).

FUTURE DEVELOPMENT

The successful conclusion of the SJADES 2018 cruise has resulted in further discussions between the managers and scientists of both countries to see if more areas of scientific collaborations are possible. In November 2019, LIPI and the National Research Foundation of Singapore signed a Memorandum of Understanding to further collaborations in marine research infrastructure and biodiversity. This bodes well for future bilateral studies.

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Table 1. List of scientists and other participants (see also Chim et al., 2021, this volume).

No	Name	Nationality	Affiliation	Role/expertise
1	Dwi Listyo Rahayu	Indonesia	LIPI	Chief Scientist/Crustacea
2	Dharma Arif Nugroho	Indonesia	LIPI	Scientist/Crustacea
3	Ernawati Widyastuti	Indonesia	LIPI	Scientist/Crustacea
4	Hadiyanto Hadiyanto	Indonesia	LIPI	Scientist/Polychaeta
5	Teguh Peristiwady	Indonesia	LIPI	Scientist/Fishes
6	Selvia Oktaviyani	Indonesia	LIPI	Scientist/Fishes
7	Ismiliana Wirawati	Indonesia	LIPI	Scientist/Echinoderms
8	Indra Bayu Vimono	Indonesia	LIPI	Scientist/Echinoderms
9	Nurul Fitriya	Indonesia	LIPI	Scientist/ Meiofauna
10	Eko Burhanuddin	Indonesia	University of Indonesia	Scientist/Crustacea
11	M. Masrur Islami	Indonesia	LIPI	Scientist/Mollusca
12	Praditya Avianto	Indonesia	LIPI	Geologist/Mapper
13	Riyana Subandi	Indonesia	LIPI	Technician
14	Peter K. L. Ng	Singapore	NUS	Chief Scientist/Crustacea
15	Jose C. E. Mendoza	Singapore	NUS	Scientist/Crustacea
16	Tan Heok Hui	Singapore	NUS	Scientist/Fishes
17	Tan Siong Kiat	Singapore	NUS	Scientist/Mollusca
18	Chim Chee Kong	Singapore	NUS	Scientist/Crustacea
19	Lim Swee Cheng	Singapore	NUS	Scientist/Porifera
20	Samantha Tong	Singapore	NUS	Scientist/Meiofauna
21	Gan Bin Qi	Singapore	NUS	Scientist/Meiofauna
22	Tan Koh Siang	Singapore	NUS	Scientist/Mollusca
23	Chuar Cheah Hoay	Singapore	NUS	Scientist/Polychaeta
24	Iffah Binte Iesa	Singapore	NUS	Scientist /Cnidaria
25	Muhammad Dzaki bin Safaruan	Singapore	NUS	Museum Specialist
26	Chan Tin-Yam	Taiwan	NTOU	Scientist/Crustacea
27	Lin Chia-Wei	Taiwan	NTOU	Scientist/Crustacea
28	Yang Chien-Hui	Taiwan	NTOU	Scientist/Crustacea
29	Bertrand Richer de Forges	France	IRD	Scientist/Advisor
30	Rene Ong	Singapore	NUS	Photographer
31	Feri Gultom	Indonesia	Indonesian Navy	Security

Table 2. List of refereed publications arising from SJADES 2018 material.

Publications

Ahyong ST (2021) Stomatopod Crustacea of the 2018 SJADES biodiversity cruise, southwestern Indonesia. In: Rahayu DL & Tan KS (eds.) South Java Deep-Sea (SJADES) Biodiversity Expedition 2018. Raffles Bulletin of Zoology, Supplement 36: 101–104.

Ahyong ST & Mendoza JCE (2021) Cyclodorippidae of the SJADES 2018 biodiversity cruise in Indonesia (Crustacea: Decapoda: Brachyura). In: Rahayu DL & Tan KS (eds.) South Java Deep-Sea (SJADES) Biodiversity Expedition 2018. Raffles Bulletin of Zoology, Supplement 36: 258–264.

Ahyong ST, Santanu M & Ng PKL (2020) Cymonomid crabs from southwestern Indonesia and redescription of *Cymonomus andamanicus* Alcock, 1905. Raffles Bulletin of Zoology, 68: 62–69.

