RAFFLES BULLETIN OF ZOOLOGY Supplement No. **36**: 78–94
Date of publication: 6 August 2021
DOI: 10.26107/RBZ-2021-0031
http://zoobank.org/urn:lsid:zoobank.org:pub:C6E59C00-3DDB-47E5-A238-0BB3CC50EC68

Tanaidacean (Crustacea: Peracarida) assemblage collected during the South Java Deep-Sea (SJADES) Biodiversity Expedition with an overview of tanaid diversity in Indonesia

Chim Chee Kong[1,2,3*] & Graham J. **Bird**[4]

Abstract. This is the first quantitative study of deep-sea tanaids in Southeast Asia. We report 59 tanaidacean species from 514 specimens, which were collected from five stations in southwest Java at depths between 377–2,355 m. These species, belonging to eight Paratanaoidea (Tanaidomorpha) families are all recorded from Indonesia for the first time. When compared to similar studies conducted in bathyal depths, the tanaidacean assemblage in the present study area was not only diverse but also abundant with densities of up to 607 ind. m^{-2}. A checklist of tanaid species that were previously recorded from Indonesia is also provided.

Key words. Arthropoda, Tanaidomorpha, Paratanaoidea, Indo-West Pacific, Southeast Asia

INTRODUCTION

The tanaidacean assemblage of Indonesia is diverse and the most studied among Southeast Asian countries, where very little has been done to assess the biodiversity of this group of small, but common, benthic infaunal crustaceans. A total of 36 species from two suborders, four superfamilies, and 11 families (Table 1) has been recorded from about five studies or expeditions, totalling 14 localities (Fig. 1) and 46 stations (Table 2) in Indonesia. However, only eight (22%) of these species were from the deep sea, collected by Dutch, Danish, and Russian expeditions between the years 1899 and 1975. Apart from their identities, very little is known about their abundances or community structure, as most studies of these animals in Southeast Asia have been qualitative in scope.

In 2018, Singapore and Indonesia jointly organised the South Java Deep-Sea (SJADES) Biodiversity Expedition 2018. Box core samples from this cruise provided the opportunity to perform quantitative analysis on the tanaidacean assemblage in this biologically rich region. The objectives of this study were to provide a preliminary species list of tanaids found on the seafloor, as well as their abundance, species richness, and diversity in the study areas.

[1]St. John's Island National Marine Laboratory, Tropical Marine Science Institute, National University of Singapore, 18 Kent Ridge Road, Singapore 119227; Email: tmscck@nus.edu.sg (*corresponding author)

[2]Keppel-NUS Corporate Laboratory, Faculty of Engineering, National University of Singapore, Blk E1A, #03-03, 1 Engineering Drive 2, Singapore 117576

[3]Department of Biological Sciences, National University of Singapore, 16 Science Drive 4, Singapore 117558

[4]Waikanae, Kāpiti Coast, New Zealand; Email: apseudes@outlook.com

ISSN 2345-7600 (electronic) | ISSN 0217-2445 (print)

MATERIAL AND METHODS

Material for this study was collected from southwestern Java, Indonesia (Fig. 1) during the SJADES research cruise, which was conducted from 23 March to 5 April 2018. Sediment samples were obtained by a box corer (sample box dimensions 60L × 50W × 50H cm; i.e., 0.3 m^2) at five stations between depths of 377–2,355 m (Table 3; see also Chim et al., 2021). The samples from all stations, except CR09, were sectioned into 0–2 cm, 2–5 cm, and 5–10 cm layers. These fractions were passed through sieves with 300-µm followed by 250-µm mesh to remove fine sediment. The samples were first fixed in 10% borax-buffered formalin, transferred to 75–80% denatured ethanol for preservation, and then stained with Rose Bengal. In the laboratory, the samples were sieved again using the same mesh sizes. Macrofauna were further isolated from the retained sediments and sorted into their respective taxa. Tanaids were examined and measured under the Leica M205 C stereomicroscope. Body length of tanaids were measured from the anterior end of the rostrum to the distal end of the pleotelson. Dissections were performed only on specimens of the three species *Agathotanais cilacapicus* Chim & Tong, 2021, *Bunburia javanica* Chim & Tong, 2021, and *Paranarthrura sundanensis* Chim & Tong, 2021, which were recently described in a separate study. Due to the poor quality of the cores from stations CR09 and CR36, quantitative analyses (e.g., tanaid densities) were not performed on these samples.

RESULTS

Abundance. A total of 514 tanaid individuals was collected from five box core stations. Tanaids were most abundant in station CR21 with 182 individuals while only one tanaid was collected from CR36 (i.e., an adult from 5–10 cm layer,

Table 1. Tanaidacean species previously recorded from Indonesia.

No.	Species	Locality	Reference
	Suborder Apseudomorpha		
	Superfamily Apseudoidea		
	Family Apseudidae		
	Subfamily Apseudinae		
1.	*Bunakenia indonesiana* Guţu, 1995	Celebes Sea, Bunaken Island, Station 5	Guţu, 1995, 1997
2.	*Zoidbergus lagenirostris* (Lang, 1968)	Sunda Trench, Station 471	Lang, 1968
	Subfamily Leviapseudinae		
3.	*Eliomosa sibogae* (Nierstrasz, 1913)	Banda Sea, Station 223	Nierstrasz, 1913
4.	*Leviapseudes weberi* (Nierstrasz, 1913)	Banda Sea, Stations 223 and 241	Nierstrasz, 1913
	Family Kalliapseudidae		
	Subfamily Kalliapseudinae		
5.	*Kalliapseudes primitivus* Nierstrasz, 1913	Between Geser Island and Ceram Sea, Station 172	Nierstrasz, 1913; Drumm & Heard, 2011
	Family Metapseudidae		
	Subfamily Synapseudinae		
6.	*Synapseudes tomescui* Guţu, 2006	Celebes Sea, Bunaken Island, Station 14	Guţu, 2006
	Family Pagurapseudidae		
	Subfamily Hodometricinae		
7.	*Indoapseudes secundus* Guţu, 1997	Celebes Sea, Bunaken Island, Station 12	Guţu, 1997
	Subfamily Pagurapseudinae		
8.	*Macrolabrum aenigmaticus* Guţu, 1997	Bali Sea, Bali Island, Sanur Beach	Guţu, 1997
9.	*Macrolabrum rugosus* Guţu, 1997	Celebes Sea, Bunaken Island, Station 17	Guţu, 1997
10.	*Macrolabrum trifidus* Guţu, 1997	Bali Sea, Bali Island, Sanur Beach	Guţu, 1997
11.	*Pagurapseudes longicarpus* Guţu, 1997	Celebes Sea, Bunaken Island, Station 23	Guţu, 1997
12.	*Pagurapseudes pangtiruthuli* Guţu, 1992	Bali Sea, Bali Island, Sanur Beach	Guţu, 1992, 1997
		Java Sea, Pari Island, Station 2	Guţu, 1997
13.	*Pagurapseudes razvani* Guţu, 1997	Celebes Sea, Bunaken Island, Station 21	Guţu, 1997
		Makassar Strait, Bontang, Stations 6, 8 and 10	Guţu, 1997
	Family Parapseudidae		
	Subfamily Parapseudinae		
14.	*Brachylicoa indonesiana* Guţu, 2006	Celebes Sea, Bunaken Island, Station 25	Guţu, 2006
15.	*Parapseudes trispinosus* Guţu, 1998	Makassar Strait, Bontang, Station 1	Guţu, 1998
16.	*Pseudohalmyrapseudes linnaei* Bamber, 2008	Sulawesi, Gua Dadeleang	Bamber, 2008
	Suborder Tanaidomorpha		
	Superfamily Neotanaoidea		
	Family Neotanaidae		
17.	*Neotanais pfaffioides* Lang, 1968	Sunda Trench, Station 471	Lang, 1968
	Superfamily Paratanaoidea		
	Family Agathotanaidae		
18.	*Paragathotanais typicus* Lang, 1971	Banda Sea, Station 7229	Kudinova-Pasternak, 1977
	Family Akanthophoreidae		
19.	*Parakanthophoreus longiremis* (Lilljeborg, 1864)	Sunda Trench, Station 5618	Kudinova-Pasternak, 1976, 1977
	Family Leptocheliidae		
	Subfamily Konariinae		
20.	*Konarus crassicornis* (Stebbing, 1905)	Flores Sea, Postillon Islands, Anchorage off Pulu Sarassa, Station 43	Nierstrasz, 1913

