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On some interesting marine decapod crustaceans (Alpheidae, Laomediidae, Strahlaxiidae) from Lombok, Indonesia

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Abstract

Several rare or uncommon, mostly infaunal decapod crustaceans are reported from intertidal and shallow subtidal habitats of Lombok, Indonesia. The alpheid shrimps *Alpheus angustilineatus* Nomura & Anker, 2005, *Athanas shawnsmithi* Anker, 2011, *Jengalpheops rufus* Anker & Dworschak, 2007, *Salmoneus alpheophilus* Anker & Marin, 2006, *Salmoneus colinorum* De Grave, 2004, and the laomediid mud-shrimp *Naushonia carinata* Dworschak, Marin & Anker, 2006, are reported for the first time since their original descriptions and represent new records for the marine fauna of Indonesia. The alpheid shrimps *Alpheus macellarius* Chace, 1988, *Alpheus platyunguiculatus* (Banner, 1953), *Athanas japonicus* Kubo, 1936, *Athanas polymorphus* Kemp, 1915, *Leptalpheus denticulatus* Anker & Marin, 2009, *Richalpheus palmeri* Anker & Jeng, 2006, *Salmoneus gracilipes* Miya, 1972, *Salmoneus tricristatus* Banner, 1959 and the laomediid mudshrimps *Lao-media astacina* De Haan, 1841 and *Naushonia lactoalbida* Berggren, 1992 are new records for Indonesian waters. The remaining alpheid shrimps, namely *Alpheopsis yaldwyni* Banner & Banner, 1973, *Alpheus savuensis* De Man, 1908, *Automate anacanthopus* De Man, 1910, *Automate dolichognatha* De Man, 1888, *Salmoneus serratidigitus* (Coutière, 1896), and the strahlaxiid mud-shrimp *Neaxius glyptocercus* (von Martens, 1869), all previously known from Indonesia, are recorded for the first time from Lombok. Colour photographs are provided for all species reported, some shown in colour for the first time.

Key words: Indonesia, marine biodiversity, Crustacea, decapod, shrimp, mud-shrimp, Caridea, Gebiidea, Axiidea, new records

Introduction

The marine decapod crustacean fauna of Indonesia, one of the richest in the world, remains rather poorly documented. This is true in both shallow and deep-water marine habitats, and particularly true for infaunal decapods, i.e. those living in self-made burrows or associated with burrows of other species. For instance, recent collections in Lombok and Papua resulted in the discovery of several species new to science (Rahayu & Ng 2010a, 2010b, 2014; Rahayu & Nugroho 2012; Ng & Rahayu, 2014; Anker *et al.* 2014).

In the present study, we report several rare, uncommon or taxonomically interesting, mainly infaunal decapods, from Lombok, based on a preliminary survey carried out in May 2014 at five sampling stations on the western and southern coasts of the island (Fig. 1). The majority of species herein reported belong to the caridean shrimp family Alpheidae (19 species); the remaining species belong to the mud-shrimp families Laomediidae (3 species) and Strahlaxiidae (1 species). Many reported species represent new records for Indonesia or Lombok, and some are reported for the first time outside their type localities. All reported species are illustrated with colour photographs, some for the first time.

The material examined in this study is deposited in the collections of the Museum Zoologicum Bogoriense (Bogor Zoological Museum), Indonesian Institute of Sciences, Bogor, Java, Indonesia (MZB); Naturalis Biodiversity Center, Leiden, the Netherlands (RMNH); Oxford University Museum of Natural History—Zoological Collections (OUMNH.ZC); and Zoological Reference Collection, Lee Kong Chian Natural History Museum (formerly Raffles Museum of Biodiversity Research), National University of Singapore, Singapore (ZRC). Other abbreviations used in the text: ASIZ—Academia Sinica, Taipei, Taiwan; FLMNH UF—Florida Museum of Natural History, University of Florida, Gainesville, USA; MNHN—Muséum National d’Histoire Naturelle, Paris, France. Carapace length (cl, in mm), given only for photographed specimens (Figs. 1–26), was measured along the mid-dorsal line from the tip of the rostrum (if absent, from the anterior margin of the carapace) to the posterior margin of the carapace.



FIGURE 26. *Neaxius glyptocercus* (von Martens, 1869): male (cl 15.8 mm) from Sira, Lombok, Indonesia (MZB Cru 4059), A—dorsal view; B—lateral view (specimen with characters of *N. acanthus* (A. Milne-Edwards 1878)).