Chan TY, Komai T & Yang CH (2021) A list of shrimps and lobsters (Crustacea: Decapoda: Dendrobranchiata, Caridea, Stenopodidea, Polychelida, Astacidea, Achelata, Axiidea, Gebiidea) photographed during the SJADES 2018 biodiversity cruise. In: Rahayu DL & Tan KS (eds.) South Java Deep-Sea (SJADES) Biodiversity Expedition 2018. Raffles Bulletin of Zoology, Supplement 36: 119–161.

Chang S-C, Chan T-Y & Kumar AB (2020) A new clawed lobster of the genus *Nephropsis* Wood-Mason, 1872 (Crustacea: Decapoda: Nephropidae) from the Indonesian deep-sea cruise, SJADES 2018. Raffles Bulletin of Zoology, 68: 50–55.

Chim CK & Bird GJ (2021) Tanaidacean (Crustacea: Peracarida) assemblage collected during the South Java Deep-Sea (SJADES) Biodiversity Expedition with an overview of tanaid diversity in Indonesia. In: Rahayu DL & Tan KS (eds.) South Java Deep-Sea (SJADES) Biodiversity Expedition 2018. Raffles Bulletin of Zoology, Supplement 36: 78–94.

Chim CK & Tong SJW (2021) Three new species of agathotanaids (Tanaidacea: Paratanaoidea: Tanaidomorpha) from southwestern Java, Indonesia, Indian Ocean with notes on the global distribution and diversity of Agathotanaidae. Zootaxa, 5004(1): 67–106.

Chuar CH, Hadiyanto H & Lee YL (2021) Annotated checklist of polychaetes from deeper waters of the Sunda Strait and eastern Indian Ocean off southwest Java, Indonesia. In: Rahayu DL & Tan KS (eds.) South Java Deep-Sea (SJADES) Biodiversity Expedition 2018. Raffles Bulletin of Zoology, Supplement 36: 47–77.

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Ho HC, Oktaviyani S, Peristiwady T & Tan HH (2021) A rare species of scaled barracudina (Paralepididae) newly collected from the eastern Indian Ocean off Indonesia. In: Rahayu DL & Tan KS (eds.) South Java Deep-Sea (SJADES) Biodiversity Expedition 2018. Raffles Bulletin of Zoology, Supplement 36: 486–490.

Ho HC, Oktaviyani S, Peristiwady T, Lee MY, Jaafar Z, Lim K & Tan HH (2021) Preliminary checklist of fishes obtained from South Java Deep-Sea (SJADES) Biodiversity Expedition 2018. In: Rahayu DL & Tan KS (eds.) South Java Deep-Sea (SJADES) Biodiversity Expedition 2018. Raffles Bulletin of Zoology, Supplement 36: 496–526.

Iesa I & Sianturi OR (2021) Medusae and polyps (Scyphozoa: Coronatae) collected from the South Java Deep-Sea (SJADES) Biodiversity Expedition 2018. In: Rahayu DL & Tan KS (eds.) South Java Deep-Sea (SJADES) Biodiversity Expedition 2018. Raffles Bulletin of Zoology, Supplement 36: 29–38.

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Komai T, Chang S-C & Chan T-Y (2019) A new deep-sea species of the caridean shrimp genus *Lebbeus* White, 1847 (Crustacea: Decapoda: Thoridae) from southern Java, Indonesia. Raffles Bulletin of Zoology, 67: 150–159.

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Lim SC & Setiawan E (2021) A new *Semperella* (Hexactinellida: Amphidiscosida: Pheronematidae) from Indonesia, Indian Ocean. In: Rahayu DL & Tan KS (eds.) South Java Deep-Sea (SJADES) Biodiversity Expedition 2018. Raffles Bulletin of Zoology, Supplement 36: 23–28.

Matsunuma M, Tan HH & Peristiwady T (2019) *Chelidoperca flavolineata*, a new species of perchlet (Perciformes: Serranidae) from Indonesia and the first Indonesian record of *C. maculicauda*. Ichthyological Research, 67: 308–319. doi: 10.1007/s10228-019-00729-2

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Mendoza JCE, Richer de Forges B, Safaruan MD & Ng PKL (2021) Checklist of the Brachyura (Crustacea: Decapoda) collected by the SJADES 2018 biodiversity cruise in the Sunda Strait and southwestern Java, Indonesia. In: Rahayu DL & Tan KS (eds.) South Java Deep-Sea (SJADES) Biodiversity Expedition 2018. Raffles Bulletin of Zoology, Supplement 36: 277–304.