No.	Species	Locality	Reference
	Subfamily Leptocheliinae		
21.	*Alloleptochelia heardi* Guţu, 2016	Celebes Sea, Bunaken Island, Stations 2 and 14	Guţu, 2016
22.	*Alloleptochelia helenae* (Guţu, 2011)	Celebes Sea, Bunaken Island, Stations 2, 5, 6, 9, 13, 14, 17, 20, 23, 25, 30, 31, 32 and 35	Guţu, 2011
		Java Sea, Pari Island, Station 2	Guţu, 2011
		Makassar Strait, Bontang, Station 8	Guţu, 2011
23.	*Alloleptochelia monotricha* Guţu, 2016	Celebes Sea, Bunaken Island, Stations 4, 6, 9, 13 and 30	Guţu, 2016
24.	*Chondrochelia andersoni* Guţu, 2016	Celebes Sea, Bunaken Island, Stations 2, 6, 14, 27 and 30	Guţu, 2016
25.	*Chondrochelia baliensis* Guţu, 2016	Bali Sea, Bali Island, Sanur Beach	Guţu, 2016
26.	*Chondrochelia dentitruncata* Guţu, 2016	Java Sea, Pari Island, Station 3	Guţu, 2016
27.	*Chondrochelia distincta* Guţu, 2016	Celebes Sea, Bunaken Island, Stations 2, 3, 7, 11, 13, 14, 16, 17, 19, 20, 22, 25, 30, 31 and 32	Guţu, 2016
28.	*Ektraleptochelia oculifurcillata* (Guţu, 2016)	Celebes Sea, Bunaken Island, Stations 2, 14, 17, 19, 21, 25, 31, 32 and 34	Guţu, 2016
29.	*Kalloleptochelia robusta* Guţu, 2016	Celebes Sea, Bunaken Island, Stations 2 and 14	Guţu, 2016
30.	*Leptochelia splendida* Guţu, 2016	Celebes Sea, Bunaken Island, Stations 13, 16, 19 and 32	Guţu, 2016
		Makassar Strait, Bontang, Station 10	Guţu, 2016
31.	*Makassaritanais angustus* Guţu, 2012	Makassar Strait, Bontang, Station 12	Guţu, 2012
32.	*Neoleptochelia javaensis* Guţu, 2011	Java Sea, Pari Island, Station 4	Guţu, 2011
		Makassar Strait, Bontang, Station 6	Guţu, 2011
33.	*Poorea obscurus* Guţu, 2016	Celebes Sea, Bunaken Island, Station 27	Guţu, 2016
	Subfamily Metaleptocheliinae		
34.	*Metaleptochelia vestpacifica* Guţu, 2016	Celebes Sea, Bunaken Island, Stations 5, 23, 28, 30 and 34	Guţu, 2016
	Family Pseudotanaidae		
35.	*Pseudotanais nordenskioldi* Sieg, 1977	Banda Sea, Weber Deep, Station 7271	Kudinova-Pasternak, 1977
	Superfamily Tanaidoidea		
	Family Tanaididae		
	Subfamily Tanaidinae		
36.	*Synaptotanais abyssorum* (Nierstrasz, 1913)	Makassar Strait, Station 88	Nierstrasz, 1913

300-µm sieve mesh size). The remaining box cores from stations CR09, CR42, and CR61 contained 163, 140 and 28 tanaids, respectively.

Most of the specimens (66.1%) were retained on the 300-µm mesh size sieve. The 250-µm mesh size sieve also captured a substantial proportion of tanaids, constituting 32.5%, 48.6%, 20.7% and 14.3% of the number of tanaids collected from the stations CR09, CR21, CR42, and CR61, respectively. About one third (31%) of the total were mancae, and 42% of these 161 individuals were obtained using the smaller mesh size. The mean body length of all tanaids was 1.2 ± 0.5 mm (range = 0.3–4.2 mm; n = 510), with the 300-µm mesh size (mean = 1.2 ± 0.7 mm; range = 0.3–4.2 mm; n = 337) capturing slightly longer tanaids than the 250-µm mesh size (mean = 0.9 ± 0.3 mm; range = 0.3–2.5 mm; n = 173). Four species (Pseudotanaidae sp. SJ#1, *Araphura* sp. SJ#1, *Typhlotanais* sp. SJ#1, Indeterminate sp. SJ#1) were retained on the smaller mesh size exclusively.

For stations CR21, CR42, and CR61, most of the tanaids (45.0–47.1%) were located at the top layer (0–2 cm) while 27.8–36.8% and 15.9–27.1% of them were found in the 2–5 cm and 5–10 cm layers, respectively (Fig. 2). This analysis was not performed on the other two stations as the sediment sample from CR09 was not sectioned and CR36 contained only one tanaid.

Among the three quantitative samples, CR21 had the highest tanaid density at 607 ind. m^{-2}. The densities at CR42 and CR61 were 467 ind. m^{-2} and 93 ind. m^{-2}, respectively.

Species composition, richness, and diversity. The samples contained about 59 tanaid morphospecies belonging to eight families from the suborder Tanaidomorpha and superfamily Paratanaoidea (Table 4; Fig. 3). The majority (39 of 59; 66%) of these species were small, with a maximum body length of 2 mm.

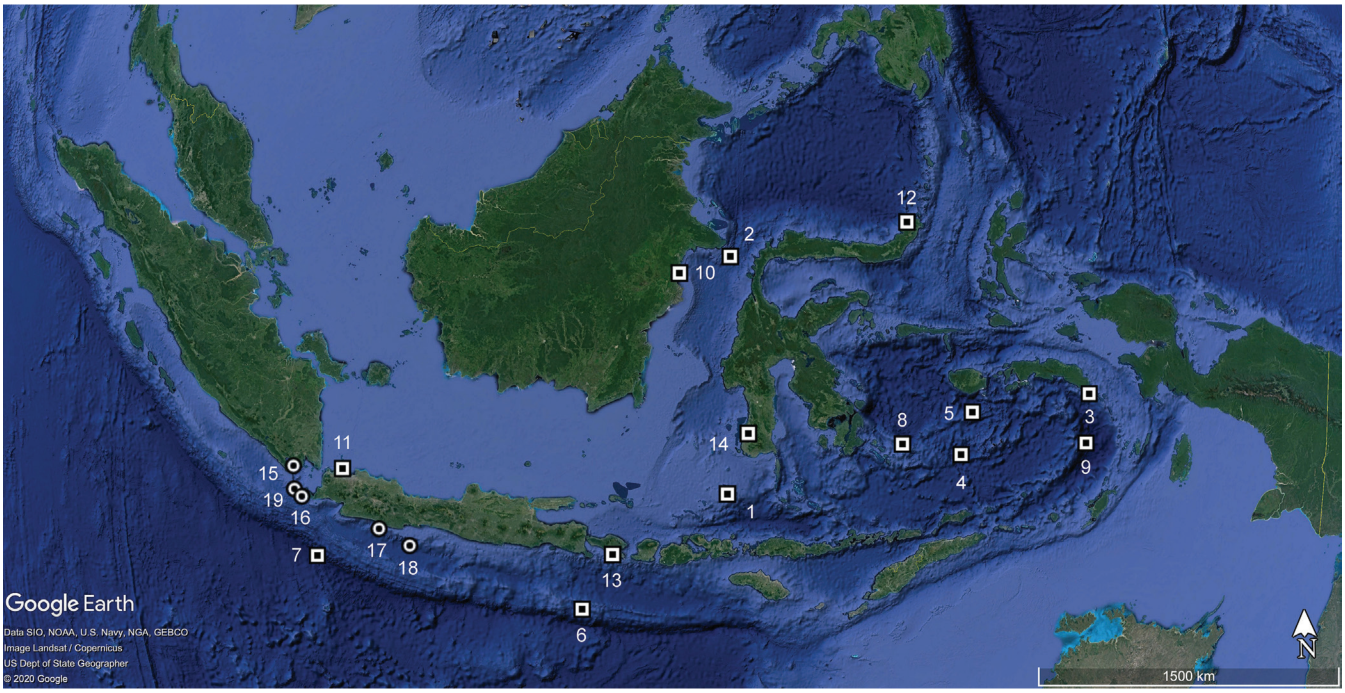

Fig. 1. Localities of tanaidacean records from past (square) and present (circle) studies. **1**, Flores Sea, Postillon Islands, Anchorage off Pulu Sarassa, Station 43 (Siboga Expedition); **2**, Makassar Strait, Station 88 (Siboga Expedition); **3**, Between Geser Island and Ceram Laut Island, Station 172 (Siboga Expedition); **4**, Banda Sea, Station 223 (Siboga Expedition); **5**, Banda Sea, Station 241 (Siboga Expedition); **6**, Sunda Trench, Station 471 (2nd Galathea Expedition); **7**, Sunda Trench, Station 5618 (R/V Vitjaz); **8**, Banda Sea, Station 7229 (R/V Vitjaz 57th Cruise); **9**, Banda Sea, Weber Deep, Station 7271 (R/V Vitjaz 57th Cruise); **10**, Makassar Strait, Bontang; **11**, Java Sea, Pari Island; **12**, Celebes Sea, Bunaken Island; **13**, Bali Sea, Bali Island, Sanur Beach; **14**, Sulawesi, Gua Dadeleang; **15**, Semangka Bay, Station CR09 (SJADES); **16**, Sunda Strait, Station CR21 (SJADES); **17**, Indian Ocean, Station CR36 (SJADES); **18**, Indian Ocean, Station CR42 (SJADES); **19**, Sunda Strait, Station CR61 (SJADES). This map was prepared in Google Earth Pro (ver. 7.3.3.7786).

