

Case 3805 – *Calliactis* Verrill, 1869 (Cnidaria, Anthozoa, Hexacorallia, Actiniaria): proposed precedence over *Adamsia* Forbes, 1840

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Abstract. The purpose of this application, under Article 23.9.3 of the Code, is to conserve the name *Calliactis* Verrill, 1869 for a genus of sea anemones (Cnidaria, Actiniaria) that has been widely studied in the context of crustacean-cnidarian symbiosis. This name is threatened by a senior subjective synonym, *Adamsia* Forbes, 1840. In the interest of nomenclatural stability, we ask the ICZN Commission to use its plenary power to reverse the precedence of *Calliactis* Verrill, 1869 and *Adamsia* Forbes, 1840 whenever the two names are considered synonyms.

Keywords. Nomenclature; taxonomy; Anthozoa; Actiniaria; HORMATHIIDAE; *Adamsia*; *Calliactis*; sea anemone.

1. The carcinoecium-forming, symbiotic sea anemone genus *Adamsia* Forbes, 1840: 180 (Cnidaria, Actiniaria) was erected for *Actinia maculata* Adams, 1800 and its purported synonyms *A. carcincopados* Otto, 1823 (sic; misspelling of *carciniopados*) and *A. picta* Risso, 1826. Under Article 67.2.1 of the Code (ICZN, 1999), the type species of *Adamsia* must be one of these three originally included nominal species, but it was not fixed by Forbes. Manuel (1981: 177) subsequently designated *A. carciniopados* as the type species, mistakenly considering *A. maculata* as preoccupied and thus unavailable, without further explanation (Daly et al., 2004: 388). Later on, Fautin (2016: 333) hypothesized that Manuel (1981) had considered *A. maculata* as preoccupied because it is a junior homonym of *A. maculata* Bruguière, 1789. In fact, under Article 10.6 of the Code (ICZN, 1999: 9–10), junior homonyms remain available “unless the Commission has ruled otherwise”.

2. All three nominal species mentioned by Forbes (1840) are currently considered junior synonyms of a species now most frequently called *Calliactis palliata* and with disputed authorship, a fact that has led to much discussion about how to cite the name and authorship of the type species. Under Recommendation 67B (ICZN, 1999: 66), “The name of a type species should be cited by its original binomen.” Evidently, because of

various authors' misunderstanding of this Recommendation, recent discussions regarding the type species have focussed on the combinations *Medusa palliata* and *Actinia palliata*. The former is the original binomen of the taxonomically valid name of the type species, but not the original binomen of the actual type species of *Adamsia*, *Actinia carciniopados*. Although the first description of *M. palliata* was by Bohadsch (1761: 135), all of the names in that work are unavailable, as it was, in the wording of the summary of Opinion 185 (ICZN, 1944: 39), "suppressed for all nomenclatorial purposes". Manuel (1981), the first to act upon this ruling, used *Actinia carciniopados* Otto, 1823 as the first available name (but not as the original binomen) for the type species of *Adamsia*. Daly et al. (2004) continued down this path, contending that Fabricius (1779: 328) had made the name *Medusa palliata* available in a redescription of the species. This temporarily settled the confusion about the type species of *Adamsia* in the eyes of many (Fautin, 2016; Daly & Fautin, 2021) until Gusmão et al. (2019a) realized that all these workers had overlooked the fact, discovered by Cornelius & Ates (2003), that the name *Medusa palliata* had actually been made available by Müller (1776) a few years prior to Fabricius (1779). Müller (1776: 233) used the binomen *Medusa palliata* while citing the name, plate and figure from Bohadsch (1761: pl. 11, fig. 1), thereby making the specific name available under Art. 12.2.1. One might argue that Opinion 185 had made Bohadsch's work ineligible as a source of bibliographic citation for the purposes of Art. 12.2.1, but that would only be true if, in the wording of the Article, the Opinion had "ruled that the work is to be treated as not having been published", which was not the case. This, however, does not make *Medusa palliata* Müller, 1776 the type species of *Adamsia*; under Recommendation 67B, the type species should still be cited as *Actinia carciniopados* Otto, 1823, optionally accompanied by its currently valid synonym.

3. The sea anemone genus *Calliactis* Verrill (1869: 481) was erected to accommodate species of sea anemones that may be symbiotic with hermit crabs but may also live independently. Its type species is *Actinia decorata* Couthouy in Dana, 1846, by original designation (Verrill, 1869: 481).

4. Sea anemones of the genera *Adamsia* and *Calliactis* are part of a conspicuous symbiotic relationship between sea anemones and hermit crabs, involving one or more sea anemones living on shells inhabited by a hermit crab. This symbiosis is ubiquitous in the marine environment, occurring from shallow to deep waters at most latitudes except the Arctic and Antarctic. The sophistication of responses and coordination between partners has inspired many behavioral and other kinds of studies aiming to understand this symbiosis (e.g., Ross, 1971, 1974a, 1974b; Dunn et al., 1980; Daly et al., 2004).