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References

- Afzal, M., Javed, A. & Barkati, S. (1986) Checklist, synonymy and key to the genera and species of alpheid shrimps of Karachi coast. *Pakistan Journal of Agriculture Research*, 7, 337–340.

- Allen, G.R. & Steene, R. (1994) Riff-Führer. Tiere und Pflanzen im Indopazifik. Verlag Christa Hemmen, Germany, 358 pp.
- Anker, A. (2003) Alpheid shrimps from the mangroves and mudflats of Singapore. Part I. Genera *Salmoneus*, *Athanas* and *Potamalpheops*, with the description of two new species (Crustacea: Decapoda: Caridea). *The Raffles Bulletin of Zoology*, 51, 283–314.
- Anker, A. (2010) New records of rare or little-known alpheid shrimp genera in Moorea, French Polynesia (Crustacea, Decapoda). *Zootaxa*, 2403, 23–41.
- Anker, A. (2011a) Four new infaunal decapod crustaceans (Caridea: Alpheidae and Gebiidea: Axianassidae) from Lizard Island, Australia, one of them also occurring in Moorea, French Polynesia. *Zootaxa*, 2734, 1–22.
- Anker, A. (2011b) Description of a third species in the alpheid shrimp genus *Richalpheus* Anker & Jeng, 2006 (Crustacea, Decapoda). *Zootaxa*, 3059, 59–68.
- Anker, A. & Dworschak, P.C. (2007) *Jengalpheops rufus*, gen. nov., sp. nov., a new commensal alpheid shrimp from the Philippines (Crustacea: Decapoda). *Zoological Studies*, 46, 290–302.
- Anker, A., Firdaus, M. & Pratama, I.S. (2014) *Salmoneus yoyo* nov. sp., a peculiar new infaunal shrimp from Lombok, Indonesia (Decapoda, Caridea, Alpheidae). *Zootaxa*, 3852 (4), 489–495.
<http://dx.doi.org/10.11646/zootaxa.3852.4.6>
- Anker, A. & Jeng, M.S. (2006) *Richalpheus palmeri*, n. gen., n. sp., an infaunal alpheid shrimp from the Philippines, with redescription of *Amphibetaeus jousseaumei* Coutière, 1896 (Decapoda: Caridea). *Journal of Crustacean Biology*, 26, 379–391.
<http://dx.doi.org/10.1651/s-2647.1>
- Anker, A. & Marin, I.N. (2006) New records and species of Alpheidae (Crustacea, Decapoda) from Vietnam. Part I. Genus *Salmoneus* Holthuis, 1955. *The Raffles Bulletin of Zoology*, 54, 295–319.
- Anker, A. & Marin, I.N. (2009) The alpheid shrimp genus *Leptalpheus* Williams, 1965 in the tropical western Pacific, with descriptions of two new species (Crustacea: Decapoda: Caridea). *The Raffles Bulletin of Zoology*, 57, 91–107.
- Banner, A.H. (1953) The Crangonidae, or snapping shrimp, of Hawaii. *Pacific Science*, 7, 1–144. Banner, A.H. (1956) Contributions to the knowledge of the alpheid shrimp of the Pacific Ocean, part I: collections from the Mariana Archipelago. *Pacific Science*, 10, 318–373.
- Banner, A.H. (1959) Contributions to the knowledge of the alpheid shrimp of the Pacific Ocean, part IV: various small collections from the central Pacific area, including supplementary notes on alpheids from Hawaii. *Pacific Science*, 13, 130–155.