Parakanthophoreus sp. SJ#2 was the most numerous species at 119 individuals, of which 24 were mancae. *Akanthinotanais* sp. SJ#1 was also very abundant with 96 individuals, of which 17 were mancae. These two species together constituted 42% of the total number of tanaids. Despite their abundance, *Parakanthophoreus* sp. SJ#2 and *Akanthinotanais* sp. SJ#1 were present only in stations CR21 and CR09, respectively. All except for eight species were restricted to only one station. Pseudotanaidae sp. SJ#2, *Araphura* sp. SJ#2, *Inconnivus* sp. SJ#1, and Typhlotanaidae sp. SJ#4 occurred in three stations while *Paranarthrura* sp. SJ#2, *Leptognathia* sp. SJ#1, Tanaellidae sp. SJ#2, and Typhlotanaidae sp. SJ#2 were recorded from two stations. Among these eight species, Pseudotanaidae sp. SJ#2 was the only species that was abundant, with a total number of 44 individuals.

CR42 was the most speciose station at 40 species and was the only station where all eight families were present. In addition, this station had (1) the highest number of species that were not found in other stations; (2) the most species that were singletons, and (3) the tanaidacean assemblage that was most diverse based on the Shannon index (H'; Table 4). CR42 also exhibited high species evenness (J') according to the Pielou's index. In contrast, station CR61 recorded the least number of species, all of which can also be found in the neighbouring station CR21. In addition, these five species of CR61 were represented by only three families.

The families Akanthophoreidae Sieg and Pseudotanaidae Sieg dominated the tanaidacean assemblage, constituting almost 60% of the overall material (Fig. 4A). The dominance of these two families can be attributed to pseudotanaids and akanthophoreids forming the overwhelming majority of tanaids at stations CR09 (Fig. 4B) and CR21 (Fig. 4C), respectively. Pseudotanaids were also abundant in CR61 but shared a similar proportion as tanaellids (Fig. 4E). The station CR42 (Fig. 4D) was not dominated by any family but most individuals belong to either Pseudotanaidae or Paratanaoidea *incertae sedis*.

DISCUSSION

This study provides preliminary quantitative data concerning tanaidacean communities in the deep-sea habitats of Southeast Asia for the first time. Our study recorded tanaid densities of 93–607 ind. m^{-2}, which are moderately high when compared to results of similar quantitative studies elsewhere in the world. For meaningful comparisons, we used only studies with samples that were collected with the same type of sampling instrument, and processed using similar depth of top layer and size of sieve mesh. However, studies that utilised the box corer and sampled at least to 10 cm depth of the sediment sample through a sieve mesh size of 250 µm or smaller, are limited to the Atlantic Ocean and one small area in the Pacific Ocean (Table 5). The highest density documented in these studies was 692 ind. m^{-2} in the Atlantic

Table 2. Summary of sampling stations in previous studies in Indonesia.

No.	Locality	Latitude	Longitude	Habitat	Depth (m)	Date	Sampling instrument	Collector
1.	Flores Sea, Postillon Islands, Anchorage off Pulu Sarassa, Station 43	Unknown	Unknown	Seabed	36	4–5 April 1899	Dredge	Siboga Expedition
2.	Makassar Strait, Station 88	0°34.6′N	119°8.5′E	Seabed	1301	20 June 1899	Unknown	Siboga Expedition
3.	Between Geser Island and Ceram Laut Island, Station 172	Unknown	Unknown	Seabed	18	26–28 August 1899	Unknown	Siboga Expedition
4.	Banda Sea, Station 223	5°44.7′S	126°27.3′E	Seabed	4391	6 November 1899	Unknown	Siboga Expedition
5.	Banda Sea, Station 241	4°24.3′S	126°49.3′E	Seabed	1570	1 December 1899	Unknown	Siboga Expedition
6.	Sunda Trench, Station 471	10°26′S	114°15′E	Seabed	2780	9 September 1951	Peterson grab	2nd Galathea Expedition
7.	Sunda Trench, Station 5618	8°41′9″S	105°30′7″E	Seabed	6330–6350	?	Unknown	R/V Vitjaz
8.	Banda Sea, Station 7229	5°21.7′S	124°30.8′E	Seabed	5700–5734	24 February 1975	Unknown	R/V Vitjaz Cruise 57
9.	Banda Sea, Weber Deep, Station 7271	5°29.5′S	130°49.0′E	Seabed	7335–7430	21–22 March 1975	Unknown	R/V Vitjaz Cruise 57
10.	Makassar Strait, Bontang, Station 1	0°05′N	117°33′E	Seabed	1–1.5	10 March 1991	Dredge	M. Guţu
11.	Java Sea, Pari Island, Station 2	5°51′S	106°35.5′E	Seabed	1.5	10 March 1991	NA	M. Guţu
12.	Java Sea, Pari Island, Station 3	5°51′S	106°35.5′E	Seabed	1.5	13 March 1991	NA	M. Guţu
13.	Java Sea, Pari Island, Station 4	5°51′S	106°35.5′E	Seabed	2.5	13 March 1991	Dredge	M. Guţu
14.	Celebes Sea, Bunaken Island, Station 12	1°37′N	124°46′E	Putrid tree trunk	6	16 April 1991	NA	M. Guţu
15.	Celebes Sea, Bunaken Island, Station 14	1°37′N	124°46′E	Crumbling tree trunk	1.5	16 April 1991	NA	M. Guţu
16.	Celebes Sea, Bunaken Island, Station 16	1°37′N	124°46′E	Seabed	1	16 April 1991	Dredge	M. Guţu
17.	Celebes Sea, Bunaken Island, Station 23	1°37′N	124°46′E	Seabed	4.5	16 April 1991	Dredge	M. Guţu
18.	Celebes Sea, Bunaken Island, Station 17	1°37′N	124°46′E	Seabed	2	17 April 1991	Dredge	M. Guţu
19.	Celebes Sea, Bunaken Island, Station 22	1°37′N	124°46′E	Seabed	1.5	17 April 1991	Dredge	M. Guţu
20.	Celebes Sea, Bunaken Island, Station 25	1°37′N	124°46′E	Seabed	2.5	17 April 1991	Dredge	M. Guţu
21.	Celebes Sea, Bunaken Island, Station 31	1°37′N	124°46′E	Seabed	1	17 April 1991	Dredge	M. Guţu
22.	Celebes Sea, Bunaken Island, Station 32	1°37′N	124°46′E	Seabed	2	17 April 1991	Dredge	M. Guţu
23.	Celebes Sea, Bunaken Island, Station 35	1°37′N	124°46′E	Seabed	6	17 April 1991	Dredge	M. Guţu
24.	Celebes Sea, Bunaken Island, Station 5	1°37′N	124°46′E	Seabed	4.5	18 April 1991	Dredge	M. Guţu

No.	Locality	Latitude	Longitude	Habitat	Depth (m)	Date	Sampling instrument	Collector
25.	Celebes Sea, Bunaken Island, Station 34	1°37′N	124°46′E	Seabed	4.5	18 April 1991	Dredge	M. Guţu
26.	Celebes Sea, Bunaken Island, Station 2	1°37′N	124°46′E	Seabed	2.5	20 April 1991	Dredge	M. Guţu
27.	Celebes Sea, Bunaken Island, Station 3	1°37′N	124°46′E	Seabed	3	20 April 1991	Dredge	M. Guţu
28.	Celebes Sea, Bunaken Island, Station 4	1°37′N	124°46′E	Dead corals	3.5	20 April 1991	NA	M. Guţu
29.	Celebes Sea, Bunaken Island, Station 5	1°37′N	124°46′E	Seabed	4–5	18 April 1991	Dredge	M. Guţu
30.	Celebes Sea, Bunaken Island, Station 6	1°37′N	124°46′E	Seabed	3.5	20 April 1991	Dredge	M. Guţu
31.	Celebes Sea, Bunaken Island, Station 7	1°37′N	124°46′E	Seabed	3	20 April 1991	Dredge	M. Guţu
32.	Celebes Sea, Bunaken Island, Station 9	1°37′N	124°46′E	Seabed	4	20 April 1991	Dredge	M. Guţu
33.	Celebes Sea, Bunaken Island, Station 11	1°37′N	124°46′E	Seabed	3.5	20 April 1991	Dredge	M. Guţu
34.	Celebes Sea, Bunaken Island, Station 13	1°37′N	124°46′E	Seabed	3	20 April 1991	Dredge	M. Guţu
35.	Celebes Sea, Bunaken Island, Station 19	1°37′N	124°46′E	Sand deposited at the entrance of the gallery of a fish	2	20 April 1991	NA	M. Guţu
36.	Celebes Sea, Bunaken Island, Station 20	1°37′N	124°46′E	Seabed	2.5	20 April 1991	Dredge	M. Guţu
37.	Celebes Sea, Bunaken Island, Station 21	1°37′N	124°46′E	Seabed	5	20 April 1991	Dredge	M. Guţu
38.	Celebes Sea, Bunaken Island, Station 27	1°37′N	124°46′E	Seabed	3.5	20 April 1991	Dredge	M. Guţu
39.	Celebes Sea, Bunaken Island, Station 28	1°37′N	124°46′E	Seabed	3	20 April 1991	Dredge	M. Guţu
40.	Celebes Sea, Bunaken Island, Station 30	1°37′N	124°46′E	Seabed	4	20 April 1991	Dredge	M. Guţu
41.	Makassar Strait, Bontang, Station 6	0°05′N	117°33′E	Seabed	3	18 May 1991	Dredge	M. Guţu
42.	Makassar Strait, Bontang, Station 8	0°05′N	117°33′E	Seabed	2	18 May 1991	Dredge	M. Guţu
43.	Makassar Strait, Bontang, Station 10	0°05′N	117°33′E	Seabed	3	18 May 1991	Dredge	M. Guţu
44.	Makassar Strait, Bontang, Station 12	0°05′N	117°33′E	Seabed	3	18 May 1991	Dredge	M. Guţu
45.	Bali Sea, Bali Island, Sanur Beach	8°40′S	115°17′E	Seabed	3.5–4	11 June 1991	Dredge	M. Guţu
46.	Sulawesi, Gua Dadeleang	4°55′33″S	119°36′36″E	Freshwater cave	NA	6 September 2007	NA	D. Jaume

Table 3. Box core sampling stations of the SJADES expedition.

