Evolutionary diversification of coral-dwelling gall crabs (Cryptochiridae)

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Curriculum vitae

Born in Groningen (The Netherlands), Sancia Esmeralda Theonilla van der Meij grew up in the land-locked province of Drenthe. She attended high school [Atheneum] in Groningen before moving to Costa Rica in 1999 to study Spanish, where she worked in a wide array of jobs and travelled all over Central America. After a travel companion suggested that she would probably enjoy diving, she obtained her first dive certificate at Utila (Islas de la Bahía, Honduras). A few years later, after obtaining her BSc in Leeuwarden at the Van Hall Institute, she moved to Leiden in 2004 to pursue her MSc degree in Biology at Leiden University with a focus on everything ocean-related.

Her first MSc internship was carried out at the NIOZ (Royal Netherlands Institute for Sea Research - Texel) on the diversity and distribution of cetaceans in the southern North Sea. She continued with a second MSc internship at Naturalis in Leiden on historical changes in the species composition of stony corals and molluscs in Jakarta Bay (Indonesia). Ever since, marine invertebrates of coral reefs have been a topic of her interest. Sancia graduated *cum laude* from Leiden University in 2007.

During her studies she worked as a freelance translator of movie subtitles for a variety of different genres, but mostly science fiction and (romantic) comedies. In addition, she worked as a museum host at Naturalis between 2006 and 2009. All of 2008 she worked at the secretariat of the Pelagic Regional Advisory Council, to prepare and provide advice on the management of pelagic fish stocks in European waters for the European Commission. Since 2008 she also held several (part-time) research, project management, and collections manager positions at Naturalis. She is the managing editor of the scientific journal *Contributions to Zoology* from 2009 onwards. In her spare time she worked on various scientific projects, mostly on gall crabs and/or corals, which eventually lead to the formal start of her PhD trajectory in 2012.

Over the years fieldwork was carried out at beautiful locations all over the world, including Australia, Curaçao, Indonesia, Malaysia, and the Red Sea, the results of which are included in the various chapters of this thesis.

Publications

Publications resulting from this thesis

Vehof J, van der Meij SET, Türkay M, Becker C. Female reproductive morphology of coral-inhabiting gall crabs (Crustacea: Decapoda: Brachyura: Cryptochiridae). *Acta Zoologica* doi: 10.1111/azo.12111. (online first)

Meij SET van der. 2015. A new gall crab species (Brachyura, Cryptochiridae) associated with the free-living coral *Trachyphyllia geoffroyi* (Scleractinia, Merulinidae). *ZooKeys* 500: 61-72.

Meij SET van der. 2015. Host relations and DNA reveal a cryptic gall crab species (Crustacea: Decapoda: Cryptochiridae) associated with mushroom corals (Scleractinia: Fungiidae). *Contributions to Zoology* 84: 39-57.

Meij SET van der, Berumen ML, Paulay G. 2015. A new species of *Fizesereneia* Takeda & Tamura, 1980 (Crustacea: Brachyura: Cryptochiridae) from the Red Sea and Oman. *Zootaxa* 3931: 585-595.

Meij SET van der. 2014. Host species, range extensions, and an observation of the mating system of Atlantic shallow-water gall crabs (Decapoda: Cryptochiridae). *Bulletin of Marine Science* 90: 1001-1010.

Meij SET van der. 2014. A new species of *Opecarcinus* Kropp & Manning, 1987 (Crustacea: Brachyura: Cryptochiridae) associated with the stony corals *Pavona clavus* (Dana, 1846) and *P. bipartita* Nemenzo, 1980 (Scleractinia: Agariciidae). *Zootaxa* 3869: 44-52.

Meij SET van der, Reijnen BT. 2014. The curious case of *Neotroglocarcinus dawydoffi* (Brachyura, Decapoda): biogeographic patterns resulting from isolation. *Systematics and Biodiversity* 12: 503-512.

Meij SET van der, Schubart CD. 2014. Monophyly and phylogenetic origin of the gall crab family Cryptochiridae (Decapoda: Brachyura). *Invertebrate Systematics* 28: 491-500.