- Banner, A.H. & Banner, D.M. (1964) Contributions to the knowledge of the alpheid shrimp of the Pacific Ocean, part IX: collections from the Phoenix and Line Islands. *Pacific Science*, 18, 83–100.
- Banner, A.H. & Banner, D.M. (1966a) Contributions to the knowledge of the alpheid shrimp of the Pacific Ocean, part X: collections from Fiji, Tonga and Samoa. *Pacific Science*, 20, 145–188.
- Banner, A.H. & Banner, D.M. (1966b) The alpheid shrimp of Thailand: the alpheid shrimp of the Gulf of Thailand and adjacent waters. *The Siam Society Monographs*, 3, i–vi + 1–168.
- Banner, A.H. & Banner, D.M. (1967) Contributions to the knowledge of the alpheid shrimp of the Pacific Ocean, part XI: collections from the Cook and Society Islands. *Occasional Papers of Bernice P. Bishop Museum*, 23, 253–286.
- Banner, A.H. & Banner, D.M. (1968) Contributions to the knowledge of the alpheid shrimp of the Pacific Ocean, part XII: collections from the Marshall and Caroline Islands. *Micronesica*, 4, 261–294.
- Banner, A.H. & Banner, D.M. (1983) An annotated checklist of the alpheid shrimp from the western Indian Ocean. *Travaux et Documents de l'ORSTOM*, 158, 1–164.
- Banner, D.M. & Banner, A.H. (1973) The alpheid shrimp of Australia, part I: the lower genera. *Records of the Australian Museum*, 28, 291–382.
<http://dx.doi.org/10.3853/j.0067-1975.28.1973.407>
- Banner, D.M. & Banner, A.H. (1978) Annotated checklist of alpheid and ogyridid shrimp from the Philippine Archipelago and the South China Sea. *Micronesica*, 14, 215–257.
- Banner, D.M. & Banner, A.H. (1981) Annotated checklist of the alpheid shrimp of the Red Sea and Gulf of Aden. *Zoologische Verhandelingen*, Leiden, 190, 1–99.
- Banner, D.M. & Banner, A.H. (1982) The alpheid shrimp of Australia, part III: the remaining alpheids, principally the genus *Alpheus*, and the family Ogyrididae. *Records of the Australian Museum*, 34, 1–357.
<http://dx.doi.org/10.3853/j.0067-1975.34.1982.434>
- Banner, D.M. & Banner, A.H. (1985) The alpheid shrimp of Indonesia, based upon J.G. de Man's "The Decapoda of the Siboga Expedition, Part II: Family Alpheidae" (1911). *Marine Research in Indonesia*, 25, 1–79.
- Berggren, M. (1992) *Naushonia lactoalbida*, new species (Decapoda: Thalassinidea: Laomediidae), a mud shrimp from Inhaca Island, Moçambique. *Journal of Crustacean Biology*, 12, 514–522.
<http://dx.doi.org/10.2307/1549043>
- Bhuti, G.S., Shakuntala, S. & Sankolli, K.N. (1977) Laboratory reared alpheid larvae of the genera *Automate*, *Athanas* and *Synalpheus* (Crustacea, Decapoda, Alpheidae). *Proceedings of the Symposium on Warm Water Zooplankton*, UNESCO/NIO (Special Publication), 588–600.
- Boone, L. (1931) A collection of anomuran and macruran Crustacea from the Bay of Panama and the fresh waters of the Canal Zone. *Bulletin of the American Museum of Natural History*, 63, 137–189.