Station	Longitude	Latitude	Location	Depth (m)	Date	Core quality
CR09	5°44.960′S	104°52.731′E	Semangka Bay (between Tabuan Island and Sumatra)	377	25 March 2018	Sediment 0–15 cm depth; not sectioned
CR21	6°44.791′S	105°06.422′E	Sunda Strait (south of Panaitan Island)	836	27 March 2018	Sediment overflowed (>50? cm depth)
CR36	7°47.782′S	107°42.991′E	Indian Ocean (south of Tanjung Boyongkareuceng)	1,114	29 March 2018	Sediment 14 cm depth
CR42	8°20.609′S	108°43.036′E	Indian Ocean (south of Cilacap)	2,355	31 March 2018	Sediment 35 cm depth
CR61	6°30.151′S	104°51.550′E	Sunda Strait (northwest of Panaitan Island)	1,950	4 April 2018	Sediment overflowed (>50? cm depth)

Ocean (Cosson et al., 1997; Galéron et al., 2000) but such high values were limited to a small number of samples (Table 5). The seamounts in the Pacific Ocean reported a mean density of only up to 31 ind. m^{-2} (Levin & Thomas, 1989).

Some 59 tanaidacean morphospecies were found in this study and most, if not all of these species are likely to be new records for Indonesia. Clearly, more detailed taxonomic work would refine the data. Nonetheless, the current tanaidacean inventory of Indonesia is now multiplied almost three-fold to 95 species. This number will undoubtedly increase with more extensive sampling in other deep-sea provinces of Indonesia using suitable sampling instruments (e.g., epibenthic sledge). At the same time, it is also important to note that two deep-sea species previously recorded from Indonesian waters are most certainly misidentifications. These two species are *Parakanthophoreus longiremis* (Lilljeborg, 1864) and *Pseudotanais nordenskioldi* Sieg, 1977, which were recorded by Kudinova-Pasternak (1976, 1977) from the Sunda Trench and Weber Deep, respectively. We believe that these have been misidentified because the type localities of *P. longiremis* and *P. nordenskioldi* are far removed from Indonesia in Molde, Norway, North Atlantic Ocean (Lilljeborg, 1864) and east of South Georgia Island, South Atlantic Ocean (Sieg, 1977), respectively. As Kudinova-Pasternak (1976, 1977) did not describe her specimens, we are unable to confirm if they were determined correctly.

Based on the same list of published data (Table 5), information on bathyal tanaid species richness appears to be limited to only two studies. Pequegnat et al. (1990) reported 186 tanaidacean taxa from the Gulf of Mexico (see Table 5) but did not provide information on their lower taxonomic levels. We recorded a smaller number of tanaidacean species in our samples (i.e., 59 species) as compared to that in the Gulf of Mexico (Pequegnat et al., 1990), despite using a larger box corer (i.e., 0.3 m^2 vs 0.06 m^2). This large difference in species richness could be due to the much smaller scale of sampling in terms of the number of stations (i.e., five vs 59), total study area covered (i.e., approx. 130,000 km^2 vs 330,000 km^2) and depth range (i.e., 377–2,355 m vs 118–3,850 m). Martín & Díaz (2005) used a slightly smaller box corer (0.25 m^2) and documented three tanaidacean species from Venezuela, including an undetermined apseudid, another apseudid *Leviapseudes* sp., and the colletteid *Isopodidus janum* Larsen & Heard. Colletteids were also present in our samples albeit being uncommon, but apseudids were absent in our material. This is not surprising as apseudids are predominantly shallow or abyssal/hadal tanaids even though they are also present but uncommon in the bathyal depths (Błażewicz-Paszkowycz et al., 2012). Since apseudids are relatively large and generally more mobile as compared to the smaller tube-dwelling tanaidomorphs that were present in our samples (Błażewicz et al., 2020), they may have escaped from the small sampling area during coring. Our study nonetheless collected many of the predominantly deep-sea tanaidacean taxa, and all these families (with the exception of Agathotanaidae, Akanthophoreidae, and Pseudotanaidae) were recorded from Indonesia for the first time.

Our limited data suggest that, within a small biogeographical region, tanaidacean species richness and diversity increased with water depth. The deepest station in this study, CR42 (depth 2,355 m), recorded the highest number of species, which were evenly represented by eight families. In contrast, the shallower stations CR09 and CR21 were much less speciose and dominated by a single taxon. The Colletteidae was the most speciose family in our material but it was almost entirely restricted to CR42, with only one species recorded from CR21 and absent in the shallowest station CR09. The distribution of Anarthruridae was also overall limited to CR42 with only one of the six species identified in this study present in CR09. The other families were distributed across the sampled depths from 377 to 2,355 m without showing any obvious patterns in depth gradient. The two neighbouring stations CR21 and CR61 shared many taxa despite a difference in bathymetric depth of 1,114 m. In fact, all tanaidacean species recorded in CR61 also occurred in CR21. The high level of similarity in taxon composition observed between CR21 and CR61 but not in the other stations suggests that local conditions play a more important role in affecting tanaidacean distribution than depth within a small biogeographical realm, which is the bathyal zone off southwest Java in this case. High levels of endemism

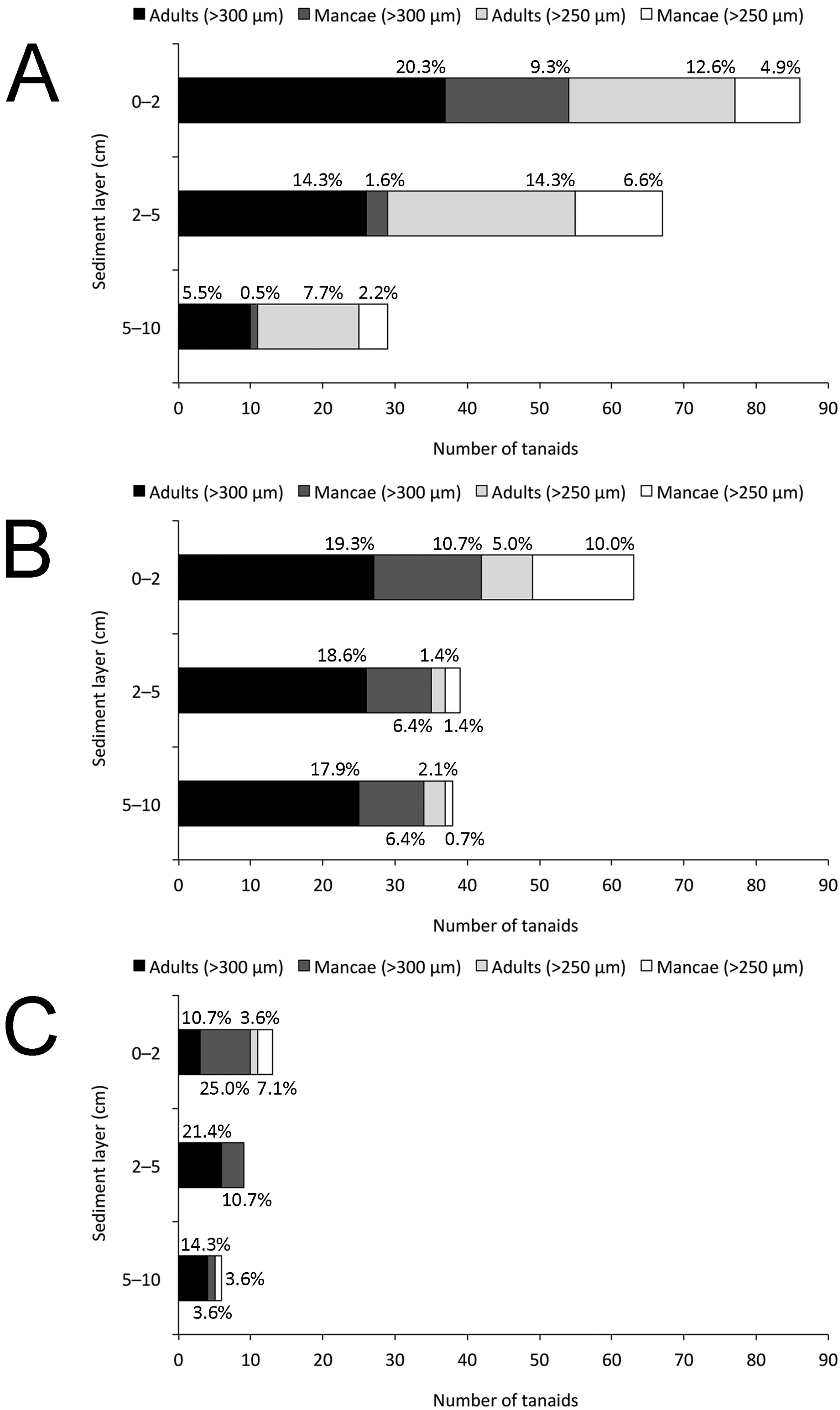

Fig. 2. The number of tanaidacean adults and mancae that were collected from three sediment layers of stations (A) CR21, (B) CR42 and (C) CR61 after sieving through 300 µm and 250 µm mesh sizes.

