ANNEX: SPLENDID WONDERS OF THE DEEP SEAS OF WEST JAVA

Scientists who participated in the South Java Deep Sea Biodiversity Expedition 2018 (SJADES 2018) had collected more than 12,000 creatures during their 14-day voyage to survey the unexplored deep seas off the southern coast of West Java, Indonesia. Highlights of their discoveries as follows:

(A) Creatures New to Science

A Trifecta of Deep Sea Decorators

It was surprising that the expedition found three new species of bizarre looking spider crabs – all in the deep waters of southwestern Java. One species has blood-red eyes, fuzzy spines and a peculiar ear-like plate protecting its eyes. This small crab was found camouflaged with detritus, small zoanthid anemones and mud. A second rarer one is bright orange with many strong spines and only one specimen was found! A third seems to be associated with deep sea stalked sea lilies.

These three spider crabs were immediately recognised as unique species by Professor Peter Ng, chief scientist of the Singapore team and a well-known crab expert, and deep-sea expedition veteran Dr Bertrand Richer de Forges, both of whom have been studying this group of spider crabs for over three decades. Belonging to the genus *Rochinia*, which currently contains over 30 species with a wide diversity of body forms, from throughout the Atlantic, Indian and Pacific Oceans, these yet to be named species have close relatives from Australia, eastern Indonesia and Papua New Guinea.

This yet-to-be-named crab species was found camouflaged with detritus, small zoanthid anemones and mud. It has a distinctive plate which resembles over-sized ears adjacent to its red eyes.
(Credit: SJADES 2018)

Name: *Rochinia* new species “big ears” (Family Epialtidae)
Size: 6 cm (including legs)
Depth: More than 1,000 m
Date collected: 26 March 2018
Place collected: Sunda Straits

A stunning orange species now ascribed to *Rochinia* with many strong spines. Only one specimen of this rare species was obtained from southwestern Java.
(Credit: SJADES 2018)

Name: *Rochinia* new species “spiky” (Family Epialtidae)
Size: 8 cm (including legs)
Depth: 800 m
Date collected: 27 March 2018
Place collected: Southwestern Java

Amazingly, scientists found a third new species of *Rochinia*, a more elongated form, from the depths of southwestern Java. Several specimens were found clinging to stalked sea lilies, a living fossil. Scientists are still not sure if this is their only habitat but they do believe these crabs have a preference for these sea lilies.

Name: *Rochinia* new species “clinger” (Family Epialtidae)
Size: 6 cm (including legs)
Depth: Between 800 m to 1,200 m
Date collected: 26-28 March 2018
Place collected: Southwestern Java

Hermit Crab

This distinctive new species of *Paguristes* hermit crab has green eyes and orange banded pincers. (Credit: SJADES 2018)

Name: *Paguristes* new species (Family Diogenidae)
Size: 3 cm (including legs)
Depth: About 200 m
Date collected: 30 March 2018
Place collected: Sunda Straits

Paguristes is a large genus of mostly shallow water hermit crabs and are found in most oceans globally. There are few species in deeper waters, so the discovery of this beautiful new species is noteworthy. The bright green eyes and distinctly patterned granulated pincers are distinctive for this new species. Professor Dwi Listyo Rahayu, chief scientist of the Indonesian team, who is the world authority on this group of crabs and has published many papers on them, immediately recognised it as something she has never seen before and excitedly asked for it to be photographed as it was pulled out of the trawl!

Giant Sea Cockroaches

The expedition found a new species of *Bathynomus*, which is 30 cm in length. Also called giant sea cockroaches, they are important deep-sea scavengers. They feed on dead animals that sink to the ocean bottom, and are an integral part of the ecosystem there. However, *Bathynomus* has not been officially recorded in Indonesia before!

There are 18 species globally, 15 of which reside in the Indian and Pacific Oceans. Among these, the most famous are eight species which experts have called “supergiants” because they reach sizes of 50 cm in length.

The two chief scientists were excited and their check of the literature indicated that the “supergiant” species collected was quite different from known species and may well be new. This will be now studied by specialists from the two countries.

Expedition member Mr Muhammad Dzaki Bin Safaruan holding the newly discovered giant sea cockroach. (Credit: SJADES 2018)

Name: *Bathynomus* new species (Family Cirolanidae)
Size: 30 cm in length
Depth: 1,300 m
Date collected: 26 March 2018
Place collected: Sunda Strait

Shrimps and Lobsters Galore

Professor Chan Tin-Yam from the National Taiwan Ocean University, who is a world expert in deep-water shrimps and lobsters, participated in the expedition. He has collaborated with the Singapore team on crustacean studies and deep-water surveys over the last 25 years in many parts of the world and is a world authority on shrimps and lobsters. During the expedition, he worked with two carcinologists from Indonesia - Ms Ernawati Widyastuti from LIPI and Mr Eko Burhanuddin from the University of Indonesia. Professor Chan's extensive knowledge allowed the expedition team to quickly identify many of the species as they were caught. By the end of the expedition, Professor Chan and his team have found 164 species of shrimps, lobsters and squat lobsters, among which five are new species and 25 are new records for Indonesia.