- Borradaile, L.A. (1900) On the Stomatopoda and Macrura brought by Dr. Willey from the South Seas. In: Willey, A. (Ed.), *Zoological results based on material from New Britain, New Guinea, Loyalty Islands and elsewhere, collected during the years 1895, 1896, and 1897, by Arthur Willey, D.Sc. Lond., Hon. M.A. Cantab.*, University Press, Cambridge, pp. 395–428, pls. 36–39.
- Borradaile, L.A. (1903) On the classification of the Thalassinidea. *Annals and Magazine of Natural History*, Series 7, 12, 534–551.
<http://dx.doi.org/10.1080/00222930308678891>
- Bouvier, E.L. (1915) Thalassinides nouveaux captures au large des côtes soudanaises par le “Talisman”. *Bulletin du Muséum National d'Histoire Naturelle*, 21, 182–185.
- Bruce, A.J. (1980) Shrimp: the complex life relationships of shrimps on the Great Barrier Reef. *Geo*, 2, 38–53.
- Bruce, A.J. (1990) Additions to the marine shrimp fauna of Hong Kong. In: Morton, B. (Ed.), *Proceedings of the Second International Marine Biological Workshop: The Marine Flora and Fauna of Hong Kong and Southern China*, Hong Kong University Press, Hong Kong, 2, pp. 611–648.
- Bruce, A.J. (1992) Additions to the marine caridean fauna of Hong Kong, with a description of a new species of *Onycocaris* (Crustacea: Decapoda: Palaemonidae) from Tuvalu. In: Morton, B.S. (Ed.), *Proceedings of the Second International Marine Biological Workshop: The Marine Flora and Fauna of Hong Kong and southern China*, Hong Kong University Press, Hong Kong, 3, pp. 329–343.
- Bruce, A.J. & Coombes, K.E. (1997) An annotated check-list of the caridean shrimps (Crustacea: Decapoda) of Darwin Harbour, with descriptions of three new species of *Periclimenes* (Palaemonidae: Pontoniinae). In: Hanley, J.R., Caswell, G., Megirian D. & Larson, H.K. (Eds.), *The marine flora and fauna of Darwin Harbour*. Northern Territory, Australia, pp. 301–337.
- Chace, F.A. Jr. (1955) Notes on shrimps from the Marshall Islands. *Proceedings of the United States National Museum*, 105, 1–22.
- Chace, F.A. Jr. (1988) The Caridean shrimps (Crustacea: Decapoda) of the Albatross Philippine Expedition, 1907–1910, part 5: Family Alpheidae. *Smithsonian Contributions to Zoology*, 466, i–v + 1–99.
- Chace, F.A. Jr. & Forest, J. (1970) Henri Coutière: son œuvre carcinologique, avec un index pour son Mémoire de 1899 sur les Alpheidae. *Bulletin du Muséum National d'Histoire Naturelle*, Série 2, 41, 1459–1486.
- Coutière, H. (1896) Note sur quelques genres nouveaux ou peu connus d’Alpheidés, formant la sous-famille des Alpheopsidés. *Bulletin du Muséum d'Histoire Naturelle*, 2, 380–386.
- Coutière, H. (1897) Notes sur quelques Alpheidés nouveaux ou peu connus rapportés de Djibouti (Afrique Orientale). *Bulletin du Muséum d'Histoire Naturelle*, 3, 233–236.
- Coutière, H. (1899) Les “Alpheidae”, morphologie externe et interne, formes larvaires, bionomie. *Annales des Sciences Naturelles, Zoologie*, Série 8, 9, 1–560, pls. 1–6.
<http://dx.doi.org/10.5962/bhl.title.13143>
- Coutière, H. (1902) Sur quelques espèces nouvelles du genre *Automate* de Man. *Bulletin du Muséum d'Histoire Naturelle*, 8, 337–342.
<http://dx.doi.org/10.5962/bhl.title.10050>
- Coutière, H. (1903) Note sur quelques Alpheidae des Maldives et Laquedives. *Bulletin de la Société Philomathique de Paris*, Série 9, 5, 72–90.
- Coutière, H. (1905) Les Alpheidae. In: Gardiner, J.S. (Ed.), *The Fauna and Geography of the Maldives and Laccadive Archipelagoes*, 2, pp. 852–921, pls. 70–87.
- Dana, J.D. (1852) Conspectus of the Crustacea of the Exploring Expedition under Capt. C. Wilkes, U.S.N. Paguridea, continued, Megalopidea and Macroura. *The American Journal of Science and Arts*, 2, 14, 116–125.
- De Grave, S. (2004) A new species of *Salmoneus* (Crustacea: Decapoda: Alpheidae) from Palau. *Bulletin de l'Institut Royal des Sciences de Belgique*, 74, 41–48.
- De Haan, W. (1833–1850) Crustacea. In: Siebold Ph.F. (Ed.), *Fauna Japonica Sive Descriptio Animalium, quae in Itinere per Japoniam, Jussu et Auspiciis Superiorum, Qui Summum in India Batavia Imperium Tenent, Suscepto Annis 1823–1830 Collegit, Notis, Observationibus et Adumbrationibus Illustravit (Crustacea)*, Lugduni-Batavorum, Leiden, xvii + xxxi + ix–xvi + 243 pp., pls. A–J, L–Q, 1–55.
- De Man, J.G. (1888) Bericht über die von Herrn Dr. J. Brock im Indischen Archipel gesammelten Decapoden und Stomatopoden. *Archiv für Naturgeschichte*, 53, 215–600, pls. 7–22a.
<http://dx.doi.org/10.5962/bhl.title.10633>
- De Man, J.G. (1898) Bericht über die von Herrn Schiffscapitän Storm zu Atjeh an den westlichen Küsten von Malakka, Borneo und Celebes sowie in der Java-See gesammelten Decapoden und Stomatopoden. *Zoologische Jahrbücher (Systematik)*, 10, 677–708, pls. 28–38.
<http://dx.doi.org/10.5962/bhl.title.16084>
- De Man, J.G. (1908) Diagnoses of new species of macrurous decapod Crustacea from the “Siboga-Expedition”. III. *Notes from the Leyden Museum*, 30, 98–112.
- De Man, J.G. (1910) Diagnoses of new species of macrurous decapod Crustacea from the “Siboga-Expedition”. *Tijdschrift der Nederlandsche Dierkundige Vereeniging*, Series II, 11, 287–319.
- De Man, J.G. (1911) The Decapoda of the Siboga-Expedition, II: family Alpheidae. *Siboga-Expeditie*, 39 a1, 133–465, pls.