Table 4. Tanaidacean species recorded from five SJADES sampling stations. Mancae are represented by values in brackets.

No.	Taxon	Body length (mm)	Station					Total	Number of stations with given species
			CR09	CR21	CR36	CR42	CR61		
	Suborder Tanaidomorpha **Superfamily Paratanaoidea** **Family Agathotanaidae**								
1.	*Agathotanais cilacapicus* Chim & Tong, 2021	2.9–3.2 (1.4–2.0)				3 (5)		3 (5)	1
2.	*Bunburia javanica* Chim & Tong, 2021	3.8				1		1	1
3.	*Paranarthrura sundanensis* Chim & Tong, 2021	1.6–2.0 (0.9–1.2)		6 (9)				6 (9)	1
4.	*Paranarthrura* sp. SJ#2	2.0 (1.2–1.3)	1			(2)		1 (2)	2
5.	*Paranarthrura* sp. SJ#3	1.4–1.5 (0.9–1.2)				2 (2)		2 (2)	1
	Family Akanthophoreidae								
6.	*Chauliopleona* sp. SJ#1	3.5–3.7 (1.9)				2 (1)		2 (1)	1
7.	*Parakanthophoreus* sp. SJ#1	1.5–2.2 (0.8–1.2)	12 (7)					12 (7)	1
8.	*Parakanthophoreus* sp. SJ#2	0.8–1.9 (0.4–0.7)		95 (24)				95 (24)	1
9.	*Parakanthophoreus* sp. SJ#3	2.1			1			1	1
10.	*Parakanthophoreus* sp. SJ#4	2.7				2		2	1
11.	*Parakanthophoreus* sp. SJ#5	2.0				1		1	1
12.	*Parakanthophoreus* sp. SJ#6	2.6				1		1	1
	Family Anarthruridae								
13.	*Anarthruropsis* sp. SJ#1	(1.0)				(4)		(4)	1
14.	Anarthruridae sp. SJ#1	1.5–2.2 (0.9–1.2)	3 (4)					3 (4)	1
15.	Anarthruridae sp. SJ#2	2.5				1		1	1
16.	Anarthruridae sp. SJ#3	(2.2)				(1)		(1)	1
17.	Anarthruridae sp. SJ#4	1.8				1		1	1
18.	Anarthruridae sp. SJ#5	(2.5)				(1)		(1)	1
	Family Colletteidae								
19.	*Collettea* sp. SJ#1	1.6				1		1	1
20.	*Filitanais* sp. SJ#1	4.2 (2.3)				1 (1)		1 (1)	1
21.	*Leptognathiella* sp. SJ#1	0.7–1.3				7		7	1
22.	*Leptognathiella* sp. SJ#2	2.0				1		1	1
23.	Colletteidae sp. SJ#1	1.4		1				1	1
24.	Colletteidae sp. SJ#2	1.6–2.5 (0.8–1.0)				4 (2)		4 (2)	1
25.	Colletteidae sp. SJ#3	1.9				1		1	1
26.	Colletteidae sp. SJ#4	1.6				1		1	1
27.	Colletteidae sp. SJ#5	1.8				1		1	1
28.	Colletteidae sp. SJ#6	(0.9)				(1)		(1)	1
29.	Colletteidae sp. SJ#7	1.0				1		1	1
	Family Leptognathiidae								
30.	*Leptognathia* sp. SJ#1	1.2–1.4		1		1		2	2
	Family Pseudotanaidae								
31.	*Akanthinotanais* sp. SJ#1	0.5–1.0 (0.3–0.4)	79 (17)					79 (17)	1
32.	Pseudotanaidae sp. SJ#1	0.8		1				1	1
33.	Pseudotanaidae sp. SJ#2	0.7–1.8 (0.4–0.6)		10 (5)		15 (4)	7 (3)	32 (12)	3
34.	Pseudotanaidae sp. SJ#3	0.6–1.0 (0.4–0.6)				7 (3)		7 (3)	1

No.	Taxon	Body length (mm)	Station					Total	Number of stations with given species
			CR09	CR21	CR36	CR42	CR61		
	Family Tanaellidae								
35.	*Araphura* sp. SJ#1	2.0 (0.9–1.3)	1 (5)					1 (5)	1
36.	*Araphura sp. SJ#2*	1.9–2.5 (1.2)		3		(1)	4	7 (1)	3
37.	*Arthrura* sp. SJ#1	1.2–1.6		5				5	1
38.	*Inconnivus* sp. SJ#1	2.1 (1.2–1.4)		(1)		(1)	1 (3)	1 (5)	3
39.	*Tanaella* sp. SJ#1	(1.7–1.8)				(2)		(2)	1
40.	Tanaellidae sp. SJ#2	1.9 (1.5–1.6)		(1)			1 (3)	1 (4)	2
41.	Tanaellidae sp. SJ#3	1.5				1		1	1
42.	Tanaellidae sp. SJ#4	1.3		1				1	1
	Family Typhlotanaidae								
43.	*Typhlotanais* sp. SJ#1	1.0–1.5 (0.9)	4 (1)					4 (1)	1
44.	Typhlotanaidae sp. SJ#1	1.8–2.2 (1.0–1.5)	5 (12)					5 (12)	1
45.	Typhlotanaidae sp. SJ#2	1.5–2.0		1		1		2	2
46.	Typhlotanaidae sp. SJ#3	1.4 (1.1)		1 (1)				1 (1)	1
47.	Typhlotanaidae sp. SJ#4	0.9–1.1		2		1	1	4	3
48.	Typhlotanaidae sp. SJ#5	1.3 (1.0)		1 (1)				1 (1)	1
49.	Typhlotanaidae sp. SJ#6	0.8		1				1	1
	Typhlotanaidae indeterminate	1.5 (0.5–1.0)		(4)		1 (8)	(1)	1 (13)	NA
	Family Paratanaoidea incertae sedis								
50.	*Insociabilitanais* sp. SJ#1	1.9–2.4 (1.4)				4 (1)		4 (1)	1
51.	*Parafilitanais* sp. SJ#1	1.3–1.9 (0.9–1.1)				17 (3)		17 (3)	1
52.	*Unispinosus* sp. SJ#1	2.6				1		1	1
	Family indeterminate								
53.	Indeterminate sp. SJ#1	1.3 (0.8–1.0)	1 (6)					1 (6)	1
54.	Indeterminate sp. SJ#2	1.3–1.6	4					4	1
55.	Indeterminate sp. SJ#3	2.9				1		1	1
56.	Indeterminate sp. SJ#4	1.9				2		2	1
57.	Indeterminate sp. SJ#5	3.2				1		1	1
58.	Indeterminate sp. SJ#6	1.2				1		1	1
59.	Indeterminate sp. SJ#7	1.8				1		1	1
	Indeterminate swimming male	0.7–1.3	1	3				4	NA
	Incomplete or badly damaged specimen	NA		1 (1)		5 (7)	(4)	6 (12)	NA
	Abundance (total number of individuals)		163	182	1	140	28	351 (163)	
	Species richness (total number of species)		9	16	1	40	5	59	
	Species richness (total number of families)		6	7	1	9	3	9	
	Number of species unique to given area		8	9	1	33	0	NA	
	Number of species that are singletons		0	4	1	21	0	25	
	Shannon diversity index (H’)		0.84	0.83	0	2.75	0.60	2.29	
	Pielou’s evenness index (J’)		0.52	0.43	NA	0.83	0.86	0.64	