An exquisitely sculptured shiny-eyed shrimp collected by scientists. These are bottom dwelling shrimps which possess unique mechanisms to lock their abdomens to protect against predators.
(Credit: SJADES 2018)

Name: *Glyphocrangon* new species (Family Glyphocrangonidae)
Size: 8 cm long
Depth: 1,013 m
Date collected: 31 March 2018
Place collected: Southwestern Java

This was among the 20 species of squat lobsters found by scientists on the expedition. This beautiful species has a distinctive zebra pattern on its body.
(Credit: SJADES 2018)

Name: *Munidopsis* new species (Family Galatheidae)
Size: 8 cm (including pincers)
Depth: 525 m
Date collected: 29 March 2018
Place collected: Southwestern Java

(B) Interesting and Rare Creatures

Hermit Crabs

Hermit crabs live solitary lives protected by shells. They are a major component of the deep-sea fauna, and they appear in almost every catch, sometimes in huge numbers. However, in the deep-sea, hermit crabs come in a surprising diversity of form, shape and sizes, and they do not just rely on old shells.

During the expedition, Professor Dwi Listyo Rahayu, chief scientist for the Indonesia team and a renowned expert on hermit crabs, discovered over 40 hermit crab species. Many of the species look nothing like the typical hermit crabs found in shallow waters and on land. Some are very skinny because they live in hollow twigs. Some resemble small lobsters – they burrow into wood. Others live inside swollen sea anemones.

This slender twig-dwelling hermit crab with a straight body has adapted its body to live inside the narrow cavities of hollow twigs and sticks. It relies on sunken wood as a major source of food or substrate. (Credit: SJADES 2018)

Name: *Xylopagurus* cf. *philippinensis* (Family Paguridae)
Size: 12 cm to 15 cm (full length)
Depth: 370 m
Date collected: 25 March 2018
Place collected: South of Java

Fishes

The expedition team collected over 80 species of fish. While most were from more than 500 m deep, the team obtained several interesting species from waters at about 200 m in depth, i.e. in the grey zone between deep and shallow waters.

The two ichthyologists in-charge of handling the fish collections, Dr Teguh Peristiwady from LIPI and Dr Tan Heok Hui from the NUS Lee Kong Chian Natural History Museum, with assistance from Ms Selvia Oktaviani from LIPI, sorted and preserved over 1,000 specimens collected.

Highlights:

- **Gobies** are mostly found in shallow intertidal waters, but *Platygobiopsis* sp. (Family Gobiidae) can be found in much deeper waters of almost 200 m, like the one depicted in the photograph, which was collected from the Sunda Strait.

  This strange goby is flat-headed, and has very enlarged otoliths (ear stones for balance) behind the eyes. It is also the first time this species is recorded in the Indian Ocean. There are currently three known species which are from Flores, Vietnam and Japan. Scientists are currently examining whether this specimen is one of the known species, or is new to science.

(Credit: SJADES 2018)

Name: *Platygobiopsis* sp. (maybe new species) (Family Gobiidae)
Size: 5 cm to 6 cm long
Depth: 182 m
Date collected: 27 March 2018
Place collected: Sunda Strait

- The **red mini-grouper** *Chelidoperca margaritifera* (Family Serranidae) is historically interesting as it was first collected by the Siboga Expedition team, and described by the famous Dutch ichthyologist Max Weber in 1913. It was first found near Misool Island in eastern Indonesia and has since been reported from Australia. The discovery of more specimens of this beautiful species in Java, which is well west of its known range, is of great interest and constitutes as a major find.

(Credit: SJADES 2018)

Name: *Chelidoperca margaritifera* (Family Serranidae)
Size: 10 cm to 12 cm long
Depth: About 165 m
Date collected: 30 March 2018
Place collected: Southwestern Java

Sea Stars

Peculiar sea stars found associated with sunken wood deep in southwestern Java, which were initially identified as *Xyloplax* (family Xyloplacidae, Infraclass Concentricycloidea), are actually members of the family Caymanostellidae.

Mr Indra Bayu Vimono from LIPI, who had been sorting the deep-water sea stars from the expedition, was intrigued by numerous specimens of a small petaloid sea star (photograph below) he found on pieces of wood and even coal.

An unusual *Caymanostella* wood-dwelling sea star, possibly new to science, found deep in southwestern Java
(Credit: SJADES 2018)

Name: Deep Sea Star (Family Caymanostellidae)
Size: Up to 1 cm in diameter
Depth: Between 500 m to 1,200 m
Date collected: 25-31 March 2018
Place collected: Southwestern Java

While initially thought to be a peculiar sea star known as *Xyloplax*, Dr Christopher Mah of the Smithsonian Institution, who saw the photographs of the expedition on the web kindly advised the expedition team otherwise by email. Although these small sea stars are superficially very similar, the Javanese ones actually belong to the sea star order Order Velatida! Dr Mah, who has studied both xyloplacids and caymanostellids, knows them well, and is currently involved in a study of the Caymanostellidae, which contains two genera and six species from around the world. He shared with the expedition team that he thinks the present Javanese species is possibly a new species of *Caymanostella*! This is exciting!

The Indonesian echinoderm team will now explore how best to work with Dr Mah to see what these curious wood-dwelling sea stars actually are! Nevertheless, it is another notable addition to the Indonesian echinoderm fauna.

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