- 1–29. [(1915) supplement—explanations of plates of Alpheidae.]
- De Man, J. (1925) The Decapoda of the Siboga-Expedition, VI: The Axiidae collected by the Siboga-Expedition. *Siboga-Expedition*, 39a5, i–ii, 1–127, pls. 1–10.
<http://dx.doi.org/10.5962/bhl.title.10512>
- Dworschak, P.C., Marin, I.N. & Anker, A. (2006) A new species of *Naushonia* Kingsley, 1897 (Decapoda: Thalassinidea: Laomediidae) from Vietnam and the Philippines with notes on the genus *Espeleonaushonia* Juarrero & Martínez-Iglesias, 1997. *Zootaxa*, 1372, 1–16.
- Edmondson, C.H. (1925) Crustacea. In: Marine Zoology of tropical central Pacific. *Bulletin of the Bernice P. Bishop Museum*, 27, pp. 3–62.
- Fabricius, J.C. (1775) *Systema Entomologiae, sistens insectorum classes, ordines, genera, species, adiectis synonymis, locis, descriptionibus, observationibus*. Officina Libraria Kortii, Flensburgi et Lipsiae, xxxii + 832 pp.
<http://dx.doi.org/10.5962/bhl.title.36510>
- Fabricius, J.C. (1798) *Supplementum Entomologiae Systematicae*. Apud Proft et Storch, Hafniae, 380 pp.
- Fourmanoir, P. (1955) Notes sur la faune intercotidale des Comores. I. Crustaces macroures et anomoures. Stomatopodes. *Naturaliste Malgache*, 7, 19–33.
- Fukuda, Y. (1982) Zoeal stages of the burrowing mud shrimp *Laomedia astacina* De Haan (Decapoda: Thalassinidea: Laomediidae) reared in the laboratory. *Proceedings of the Japanese Society of Systematic Zoology*, 24, 19–31.
- Gosliner, T.M., Behrens, D.W. & Williams, G.C. (1996) *Coral reef animals of the Indo-Pacific*. Sea Challengers, Monterey, 314 pp.
- Hay, W.P. (1917) Preliminary descriptions of five new species of crustaceans from the coast of North Carolina. *Proceedings of the Biological Society of Washington*, 30, 71–74.
- Hayashi, K.I. (1995) Prawns, shrimps and lobsters from Japan (85). Family Alpheidae—genera *Automate* and *Salmoneus*. *Aquabiology*, 101, 520–524.
- Hayashi, K.I. (1996) Prawns, shrimps and lobsters from Japan (86). Family Alpheidae—genera *Alpheopsis* and *Synalpheus* (1). *Aquabiology*, 102, 39–43.
- Hayashi, K.I. (1998) Prawns, shrimps and lobsters from Japan (100). Family Alpheidae—genus *Alpheus* (9). *Aquabiology*, 116, 209–216.
- Hayashi, K.I., Komai, T. & Asakura, A. (1994) Macrura (Crustacea: Decapoda: Stenopodidea, Caridea and Palinulidea) collected from the northern Mariana Islands, Micronesia. In: Asakura, A. & Furuki, T. (Eds.), Biological Expedition to the northern Mariana Islands, Micronesia. *Natural History Research*, 1 (Special Issue), pp. 267–273.
- Holmer, M. & Heilskov, A.C. (2008) Distribution and bioturbation effects of the tropical alpheid shrimp *Alpheus macellaris* in sediments impacted by milkfish farming. *Estuarine, Coastal and Shelf Science*, 76, 657–667.
<http://dx.doi.org/10.1016/j.ecss.2007.07.033>
- Holthuis, L.B. (1958) Contributions to the knowledge of the Red Sea. N°. 8. Crustacea Decapoda from the northern Red Sea (Gulf of Aqaba and Sinai Peninsula). I. Macrura. *Bulletin of the Sea Fisheries Research Station, Haifa*, 17, 1–40.
- Jeng, M.S. (1997) Studies on the land and aquatic decapod crustacean fauna of the Kenting National Park (II). *Conservation Research Report*, 96, 1–66. Kenting National Park, Taiwan.
- Jeng, M.S. & Chang, K.H. (1985) Snapping shrimps (Crustacea: Decapoda: Alpheidae) of Taiwan. *Bulletin of Institute of Zoology, Academica Sinica*, 24, 241–256.
- Johnson, D.S. (1962) A synopsis of the Decapoda Caridea and Stenopodidea of Singapore, with notes on their distribution and a key to the genera of Caridea occurring in Malayan waters. *Bulletin of the National Museum of Singapore*, 30, 44–79, pl. 2.
- Johnson, D.S. (1972) The occurrence of the rare mud-shrimp, *Laomedia astacina*, in Malaysian waters. *Journal of the marine Biological Association of India*, 14, 406–408.
- Johnson, D.S. (1976) Prawns of the Malacca Straits and Singapore waters. *Journal of the Marine Biological Association of India*, 18, 1–54.
- Kazmi, M.A. & Kazmi, Q.B. (1979) A check-list of marine caridean prawns of Pakistan. *Biologia*, 25, 151–157.
- Kemp, S. (1915) The Fauna of the Chilka Lake, Crustacea, Decapoda. *Memoirs of the Indian Museum*, 5, 199–326, pls. 12–13.
<http://dx.doi.org/10.5962/bhl.title.10414>
- Kensley, B., Lin, F.J. & Yu, H.P. (2000) Further records of thalassinidean shrimps from Taiwan (Decapoda: Axiidae and Calocarididae), with descriptions of three new species. *Journal of Crustacean Biology*, 20 (special number 2), 207–217.
- Kikuchi, T. & Miyake, S. (1978) Fauna and flora of the sea around the Amakusa Marine Biological Laboratory. Part II. Decapod Crustacea (revised edition). *The Amakusa Marine Biological Laboratory, Kyushu University*, 245, 1–52 pp. [in Japanese]
- Kim, H.S. (1973) *Illustrated encyclopedia of fauna and flora of Korea. Vol. 14. Anomura and Brachyura*. Samhwa Publishing Co. Ltd., Seoul, 694 pp.
- Kingsley, J.S. (1897) On a new genus and two new species of macrurous Crustacea. *Bulletin of the Essex Institute*, 27, 95–99.
- Komai, T. (2004) Rare mud shrimp genus *Naushonia* Kingsley (Decapoda: Thalassinidea: Laomediidae) from Japan: description of a new species and new record of *N. lactoalbida* Berggren. *Crustacean Research*, 33, 15–26.
- Kubo, I. (1936) A description of a new alpheoid shrimp from Japan. *Journal of the Imperial Fisheries Institute*, 31, 43–46, pl. 13.
- Kubo, I. (1940) Notes on the Japanese shrimps of the genus *Athanas* with a description of one new species. *Annotationes*