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Publications

Ng PKL & Rahayu DL (2020) A synopsis of *Typhlocarcinops* Rathbun, 1909 (Crustacea: Decapoda: Brachyura: Pilumnidae), with descriptions of nine new species from the Indo-West Pacific. Zootaxa, 4788(1): 1–100.

Ng PKL & Rahayu DL (2021) On the Pilumnidae (Crustacea: Brachyura: Pilumnoidea) collected during the SJADES 2018 biodiversity cruise in Indonesia, with description of a new species of *Pilumnus*. In: Rahayu DL & Tan KS (eds.) South Java Deep-Sea (SJADES) Biodiversity Expedition 2018. Raffles Bulletin of Zoology, Supplement 36: 265–276.

Okanishi M, Matsuo T & Fujita T (2021) Redescription of *Ophiolipus levis* (Echinodermata: Ophiuroidea) collected from deep waters in the Sunda Strait. In: Rahayu DL & Tan KS (eds.) South Java Deep-Sea (SJADES) Biodiversity Expedition 2018. Raffles Bulletin of Zoology, Supplement 36: 426–434.

Oktaviyani S, Peristiwady T, Tan HH & Ho HC (2021) New record of *Parascolopsis rufomaculata* Russell, 1986 (Perciformes: Nemipteridae) from Indonesian waters, Eastern Indian Ocean. In: Rahayu DL & Tan KS (eds.) South Java Deep-Sea (SJADES) Biodiversity Expedition 2018. Raffles Bulletin of Zoology, Supplement 36: 491–495.

Pratama GA, Obuchi M & Fujita T (2021) An annotated checklist of crinoids (Echinodermata) collected by the South Java Deep-Sea biodiversity cruise 2018. In: Rahayu DL & Tan KS (eds.) South Java Deep-Sea (SJADES) Biodiversity Expedition 2018. Raffles Bulletin of Zoology, Supplement 36: 435–450.

Rahayu DL (2021) Hermit crabs of the family Diogenidae (Crustacea: Decapoda: Anomura) collected during the South Java Deep-Sea 2018 biodiversity cruise in Indonesia, with description of two new species. In: Rahayu DL & Tan KS (eds.) South Java Deep-Sea (SJADES) Biodiversity Expedition 2018. Raffles Bulletin of Zoology, Supplement 36: 162–180.

Richer de Forges B, Lee BY & Ng PKL (2021) Spider crabs from the SJADES 2018 biodiversity cruise in Indonesia, with descriptions of one new genus and five new species, including one from Western Australia (Crustacea: Brachyura: Majoidea). In: Rahayu DL & Tan KS (eds.) South Java Deep-Sea (SJADES) Biodiversity Expedition 2018. Raffles Bulletin of Zoology, Supplement 36: 211–257.

Sidabalok CM, Wong HP-S & Ng PKL (2020) Description of the supergiant isopod *Bathynomus raksasa* sp. n. from southern Java, the first record of the genus from Indonesia (Crustacea: Isopoda: Cirolanidae). Zookeys, 947: 39–52.

Tan KS (2021) Deep-sea Protobranchia (Bivalvia) from the SJADES biodiversity cruise, with a description of a new species of *Propeleda* (Nuculanidae). In: Rahayu DL & Tan KS (eds.) South Java Deep-Sea (SJADES) Biodiversity Expedition 2018. Raffles Bulletin of Zoology, Supplement 36: 346–385.

Tan SK & Islami MM (2021) A preliminary account of the Gastropoda (Mollusca) collected by the South Java Deep-Sea (SJADES) Biodiversity Expedition 2018. In: Rahayu DL & Tan KS (eds.) South Java Deep-Sea (SJADES) Biodiversity Expedition 2018. Raffles Bulletin of Zoology, Supplement 36: 305–345.

