

## **Cryptic speciation yields remarkable mimics: a new genus of sea slugs that masquerade as toxic algae (*Caulerpa* spp.)**

### **ABSTRACT**

“Cryptic” can refer to species that match their background through camouflage or disruptive colouration, or in taxonomy to externally similar but unrecognized congeners. In adaptive resemblance, organisms resemble parts of a larger host animal or plant on which the mimic is highly cryptic. Mimetic lineages that radiate onto superficially similar hosts may contain cryptic species in both senses: taxa that are difficult to detect, and challenging for taxonomists to distinguish. Here, we describe a new genus and four species of herbivorous sea slugs (Gastropoda, Heterobranchia, Sacoglossa), including remarkable mimics of toxic green algae (*Caulerpa* spp.) on which the slugs feed. The long-recognized *Stiliger smaragdinus* Baba 1949 is highly mimetic of “sea grapes” (*Caulerpa racemosa-lentillifera*), but phylogenetic analyses of four genes indicated *Stiliger* was polyphyletic: the name-bearing species grouped within *Placida*, whereas *Caulerpa*-mimetic lineages were phylogenetically distinct. We erect the genus *Sacoproteus* gen. n. for *S. smaragdinus* (Baba 1949), and describe four new species: *S. nishae* sp. n. from the Indo-Pacific, which mimics *Caulerpa chemnitzia*; *Sacoproteus yhae* sp. n. and *Sacoproteus browni* sp. n. from southern Australia, which mimic *Caulerpa cactoides* and *Caulerpa gemminata*; and *Sacoproteus thomasleei* sp. n., a non-mimetic west Pacific species that shared key features. *Stiliger* s.s. and *Placida* species show crypsis and aposematism but not host mimicry, although *Stiliger* spp. feeding on undefended algae may be Batesian mimics. Investigating the ecology and biogeography of *Sacoproteus* gen. n. will yield insight into how selection generates such extraordinary examples of adaptive resemblance in the marine realm.

**Keyword:** Aposematism; Coevolution; Cryptic species; Heterobranch; Mimicry; Phylogenetic systematics