- Zoologicae Japonenses*, 19, 99–106.
- Kuiter, R. & Debelius, H. (2009) *World atlas of marine fauna*. IKAN, Frankfurt, 725 pp.
- Lanchester, W.F. (1901) On the Crustacea collected during the “Skeat” expedition to the Malay Peninsula, together with a note on the genus *Actaeopsis*. Part I. Brachyura, Stomatopoda, and Macrura. *Proceedings of the Zoological Society of London*, 1901, 534–574, pls. 33, 34.
- Latreille, P.A. (1802) *Histoire naturelle, générale et particulière, des crustacés et des insectes. Ouvrage faisant suite à l'histoire naturelle générale et particulière, composée par Leclerc de Buffon, et rédigée par C.S. Sonnini, membre de plusieurs sociétés savantes. Familles naturelles des genres*. Vol. 3. F. DuFart, Paris, 467 pp.
<http://dx.doi.org/10.5962/bhl.title.60678>
- Ledoyer, M. (1970) Étude systématique et remarques écologiques sur les Caridea recueillis principalement dans les biotopes de substrat meuble. Régions de Tuléar et de Nosy-Bé. *Annales de l'Université de Madagascar (Sciences Naturelles et Mathématiques)*, 7, 121–157, pls 1–25.
- Martens, E. von (1869) Über einige neue Crustaceen und über die neuholändischen Süßwasserkrebse. *Monatsberichte der Akademie der Wissenschaften*, 1868, 608–619.
- Milne-Edwards, A. (1870) Révision du genre *Callianassa* (Leach) et description de plusieurs espèces nouvelles de ce groupe. *Nouvelles Archives du Muséum d'Histoire Naturelle*, 6, 75–102, pls. 1, 2.
<http://dx.doi.org/10.5962/bhl.title.10050>
- Milne-Edwards, A. (1878) Additions à la famille des thalassiniens. *Bulletin de la Société Philomathique*, 7, 110–113.
- Miya, Y. (1972) The Alpheidae (Crustacea Decapoda) of Japan and its adjacent waters, part I. *Publications from the Amakusa Marine Biological Laboratory, Kyushu University*, 3, 23–101, pls. 1–14.
- Miya, Y. (1984) Alpheid shrimps from the Truks, Ponape and Majuro Atolls (Crustacea Decapoda). *Proceedings of the Japanese Society of Systematic Zoology*, 27, 67–100.
- Miya, Y. (1995) Four species of *Alpheus* from intertidal and shallow water mudflats in the Sea of Ariake, Kyushu, Japan (Crustacea, Decapoda, Alpheidae). *Bulletin of the Faculty of Liberal Arts, Nagasaki University, Natural Science*, 35, 271–288.
- Miya, M. & Miyake, S. (1968) Revision of the genus *Athanas* of Japan and the Ryukyu Islands, with description of a new species (Crustacea, Decapoda, Alpheidae). *Publications from the Amakusa Marine Biological Laboratory, Kyushu University*, 1, 129–162.
- Miyake, S. & Miya, Y. (1966) On a new species and a new record of alpheid shrimps from Japan. *Journal of the Faculty of Agriculture, Kyushu University*, 14, 133–141.
- Mukai, H. & Sakai, K. (1992) Morphology and quantitative characteristics of *Neaxius acanthus* (A. Milne-Edwards, 1878) (Thalassinidea: Axiidae) in the Papua New Guinean seagrass bed. *Bulletin of the Japanese Association of Benthology*, 43, 47–52.