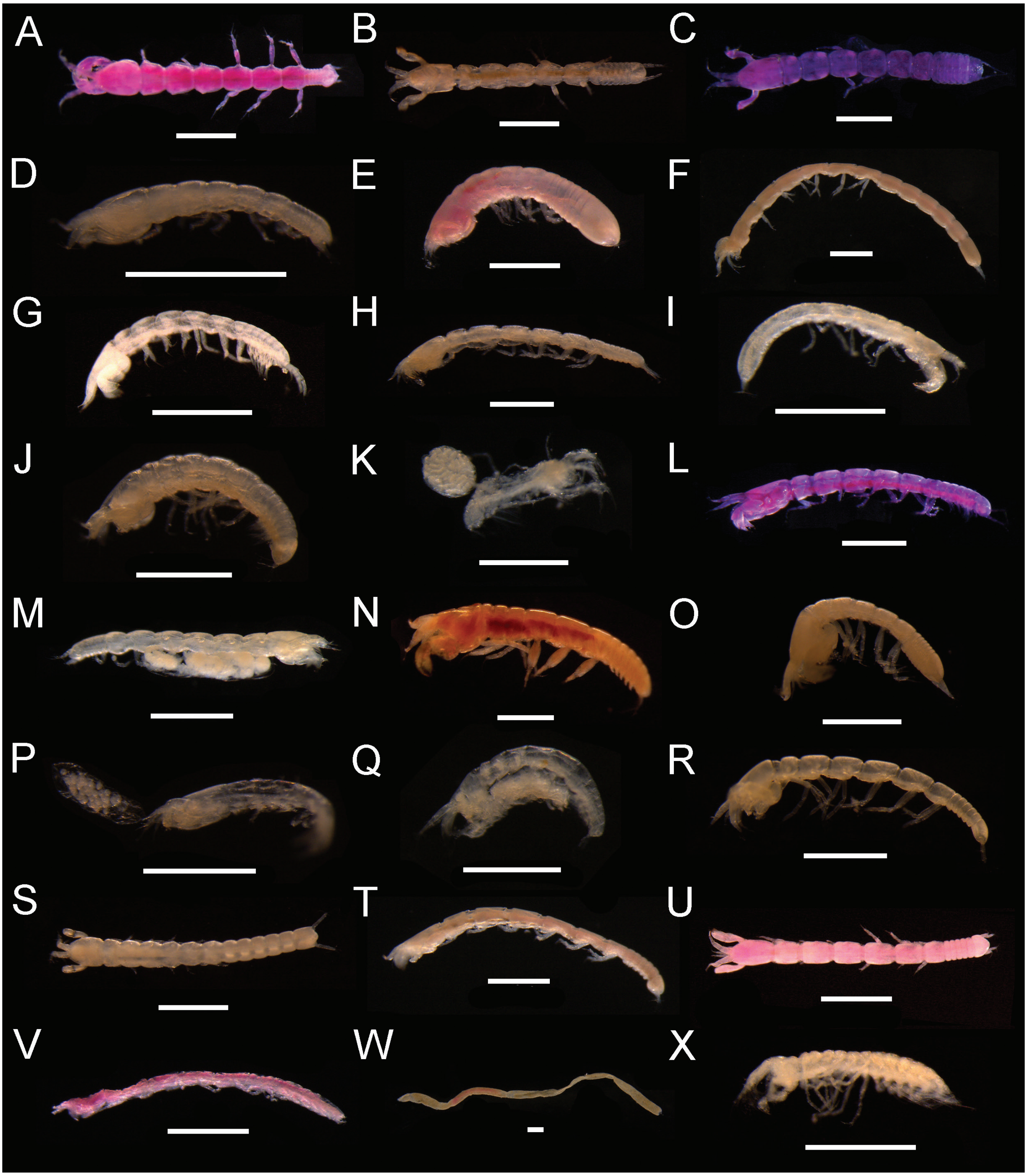

Fig. 3. Tanaids collected from southwest Java, Indonesia during SJADES. (A) *Paranarthrura* sp. SJ#2; (B) *Chauliopleona* sp. SJ#1; (C) *Parakanthophoreus* sp. SJ#1; (D) *Anarthruropsis* sp. SJ#1; (E) *Collettea* sp. SJ#1; (F) *Filitanais* sp. SJ#1; (G) *Leptognathiella* sp. SJ#1; (H) Colletteidae sp. SJ#2; (I) Colletteidae sp. SJ#6; (J) *Leptognathia* sp. SJ#1; (K) Pseudotanaidae sp. SJ#2 with a tantulocarid parasite; (L) *Araphura* sp. SJ#1; (M) *Arthrura* sp. SJ#1 with eggs; (N) *Inconnivus* sp. SJ#1; (O) *Tanaella* sp. SJ#1; (P) Typhlotanaidae sp. SJ#3 with a tantulocarid parasite; (Q) Typhlotanaidae sp. SJ#6 with mancae in a brood pouch; (R) *Insociabilitanais* sp. SJ#1; (S) *Parafilitanais* sp. SJ#1; (T) *Unispinosus* sp. SJ#1; (U) Indeterminate sp. SJ#4; Indeterminate sp. SJ#7 (V) before and (W) after removal from its tube; (X) indeterminate swimming male. Scale = 500 µm.

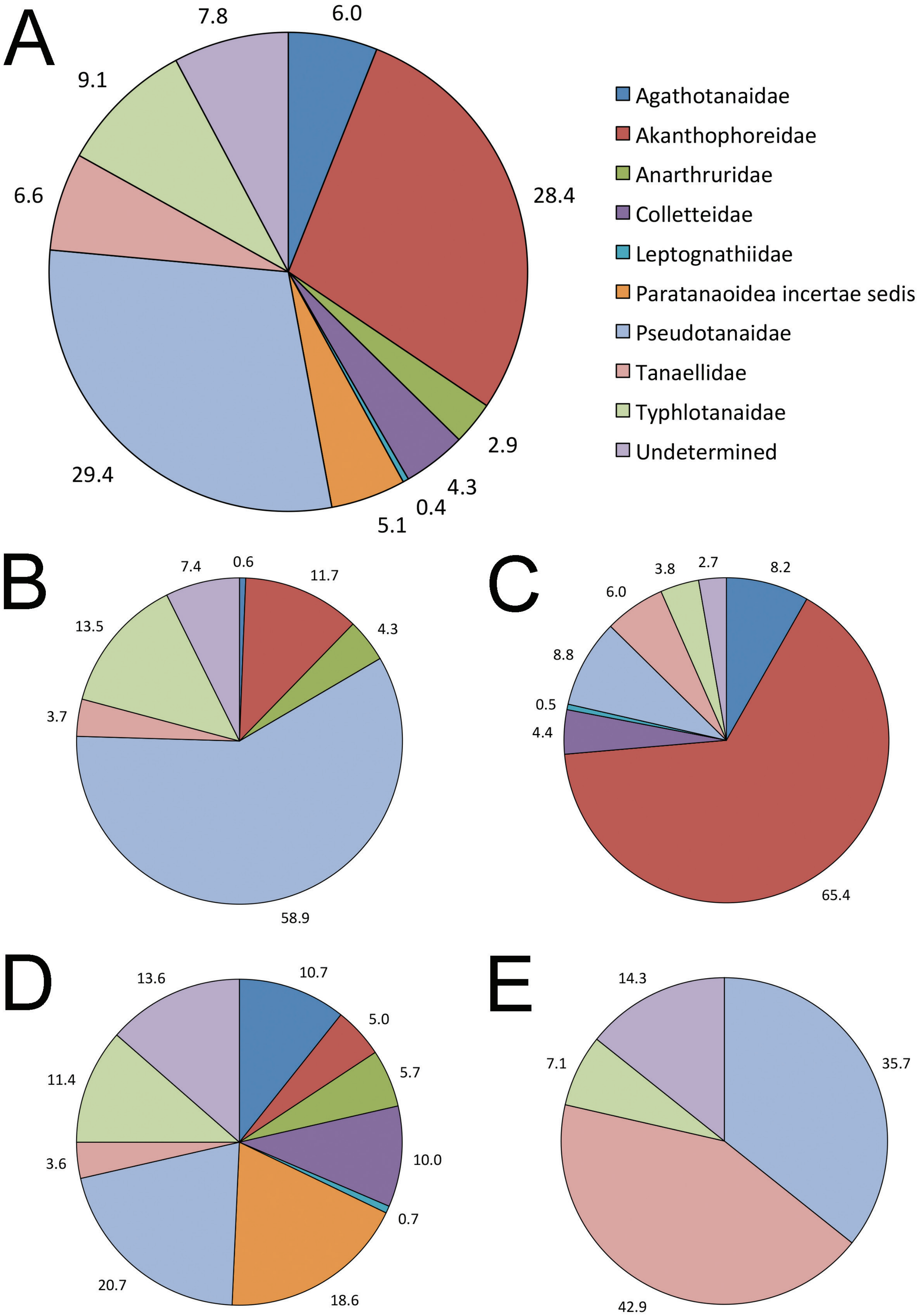

Fig. 4. Percentage composition of tanaidacean families in (A) all stations; (B) CR09; (C) CR21; (D) CR42; (E) CR61.

Table 5. Tanaid densities recorded in benthic macrofaunal quantitative studies using box core samples from bathyal depths (200–4,000 m).

