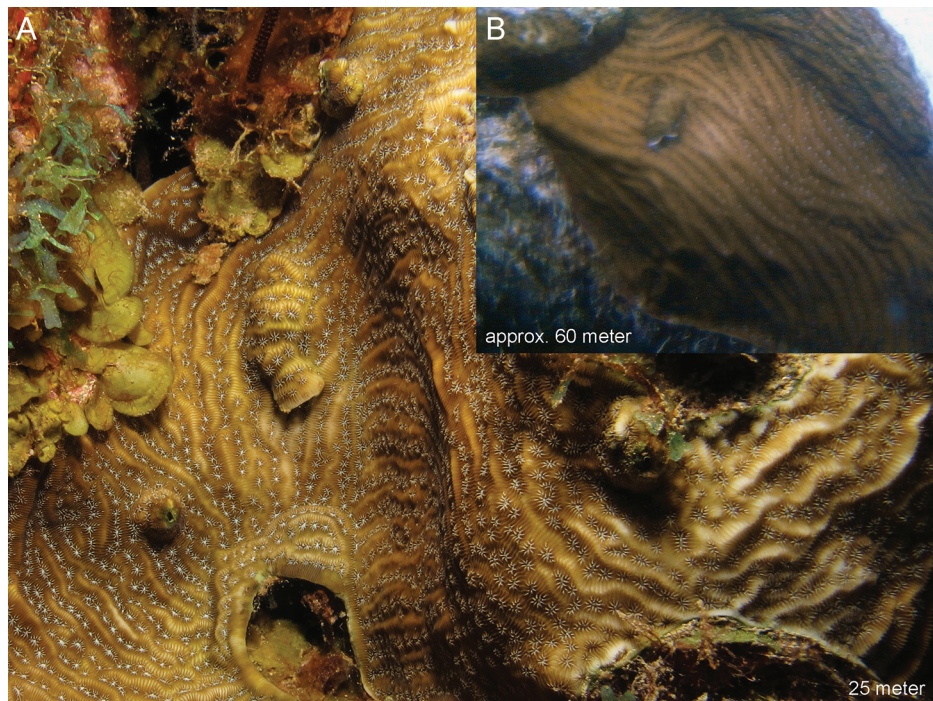


## A mesophotic record of the gall crab *Opecarcinus hypostegus* from a Curaçaoan reef

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Curaçao, Dutch Caribbean, is home to three species of gall crabs belonging to Cryptochiridae, a family obligatorily associated with a wide range of scleractinian host species. Gall crabs are reliant on their host coral; females are sedentary and never leave their dwelling (van der Meij 2014a). One of the three Atlantic gall crab species is *Opecarcinus hypostegus* (Shaw and Hopkins, 1977), which inhabits corals of the genus *Agaricia*. Corals of this genus are abundant in the photic zone (<30 m), but also in the mesophotic zone (30–150 m), where they predominantly belong to *Agaricia grahamae* Wells, 1973 and *Agaricia lamarcki* Milne-Edwards and Haime, 1851. The latter was found to be most abundant at depths of 25–60 m (Bongaerts et al. 2013).

Kropp and Manning (1987) provide occurrence data for *O. hypostegus* from 1 to 27 m depth, based on museum specimens collected at various Atlantic localities. Data from off Curaçao showed that *O. hypostegus* occurrences range from shallow (approximately 1–5 m) down to 35 m depth over all *Agaricia* hosts (van der Meij 2014a). Belt transect surveys at 6, 12, and 18 m depth revealed that *O. hypostegus* is most abundant at 18 m, where it occurs predominantly in *A. lamarcki* (van Tienderen and van der Meij unpubl data).