- Nacorda, H.M. (2008) *Burrowing shrimps and seagrass dynamics in shallow-water meadows off Bolinao (NW Philippines)*. Unpublished PhD Dissertation, Wageningen University and UNESCO-IHE Institute for Water Education, 100 pp.
- Nakazawa, K. & Miyake, S. (1957) *Illustrated encyclopedia of the fauna of Japan (exclusive of insects)*. Crustacea Decapoda. The Hokuryukan Co. Ltd., Tokyo, 1898 pp. [in Japanese]
- Ng, P.K.L & Rahayu, D.L. (2014) Revision of the family Acidopsidae Števčić, 2005, and the systematic position of *Typhlocarcinodes* Alcock, 1900, *Caecopilumnus* Borradaile, 1902, and *Raoulia* Ng, 1987, with descriptions of two new genera and five new species (Crustacea: Brachyura: Gonoplacoidea). *Zootaxa*, 3773 (1), 1–63.
<http://dx.doi.org/10.11646/zootaxa.3773.1.1>
- Ngoc-Ho, N. (1997) The genus *Laomedia* De Haan, 1841 with description of a new species from Vietnam (Crustacea, Thalassinidea, Laomediidae). *Zoosystema*, 19, 729–747.
- Ngoc-Ho, N. (2005) Thalassinidea (Crustacea, Decapoda) from French Polynesia. *Zoosystema*, 27, 47–83.
- Ngoc-Ho, N. (2006) A new species of *Neaxius* Borradaile, 1903 from the Gulf of Guinea (Crustacea, Decapoda, Thalassinidea, Strahlaxiidae). *Zoosystema*, 28, 409–415.
- Nishimura, S. & Suzuki, H. (1971) *Seashore animals*. Hoikusha, Osaka, i–xi + 196 pp., 64 pls. [in Japanese]
- Nomura, K. & Anker, A. (2005) The taxonomic identity of *Alpheus gracilipes* Stimpson, 1860 (Decapoda: Caridea: Alpheidae), with description of five new cryptic species from Japan. *Crustacean Research*, 34, 104–139.
- Nomura, K. & Asakura, A. (1998) The alpheid shrimps (Decapoda: Alpheidae) collected from Kushimoto on the Pacific coast of central Japan, and their spatial distributions, zoogeographical affinities, social structures, and life styles. *Nankiseibutsu*, 40, 25–34. [in Japanese]
- Nomura, K., Hagiwara, K. & Ikeda, H. (1998) The alpheid shrimps (Decapoda: Alpheidae) recorded from Kanagawa Prefecture, on the Pacific coast of central Honshu, Japan. *Kanagawa Prefectural Natural History Data*, 19, 39–48, pl. 1. [in Japanese]
- Nomura, K., Nagai, S., Asakura, A. & Komai, T. (1996) A preliminary list of shallow water decapod Crustacea in the Kerama Group, the Ryukyu Archipelago. *Bulletin of the Biogeographical Society of Japan*, 51, 7–21.
- Palomar, N.E., Juinio-Meñez, M.A. & Karplus, I. (2004) Feeding habits of the burrowing shrimp *Alpheus macellarius*. *Journal of the Marine Biological Association of the United Kingdom*, 84, 1199–1202.
<http://dx.doi.org/10.1017/s0025315404010641h>
- Palomar, N., Juinio-Meñez, M.A. & Karplus, I. (2005) Behavior of the burrowing shrimp *Alpheus macellarius* in varying