Study area	Depth (m)	Sediment depth (cm)	Sieve mesh size (µm)	Core surface area (m^2)	Density (ind. m^{-2}) Mean	Density (ind. m^{-2}) Range	Number of species	Sample size (n)	Reference
Atlantic Ocean, Norwegian Sea	2465–3718	20	250	0.06	40	0–150	No data	18	Dahl et al., 1976
Atlantic Ocean, Bay of Biscay, BIOGAS Station 1	2100	Unknown	250	Unknown	90	Unknown	No data	4	Laubier & Sibuet, 1979
Atlantic Ocean, Bay of Biscay, BIOGAS Station 2	3000	Unknown	250	Unknown	76	Unknown	No data	5	Laubier & Sibuet, 1979
Atlantic Ocean, Bay of Biscay, BIOGAS Station 6	2000	Unknown	250	Unknown	120	Unknown	No data	3	Laubier & Sibuet, 1979
Pacific Ocean, “Horizon Guyot” seamount	1480	10	63 (0–2 cm); 300 (2–10 cm)	0.0196	13	Unknown	No data	4	Levin & Thomas, 1989
Pacific Ocean, “Horizon Guyot” seamount	1480	10	63 (0–2 cm); 300 (2–10 cm)	0.0413	19	Unknown	No data	5	Levin & Thomas, 1989
Pacific Ocean, “Magellan Rise Plateau” seamount	3150	10	63 (0–2 cm); 300 (2–10 cm)	0.0196	12	Unknown	No data	5	Levin & Thomas, 1989
Pacific Ocean, “Magellan Rise Plateau” seamount	3150	10	63 (0–2 cm); 300 (2–10 cm)	0.0413	31	Unknown	No data	6	Levin & Thomas, 1989
Atlantic Ocean, Gulf of Mexico	118–3850	Unknown	300	0.06	?	28–512	186	59	Pequegnat et al., 1990
Atlantic Ocean, Greenland, and Norwegian Seas	3700–3800	Unknown	250	0.06	25	0–83	No data	4	Boland & Rowe, 1991
Atlantic Ocean, Greenland, and Norwegian Seas	3700–3800	Unknown	250	0.0625	147	32–256	No data	5	Boland & Rowe, 1991
Atlantic Ocean, Mauritania (EUMELI-E)	1590–2040	10	250	0.25	692	Unknown	No data	8	Cosson et al., 1997
Atlantic Ocean, Mauritania (EUMELI-M)	3095–3128	10	250	0.25	176	Unknown	No data	16	Cosson et al., 1997
Atlantic Ocean, Eutrophic site (EUMELI-2)	1600–2100	10	250	0.25	692	Unknown	No data	4	Galéron et al., 2000
Atlantic Ocean, Eutrophic site (EUMELI-4)	1600–2100	10	250	0.25	611	Unknown	No data	3	Galéron et al., 2000
Atlantic Ocean, Venezuela	230–382	20	250	0.25	26	Unknown	1	3	Martín & Díaz, 2005
Atlantic Ocean, Venezuela	1020–1485	20	250	0.25	51	Unknown	2	4	Martín & Díaz, 2005
Atlantic Ocean, West African Equatorial margin (2000)	1300–1400	10	250	0.25	~110	Unknown	No data	6	Brind’Amour et al., 2009

Study area	Depth (m)	Sediment depth (cm)	Sieve mesh size (µm)	Core surface area (m^2)	Density (ind. m^{-2})		Number of species	Sample size (n)	Reference
					Mean	Range			
Atlantic Ocean, West African Equatorial margin (2001)	1300–1400	10	250	0.25	~153	Unknown	No data	2	Brind'Amour et al., 2009
Atlantic Ocean, West African Equatorial margin (2003)	1300–1400	10	250	0.25	~119	Unknown	No data	9	Brind'Amour et al., 2009
Atlantic Ocean, Gulf of Guinea (ZC-BIOZAIRE-1)	3160–4000	15	250	0.25	353	Unknown	No data	3	Galéron et al., 2009
Atlantic Ocean, Gulf of Guinea (ZC-BIOZAIRE-2)	3160–4000	15	250	0.25	240	Unknown	No data	2	Galéron et al., 2009
Atlantic Ocean, Gulf of Guinea (ZC-BIOZAIRE-3)	3160–4000	15	250	0.25	456	Unknown	No data	3	Galéron et al., 2009
Atlantic Ocean, Gulf of Guinea (ZD-BIOZAIRE-1)	3160–4000	15	250	0.25	241	Unknown	No data	3	Galéron et al., 2009
Atlantic Ocean, Gulf of Guinea (ZD-BIOZAIRE-2)	3160–4000	15	250	0.25	172	Unknown	No data	2	Galéron et al., 2009
Atlantic Ocean, Gulf of Guinea (ZD-BIOZAIRE-3)	3160–4000	15	250	0.25	157	Unknown	No data	3	Galéron et al., 2009
Atlantic Ocean, Gulf of Guinea (R-BIOZAIRE-2)	3160–4000	15	250	0.25	154	Unknown	No data	2	Galéron et al., 2009
Atlantic Ocean, Gulf of Guinea (R3-BIOZAIRE-3)	3160–4000	15	250	0.25	85	Unknown	No data	3	Galéron et al., 2009; Menot et al., 2010
Atlantic Ocean, Gulf of Guinea (R4-BIOZAIRE-3)	3160–4000	15	250	0.25	196	Unknown	No data	3	Galéron et al., 2009; Menot et al., 2010
Atlantic Ocean, Gulf of Guinea (R6-BIOZAIRE-3)	3160–4000	15	250	0.25	219	Unknown	No data	3	Galéron et al., 2009; Menot et al., 2010
Atlantic Ocean, Gulf of Guinea (R7-BIOZAIRE-3)	3160–4000	15	250	0.25	432	Unknown	No data	3	Galéron et al., 2009; Menot et al., 2010
Atlantic Ocean, Gulf of Guinea (R9-BIOZAIRE-3)	3160–4000	15	250	0.25	196	Unknown	No data	3	Galéron et al., 2009; Menot et al., 2010
Atlantic Ocean, Gulf of Guinea (R10-BIOZAIRE-3)	3160–4000	15	250	0.25	201	Unknown	No data	3	Galéron et al., 2009; Menot et al., 2010
Atlantic Ocean, Gulf of Guinea (O2-BIOZAIRE-2)	3160	10	250	0.25	38.5	Unknown	No data	2	Menot et al., 2010
Atlantic Ocean, Gulf of Guinea (O1-BIOZAIRE-1)	3160	10	250	0.25	21	Unknown	No data	1	Menot et al., 2010
Atlantic Ocean, Gulf of Guinea (S1-BIOZAIRE-1)	3160	10	250	0.25	0	Unknown	No data	1	Menot et al., 2010

Study area	Depth (m)	Sediment depth (cm)	Sieve mesh size (µm)	Core surface area (m^2)	Density (ind. m^{-2})		Number of species	Sample size (n)	Reference
					Mean	Range			
Atlantic Ocean, Gulf of Guinea (S2-BIOZAIRE-2)	3160	10	250	0.25	3	Unknown	No data	2	Menot et al., 2010
Atlantic Ocean, Gulf of Guinea (M3-BIOZAIRE-2)	3160	10	250	0.25	0	Unknown	No data	2	Menot et al., 2010
Atlantic Ocean, Gulf of Guinea (V1-BIOZAIRE-2)	3160	10	250	0.25	0	Unknown	No data	2	Menot et al., 2010
Atlantic Ocean, Gulf of Guinea (V3-BIOZAIRE-2)	3160	10	250	0.25	2	Unknown	No data	2	Menot et al., 2010

were observed in CR09 and CR42, with 89% and 83% of the species possibly unique to the respective stations. For CR42, 64% of these endemic species were singletons. The high diversity, high endemism and rarity of deep-sea species imply that sampling needs to be both intensive and extensive in order to make a comprehensive inventory of tanaidacean assemblages in deep-sea environments.

It is evident that the 250-µm mesh size sieve is effective in capturing small tanaidacean species and mancae that would otherwise be lost if only the 300-µm mesh size sieve was used (Fig. 2). Mancae may not always be amenable to taxonomic treatment or allow unequivocal taxonomic identification but their omission from community statistics will underestimate the true abundance of their respective taxa. Furthermore, this study showed that the 2–10 cm layer contained as many tanaids as the 0–2 cm layer, thus highlighting the importance of sampling below the top layer of the seafloor in order to collect deep-burrowing taxa (Fig. 2).

Due to logistical constraints, each station was limited to only one sample and, as a result, we were unable to perform statistical tests for a lack of replicates. Furthermore, four out of five box core samples obtained were unfortunately not of high quality due to seabed irregularities, and this hindered a proper assessment of the tanaidacean abundance and diversity. The samples from stations CR09 and CR36 contained too little sediment while the box core samples overflowed at stations CR21 and CR61. We believe that the overflow, fortunately, did not lose the entire surface layers of both stations as evidenced by the high tanaid abundance in CR21 as well as the similar taxonomic compositions of CR21 and its nearest station CR61. To better understand the ecology of tanaids in this region, future studies should include experimental designs with sufficient replicates for robust quantitative analyses. Despite being primarily a faunal report, we believe the present results from this poorly sampled region provide a useful baseline for future studies. Our data also presented valuable insights on the ecology of tanaids in the bathyal zone as other quantitative studies were largely conducted in the abyssal zone (Guerrero-Kommritz, 2005; Yu et al., 2018). Previous studies in the bathyal zone mostly deployed either qualitative or semi-quantitative sampling instruments such as grabs, sledges, and trawls (Błażewicz-Paszkowycz et al., 2015; Pabis et al., 2015; Stępień et al., 2019).

ACKNOWLEDGEMENTS

We would like to thank all scientific and vessel crew involved in the deep-sea expedition SJADES, especially the captain of *Baruna Jaya VIII* and chief scientists Peter KL Ng (Lee Kong Chian Natural History Museum; LKCNHM) and Dwi Listyo Rahayu (Indonesian Institute of Sciences; LIPI); our colleagues from the Tropical Marine Science Institute, especially Chuar Cheah Hoay, who were involved in the processing of the box core samples; the three anonymous reviewers for their valuable comments, which greatly improved the quality of this manuscript; the National Research Foundation (NRF), Keppel Corporation and the

National University of Singapore (NUS) for supporting this work done in the Keppel-NUS Corporate Laboratory; and the St. John's Island National Marine Laboratory (SJINML) for providing the facility necessary for conducting the research. The Laboratory is a National Research Infrastructure under NRF. Specimens were collected under the research permit RISTEKDIKTI 80/SIP/FRP/E5/Dit.KI/III/2018. The first author is grateful to his thesis supervisors Tan Koh Siang and Peter KL Ng for their constructive suggestions.