Tong SJW, Fitrya N, Gan BQ & Tan YK (2021) First insights into the community structure of the deep-sea benthic metazoan meiofauna off southwest Java (eastern Indian Ocean). In: Rahayu DL & Tan KS (eds.) South Java Deep-Sea (SJADES) Biodiversity Expedition 2018. Raffles Bulletin of Zoology, Supplement 36: 469–485.

Vimono IB & Lane DJW (2021) Asteroidea (Echinodermata) of the South Java Deep-Sea biodiversity cruise, Indonesia. In: Rahayu DL & Tan KS (eds.) South Java Deep-Sea (SJADES) Biodiversity Expedition 2018. Raffles Bulletin of Zoology, Supplement 36: 386–425.

Widyastuti E & Lin CW (2021) Deep-sea squat lobsters (Crustacea: Decapoda: Anomura: Galatheidae, Munididae and Munidopsidae) from the SJADES 2018 biodiversity cruise. In: Rahayu DL & Tan KS (eds.) South Java Deep-Sea (SJADES) Biodiversity Expedition 2018. Raffles Bulletin of Zoology, Supplement 36: 105–118.

Wirawati I & Setyastuti A (2021) Holothuroids collected during the South Java Deep-Sea biodiversity cruise 2018, with emphasis on the order Elasipodida. In: Rahayu DL & Tan KS (eds.) South Java Deep-Sea (SJADES) Biodiversity Expedition 2018. Raffles Bulletin of Zoology, Supplement 36: 451–468.

Wong HPS & Sidabalok C (2021) A new species of deep-sea isopod in the genus *Dolichiscus* Richardson, 1913 (Crustacea: Isopoda: Austrarcturellidae) from Indonesia. In: Rahayu DL & Tan KS (eds.) South Java Deep-Sea (SJADES) Biodiversity Expedition 2018. Raffles Bulletin of Zoology, Supplement 36: 95–100.

Table 3. List of new genera and species from SJADES 2018 material reported thus far.

Porifera (Hexactinellida) (1 taxon)
Semperella sjades Lim & Setiawan, 2021

Annelida (Polychaeta) (1 taxon)
Caulleryaspis sundaensis Chuar & Salazar-Vallejo, 2021

Mollusca (Bivalvia) (1 taxon)
Propeleda dirham Tan, 2021

Echinodermata (Asteroidea) (2 taxa)
Dipsacaster fisheri Lane & Vimono, 2020
Pteraster sjadesensis Lane & Vimono, 2020

Crustacea (Isopoda) (2 taxa)
Bathynomus raksasa Sidabalok, Wong & Ng, 2020
Dolichiscus selatan Wong & Sidabalok, 2021

Crustacea (Tanaidacea) (3 taxa)
Agathotanais cilacapicus Chim & Tong, 2021
Bunburia javanica Chim & Tong, 2021
Paranarthrura sundaensis Chim & Tong, 2021

Crustacea (Decapoda) (15 taxa)
Diogenes berduri Rahayu, 2021
Paguristes rectus Rahayu, 2021
Chimaerodinia Richer de Forges, Lee & Ng, 2021
Chimaerodinia musica Richer de Forges, Lee & Ng, 2021
Cymonomus java Ahyong, Santanu & Ng, 2020
Glyphocrangon serratirostris Komai, Yang & Chan, 2020
Lebbeus java Komai, Chang & Chan, 2020
Metacrangon latirostris Komai & Chan, 2020
Neophrys neptunus Richer de Forges, Lee & Ng, 2021
Nephropsis rahayuae Chang, Chan & Kumar, 2020
Pilumnus swajayai Ng & Rahayu, 2021
Samadinia jefrii Richer de Forges, Lee & Ng, 2021
Samadinia yoyoae Richer de Forges, Lee & Ng, 2021
Typhlocarcinops hadrotes Ng & Rahayu, 2020
Ketamia rising Ahyong & Mendoza, 2021
Oreotlos octavus Mendoza & Nugroho, 2021

Pisces (2 taxa)
Chelidoperca flavolineata Matsunuma, Tan & Peristiwady, 2019
Platygobiopsis hadiatyae Larson, Jaafar, Tan & Peristiwady, 2020