White spot syndrome of *Turbinaria peltata* in the temperate region of Japan

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Fig. 1 **a** White spots on the colony of *Turbinaria peltata*. **b** Enlarged view of the spots, (bar: 1 cm). **c** Fully covered colony by white spots

This study describes new symptoms for *Turbinaria* in the temperate region of Japan, where coral reefs do not develop (Fig. 1a). Focal bleaching was observed on colonies of *Turbinaria peltata* (Esper), which is dominant around the study site on Ohshima Island (31°31' N, 131°24' E) located to the east of the main island of Kyushu, Japan. The bleached spots, where the number of zooxanthellae was decreased (29% of ordinary tissue, Mann–Whitney U-test, $P = 0.02$, $n = 4$), were roughly circular and about 1 cm in diameter (Fig. 1b). Almost one-third of the colonies (total of 100 colonies examined) of *T. peltata* were observed to be affected in 2008. The observed spots resemble *Porites* ulcerative white spot disease (PUWS; Raymundo et al. 2003), but the spots on *T. peltata* were larger (1 cm in diameter) than those in PUWS (3–5 mm). There was no tissue loss, and they appeared exclusively on the coenosarc (Fig. 1b). Ultimately, these spots covered the entire surface of the colony (Fig. 1c), which led to gradual necrotic death.

A white syndrome affecting colonies of *Turbinaria* spp. in tropical regions has been reported from the Great Barrier Reef (Dalton and Smith 2006) and Arabian Gulf (Riegl 2002). In addition, black and yellow band diseases of *Turbinaria* have been described (Dai et al. 2002). For the temperate corals of Japan, environmentally induced bleaching, predation by crown-of-thorns starfish, and outbreaks of coral-eating gastropods *Drupella* spp. have been observed

(Fujiwara et al. 2000; Nature Conservation Bureau, Environment Agency 1994). Although the causal agent for these symptoms of *T. peltata* is still unknown, one should be aware of possible diseases of temperate corals in the northern hemisphere, in addition to bleaching and predators.

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