LITERATURE CITED

Bamber RN (2008) A new species of the freshwater tanaidacean genus *Pseudohalmyrapseudes* (Crustacea: Tanaidacea: Parapseudidae) from Sulawesi. Records of the Western Australian Museum, 24: 421–428.

Błażewicz M, Stępień A, Jakiel A & Palero F (2020) Chapter 20. Tanaidacea. In: Saeedi H & Brandt A (eds.) Biogeographic Atlas of the Deep NW Pacific Fauna. Pensoft, Sofia, pp. 461–500.

Błażewicz-Paszkowycz M, Bamber R & Anderson G (2012) Diversity of Tanaidacea (Crustacea: Peracarida) in the world's oceans – how far have we come? PLoS ONE, 7(4): e33068.

Błażewicz-Paszkowycz M, Pabis K & Jóźwiak P (2015) Tanaidacean fauna of the Kuril–Kamchatka Trench and adjacent abyssal plain – abundance, diversity and rare species. Deep-Sea Research II, 111: 325–332.

Boland GS & Rowe GT (1991) Deep-sea benthic sampling with the GOMEX box corer. Limnology and Oceanography, 36(5): 1015–1020.

Brind'Amour A, Menot L, Galéron J & Crassous P (2009) Spatial organization of a sedimentary macrobenthic community located on the West African Equatorial margin. Deep-Sea Research II, 56: 2292–2298.

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

Chim CK, Wirawati I, Avianto P, Richer de Forges B, Chan TY & Tan KS (2021) SJADES 2018 biodiversity research cruise: Methodology and station data. In: Rahayu DL & Tan KS (eds.) South Java Deep-Sea (SJADES) Biodiversity Expedition 2018. Raffles Bulletin of Zoology, Supplement 36: 17–22.

Cosson N, Sibuet M & Galéron J (1997) Community structure and spatial heterogeneity of the deep-sea macrofauna at three contrasting stations in the tropical northeast Atlantic. Deep-Sea Research I, 44(2): 247–269.

Dahl E, Laubier L, Sibuet M & Strömberg J-O (1976) Some quantitative results on benthic communities of the deep Norwegian Sea. Astarte, 9: 279–297.

Drumm DT & Heard RW (2011) Systematic revision of the family Kalliapseudidae (Crustacea: Tanaidacea). Zootaxa, 3142: 1–172.

Galéron J, Menot L, Renaud N, Crassous P, Khripounoff A, Treignier C & Sibuet M (2009) Spatial and temporal patterns of benthic macrofaunal communities on the deep continental margin in the Gulf of Guinea. Deep-Sea Research II, 56: 2299–2312.

Galéron J, Sibuet M, Mahaut M-L & Dinet A (2000) Variation in structure and biomass of the benthic communities at three contrasting sites in the tropical Northeast Atlantic. Marine Ecology Progress Series, 197: 121–137.

Guerrero-Kommritz J (2005) Notes on the Tanaidacea (Crustacea: Peracarida) of the Angola Basin. Organisms, Diversity & Evolution, 5: 171–177.

Guţu M (1992) *Pagurapseudes pangtiruthuli*, a new species (Crustacea, Tanaidacea) from Bali Island. 4 Naturalisti Romani in Indonezia. Expozitie Temporara, 21(30): 17–18.

Guţu M (1995) *Bunakenia indonesiana*, a new genus and species of Apseudomorpha (Crustacea, Tanaidacea), from the south of Sulawesi Sea. Travaux du Muséum National d'Histoire Naturelle "Grigore Antipa", 35: 7–16.

Guţu M (1997) Tanaidacea. Travaux du Muséum National d'Histoire Naturelle "Grigore Antipa", 38: 259–327.

Guţu M (1998) New data on genus *Parapseudes* G.O. Sars, 1882 (Crustacea, Tanaidacea) and the description of the species *Parapseudes trispinosus* n.sp. from Indonesia. Travaux du Muséum National d'Histoire Naturelle "Grigore Antipa", 40: 165–177.

Guţu M (2006) New apseudomorph taxa (Crustacea, Tanaidacea) of the world ocean. Curtea Veche, Bucharest, 318 pp.

Guţu M (2011) A new genus and two new species of leptocheliids from the marine shallow waters of Indonesia (Crustacea: Tanaidacea: Tanaidomorpha). Travaux du Muséum National d'Histoire Naturelle "Grigore Antipa", 54(1): 43–61.

Guţu M (2012) A new subgenus and two new Indo-West-Pacific species of the leptocheliid genus *Pseudonototanais* Lang, 1973 (Crustacea: Tanaidacea: Tanaidomorpha). Travaux du Muséum National d'Histoire Naturelle "Grigore Antipa", 55(1): 27–40.

Guţu M (2016) Systematic Novelties of the Enigmatic Universe of the Leptocheliids (Crustacea: Tanaidacea). ePublishers, Bucharest, 208 pp.

Kudinova-Pasternak RK (1976) Additional notes on the fauna of Tanaidacea (Crustacea, Malacostraca) of the deep water trenches. Transactions of the Institute of Oceanology, 99: 115–125.

Kudinova-Pasternak RK (1977) Tanaidacea (Crustacea, Malacostraca) from the deep-sea trenches of the western part of the Pacific. Transactions of the Institute of Oceanology, 108: 115–135.

Lang K (1968) Deep-sea Tanaidacea. Galathea Report, 9: 23–210.

Lang K (1971) Die Gattungen *Agathotanais* Hansen und *Paragathotanais* n. gen. Tanaidacea. Crustaceana, 21: 57–71.

Laubier I & Sibuet M (1979) Ecology of the benthic communities of the deep North East Atlantic. Ambio Special Report, 6: 663–668.

Levin LA & Thomas CL (1989) The influence of hydrodynamic regime on infaunal assemblages inhabiting carbonate sediments on central Pacific seamounts. Deep-Sea Research, 36(12): 1897–1915.

Lilljeborg W (1864) Bidrag til kännedomen om de inom Sverige och Norrige förekommande Crustaceer af Isopodernas underordning och Tanaidernas familj. Inbjudningsskrift till Åhörande av de Offentliga Föreläsningar (Uppsala Universitet), 1864: 1–31.

Martín A & Díaz YJ (2005) Crustáceos Peracáridos de la región Atlántica de Venezuela: biodiversidad y taxonomía. In: Gómez MG, Capaldo M, Yanes C & Martín A (eds.) Frente Atlántico Venezolano. Investigaciones Geoambientales. Ciencias Ambientales. Tomo I. PDVSA-Fondo Editorial Fundambiente, Caracas, pp. 97–117.

Menot L, Galéron J, Olu K, Caprais J-C, Crassous P, Khripounoff A & Sibuet M (2010) Spatial heterogeneity of macrofaunal communities in and near a giant pockmark area in the deep Gulf of Guinea. Marine Ecology, 31(1): 78–93.

Nierstrasz HF (1913) Die Isopoden der Siboga-Expedition. I. Isopoda Chelifera XXXIIa. In: Weber M (ed.) Siboga-Expeditie. Uitkomsten op Zoologisch, Botanisch, Oceanographisch en Geologisch Gebied Verzameld in Nederlandsch Oost-Indie 1899–1900 aan Boord H.M. Siboga Onder Commando van Luitenant ter zee 1e kl. G.F. Tydeman. Brill, Leiden, pp. 1–56.

Pabis K, Jóźwiak P, Lörz A-N, Schnabel K & Błażewicz-Paszkowycz M (2015) First insights into the deep-sea tanaidacean fauna of

the Ross Sea: species richness and composition across the shelf break, slope and abyss. Polar Biology, 38: 1429–1437.
Pequegnat WE, Gallaway BJ & Pequegnat LH (1990) Aspects of the ecology of the deep-water fauna of the Gulf of Mexico. American Zoologist, 30: 45–64.
Sieg J (1977) Taxonomische Monographie der familie Pseudotanaidae (Crustacea, Tanaidacea). Mitteilungen aus dem Zoologischen Museum in Berlin, 53: 1–109.
Stebbing TRR (1905) Report on the Isopoda collected by Professor Herdman, at Ceylon, in 1902. Ceylon Pearl Oyster Fisheries, Supplementary Reports, 23: 1–64.
Stępień A, Pabis K & Błażewicz M (2019) Tanaidacean faunas of the Sea of Okhotsk and northern slope of the Kuril-Kamchatka Trench. Progress in Oceanography, 178: 102196.
Yu OH, Lee HG, Kim DS, Wi JH, Kim KH & Yoo CM (2018) Characterization of deep-sea macrofauna in the Korean exploration claim area in the Clarion-Clipperton Fracture Zone, northeastern Pacific Ocean. Ocean Science Journal, 53: 301–314.