Meij SET van der, Hoeksema BW. 2013. Distribution of gall crabs inhabiting mushroom corals on Semporna reefs, Malaysia. *Marine Biodiversity* 43: 53-59.

Meij SET van der. 2012. Host preferences, colour patterns and distribution records of *Pseudocryptochirus viridis* Hiro, 1938 (Decapoda, Cryptochiridae). *Crustaceana* 85: 769-777.

Publications outside of this thesis

Meij SET van der. In press. Rediscovery of *Fizesereneia tholia* Kropp, 1994 (Decapoda: Cryptochiridae). *Crustaceana*.

Meij SET van der, van Tienderen KM, Hoeksema BW. 2015. A mesophotic record of the gall crab *Opecarcinus hypostegus* from a Curaçaoan reef. *Bulletin of Marine Science* 91: 205-206.

Oijen MJP van, van der Meij SET. 2013. The types of *Osteoglossum formosum* Müller & Schlegel, 1840 (Teleostei, Osteoglossidae). *Zootaxa* 3722: 361-371.

Hoeksema BW, van der Meij SET. 2013. Editorial: corals, reefs and marine biodiversity. *Marine Biodiversity* 43: 1-6. [editorial for a Special Issue of *Marine Biodiversity* on 'Biodiversity of Coral Reefs']

Hoeksema BW, van der Meij SET. 2013. Gall crab city: an aggregation of endosymbiotic crabs inhabiting a colossal colony of *Pavona clavus*. *Coral Reefs* 32: 59.

Hoeksema BW, van der Meij SET, Fransen CHJM. 2012. The mushroom coral as a habitat. *Journal of the Marine Biological Association of the United Kingdom* 92: 647-663.

Meij SET van der, Reijnen BT. 2012. First observations of attempted nudibranch predation by sea anemones. *Marine Biodiversity* 42: 281-283.

Hoeksema BW, van der Land J, van der Meij SET, van Ofwegen LP, Reijnen BT, van Soest RWM, de Voogd NJ. 2011. Unforeseen importance of historical collections as baselines to determine biotic change of coral reefs: the Saba Bank case. *Marine Ecology - An Evolutionary Perspective* 32: 135-141.

Meij SET van der, Visser RR. 2011. The *Acropora humilis* group (Scleractinia) of the Snellius expedition (1929-30). *Raffles Bulletin of Zoology* 59: 9-17.

Reijnen BT, van der Meij SET, van Ofwegen LP. 2011. Fish, fans and hydroids: host species of pygmy seahorses. *ZooKeys* 103: 1-26.

Fransen CHJM, van der Meij SET. 2010. First record of a pontoniine shrimp (Caridea, Palaemonidae) in association with a boring bivalve of the genus *Spengleria* (Bivalvia, Euheterodonta, Gastrochaenidae). *Crustaceana* 83: 1391-1400.

Meij SET van der, Moolenbeek RG, Dekker H. 2010. The *Lioconcha castrensis* species group (Bivalvia: Veneridae); with the description of two new species. *Molluscan Research* 30: 117-124.

Meij SET van der, Suharsono, Hoeksema BW. 2010. Long-term changes in coral assemblages under natural and anthropogenic stress in Jakarta Bay (1920-2005). *Marine Pollution Bulletin* 60: 1442-1454.

Meij SET van der, Moolenbeek RG, Hoeksema BW. 2009. Decline of the Jakarta Bay molluscan fauna linked to human impact. *Marine Pollution Bulletin* 59: 101-107.

Moolenbeek RG, Dekker H, van der Meij SET. 2008. *Lioconcha lamprelli* spec. nov. (Bivalvia: Veneridae) from Australia. *Zoologische Mededelingen, Leiden* 82: 627-630.

Meij SET van der, Camphuysen CJ. 2006. Distribution and diversity of whales and dolphins (Cetacea) in the southern North Sea: 1970-2005. *Lutra* 49: 3-28.