During a survey on 31 March, 2014, with the manned CuraSub submersible launched from Substation Curaçao (12°05'04.14"N, 68°53'53.16"W), a colony of *A. lamarcki* was observed

at approximately 60 m depth (Panel B) exhibiting the characteristic tunnel formed by *O. hypostegus* (Kropp and Manning 1987: fig. 10d, e). The shape of this tunnel is virtually identical to those found with *O. hypostegus* crabs in *A. lamarcki* at shallower depths (Panel A: Slangenbaai, Curaçao). Hence, we contend that this is strong evidence of *O. hypostegus* at mesophotic depth. In addition to the Atlantic species *O. hypostegus*, *Opearcinus* has eight members associated with Agariciidae in the Indo-Pacific region, where specimens have been observed at shallow reefs between 1 and 24 m (Kropp 1989, Hoeksema and van der Meij 2013, van der Meij 2014b). In contrast, the closely related species *Luciades agana* Kropp and Manning, 1996 has been recorded from 34 m and 128–137 m in the agariciid *Leptoseris papyracea* (Dana, 1846), a delicate coral species known to occur in a wide depth range (Dinesen 1980, Komatsu and Takeda 2013).

So far, gall crabs and other coral-associated fauna (e.g., see Hoeksema et al. 2012) have been sampled mostly on shallow reefs due to technical limitations of scientific diving deeper than 30–35 m. Previous deep gall crabs records were all obtained by dredging. The availability of rebreathers, ROVs, and small submarines equipped for collecting allow further explorations of deep coral-associated fauna. The present finding is relevant in the light of the “deep reef refugia” hypothesis, which states that mesophotic reefs may act as a refuge in the face of global reef decline (Bongaerts et al. 2010), as it furthers our knowledge on the communities that presently thrive on these deep reefs.

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#### LITERATURE CITED

- Bongaerts P, Ridgway T, Sampayo EM, Hoegh-Guldberg O. 2010. Assessing the ‘deep reef refugia’ hypothesis: focus on Caribbean reefs. *Coral Reefs*. 29:309–327. <http://dx.doi.org/10.1007/s00338-009-0581-x>
- Bongaerts P, Frade PK, Ogier JJ, Hay KB, van Bleijswijk J, Englebret N, Vermeij MJA, Bak RPM, Visser PM, Hoegh-Guldberg O. 2013. Sharing the slope: depth partitioning of agariciid corals and associated *Symbiodinium* across shallow and mesophotic habitats (2–60 m) on a Caribbean reef. *BMC Evol Biol*. 13:205. <http://dx.doi.org/10.1186/1471-2148-13-205>
- Dinesen ZB. 1980. A revision of the coral genus *Leptoseris* (Scleractinia: Fungiina: Agariciidae). *Mem Queensl Mus*. 20:181–235.
- 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. <http://dx.doi.org/10.1007/s00338-012-0954-4>
- Hoeksema BW, van der Meij SET, Franssen CHJM. 2012. The mushroom coral as a habitat. *J Mar Biol Assoc UK*. 92:647–663. <http://dx.doi.org/10.1017/S0025315411001445>
- Komatsu H, Takeda M. 2013. Second record of *Luciades agana* Kropp and Manning, 1996 (Crustacea, Decapoda, Cryptochiridae) from Tonga, South Pacific. *Bull Natl Mus Nat Sci Ser A*. 39:11–14.
- Kropp RK. 1989. A revision of the pacific species of gall crabs, genus *Opearcinus* (Crustacea: Cryptochiridae). *Bull Mar Sci*. 45:98–129.
- Kropp RK, Manning RB. 1987. The Atlantic gall crabs, family Cryptochiridae (Crustacea: Decapoda: Brachyura). *Smithson Contrib Zool*. 462:1–21. <http://dx.doi.org/10.5479/si.00810282.462>
- van der Meij SET. 2014a. Host species, range extensions, and an observation of the mating system of Atlantic shallow-water gall crabs (Decapoda: Cryptochiridae). *Bull Mar Sci*. 90:1001–1010. <http://dx.doi.org/10.5343/bms.2014.1017>
- van der Meij SET. 2014b. A new species of *Opearcinus* 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. <http://dx.doi.org/10.11646/zootaxa.3869.1.4>

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