- gravel substrate conditions. *Journal of Ethology*, 23, 173–180.
<http://dx.doi.org/10.1007/s10164-005-0149-3>
- Poore, G.C.B. (1994) A phylogeny of the families of Thalassinidea (Crustacea: Decapoda) with keys to families and genera. *Memoirs of the Museum of Victoria*, 54, 79–120.
- Poore, G.C.B. & Griffin, D.J.G. (1979) The Thalassinidea (Crustacea: Decapoda) of Australia. *Records of the Australian Museum*, 32, 217–321.
<http://dx.doi.org/10.3853/j.0067-1975.32.1979.457>
- Poupin, J. (1998) Crustacea Decapoda and Stomatopoda of French Polynesia. II. *Atoll Research Bulletin*, 451, i–iii, 1–62.
<http://dx.doi.org/10.5479/si.00775630.451.1>
- Rahayu, D.L. & Ng, P.K.L. (2010a) *Notonyx guinotae*, a new species of goneplacid crab (Brachyura, Goneplacidae) from Lombok Island, Indonesia. *Studies on Brachyura. Crustaceana Monographs*, 11, 269–278.
<http://dx.doi.org/10.1163/ej.9789004170865.i-366.164>
- Rahayu, D.L. & Ng, P.K.L. (2010b) The species of *Notonyx* A. Milne-Edwards, 1873, from Lesser Sunda and Maluku Islands, Indonesia, with description of a new species (Crustacea: Decapoda: Brachyura: Goneplacidae). *Zootaxa*, 2570, 51–60.
- Rahayu, D.L. & Nugroho, D.A. (2012) The Indonesian species of *Macrophthalmus* Desmarest, 1823, with the description of a new species (Crustacea: Decapoda: Brachyura: Macrophthalmidae). *Zootaxa*, 3158, 20–36.
- Rahayu, D.L. & Ng, P.K.L. (2014) New genera and new species of Hexapodidae (Crustacea, Brachyura) from Indo-West Pacific and east Atlantic. *Raffles Bulletin of Zoology*, 62, 396–483.
- Saint-Laurent, M. de (1979) Vers une nouvelle classification des crustacés décapodes Reptantia. *Bulletin de l'Office National des Pêches République Tunisienne, Ministère de l'Agriculture*, 3, 15–31
- Sankolli, K.N. (1971) The Thalassinoidea (Crustacea, Anomura) of Maharashtra. *Journal of the Bombay Natural History Society*, 68, 94–106.
- Sakai K. (1962) Systematic studies on Thalassinidea. I. *Laomedia astacina* De Haan. *Publications of the Seto Marine Biological Laboratory*, 10, 27–34.
- Sakai, K. (2011) Axioidea of the world and a reconsideration of the Callianassoidea (Decapoda, Thalassinidea, Callianassida). *Crustaceana Monographs*, 13, i–x, 1–616.
<http://dx.doi.org/10.1163/9789047424185>
- Sakai, K. & Miyake, S. (1964) Description of the first zoea of *Laomedia astacina* de Haan (Decapoda Crustacea). *Science Bulletin of the Faculty of Agriculture, Kyushu University*, 21, 83–87.
- Sakai, K. & Saint Laurent, M. de. (1989) A check list of Axiidae (Decapoda, Crustacea, Thalassinidea, Anomura), with remarks and in addition descriptions of one new subfamily, eleven new genera and two new species. *Naturalist, Shikoku University*, 3, 1–104.
- Suvatti, C. (1937) *A check-list of aquatic fauna of Siam, (excluding fishes)*. Bangkok, 116 pp.
- Tirmizi, N.M. (1983) Four axiids (Decapoda, Thalassinidea) from Indonesia. *Research on Crustacea, Tokyo*, 12, 85–95.
- Yaldwyn, J.C. & Wear, R.G. (1972) The eastern Australian, burrowing mud-shrimp *Laomedia healyi* (Crustacea, Macrura Reptantia, Laomediidae) with notes on larvae of the genus *Laomedia*. *Australian Zoologist*, 17, 126–141.