5. Ross (1974a) hypothesized a close phylogenetic relationship between members of *Calliactis* and *Adamsia* based on morphology. Later, a close phylogenetic relationship between these genera was confirmed in a series of works beginning with a morphological revisionary dissertation on sea anemones symbiotic with hermit crabs (Gusmão, 2010) and a multi-locus molecular phylogeny of these sea anemones (Gusmão & Daly, 2010). The latter work found no support for the monophyly of the hermit crab symbionts. Conversely, *Calliactis* was rendered paraphyletic by the consistent inclusion, with high bootstrap support (> 99%), of *Adamsia palliata* within a clade otherwise containing four species of *Calliactis*. Since then, all molecular phylogenetic analyses (e.g., Rodríguez et al., 2012, 2014; Lauretta et al., 2014; Grajales & Rodríguez, 2016; Gusmão et al., 2018, 2019a, 2019b) have supported a close phylogenetic relationship between *Adamsia* and *Calliactis*.

6. Gusmão et al. (2019a) described a new species of *Calliactis*, revised the hermit-crab-symbiotic genera based on morphological and molecular data, formalized the findings from Gusmão & Daly (2010) by synonymizing *Adamsia* and *Calliactis*, and modified the diagnosis of the latter genus accordingly. These actions resulted in the transfer of the three valid species of *Adamsia* to *Calliactis*.

7. According to the Principle of Priority (Articles 23.1 and 23.3), as the above-mentioned synonymy is accepted, the senior subjective synonym *Adamsia* Forbes, 1840 must be preferred to the junior synonym, *Calliactis* Verrill, 1869. However, for more than 50 years, *Calliactis* species have been used as a model system for research on the hermit crab-sea anemone symbiosis and the complex behavior of the symbiotic partners (e.g., McFarlane, 1969; Cutress et al., 1970; Brooks & Mariscal, 1986; Imafuku et al., 2000; Giraud, 2011). *Calliactis* is more speciose than *Adamsia* (14 species versus two; Gusmão et al., [2019b]) and generally encompasses species living in shallower habitats, which are more accessible. Furthermore, a marine natural product, the toxin calitoxin, is named after its source genus *Calliactis* (see Cariello et al., 1989). *Calliactis* is currently in wider use than its senior synonym, arguably by a sufficient margin to be deemed in “prevailing usage” under the definition given in the Code’s Glossary. In the last 50 years (1974–2024), the name *Adamsia* has been used in 39 publications by 106 different authors (Appendix 1), whereas the name *Calliactis* has been used in at least 126 publications by 259 different authors (Appendix 2). Furthermore, most of the studies using *Calliactis* spp. have been non-taxonomic and did not always follow formal nomenclature. In the interests of nomenclatural stability, it would be ideal to maintain the use of the junior synonym by reversal of precedence (Art. 23.9). The name *Adamsia* has been used as a valid name after 1899 (e.g., Ates, 1995; Daly et al., 2004), and so does not meet the conditions of Art. 23.9.1.1; therefore, although the name *Calliactis* has been the more widely used during the last 50 years, reversal of precedence cannot be automatically granted. Nonetheless, we believe that the use of the senior synonym *Adamsia* would cause confusion and threaten stability, and we therefore refer the matter to the Commission under Art. 23.9.3 for a ruling in favour of reversal of precedence.

8. The International Commission on Zoological Nomenclature is accordingly asked:

- (1) to use its plenary power:
 - (a) to give the generic name *Calliactis* Verrill, 1869 precedence over the generic name *Adamsia* Forbes, 1840, whenever the two are considered to be synonyms;
 - (b) to rule that the correct authorship for the name *palliata* (as published in the binomen *Medusa palliata*) is Müller, 1776, regardless of Opinion 185’s suppression of Bohadsch (1761) for all nomenclatural purposes;
- (2) to place on the Official List of Generic Names in Zoology the following names:
 - (a) *Calliactis* Verrill, 1869 (gender: feminine) (type species by original designation *Actinia decorata* Couthouy in Dana, 1846) with the endorsement that it is to be given precedence over the name *Adamsia* Forbes, 1840, as ruled in (1)(a) above;
 - (b) *Adamsia* Forbes, 1840 (gender: feminine) (type species *Actinia carcinopados* Otto, 1823 by subsequent designation by Manuel [1981]), with the endorsement that it is not to be given priority over the name *Calliactis* Verrill, 1869 whenever the two are considered synonyms.

- (3) to place on the Official List of Specific Names in Zoology the following names:
- (a) *carciniopados* Otto, 1823 (as published in the binomen *Actinia carciniopados*) (type species of *Adamsia* Forbes, 1840);
 - (b) *decorata* Couthouy in Dana, 1846 (as published in the binomen *Actinia decorata*) (type species of *Calliactis* Verrill, 1869).

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Appendix 1. List of 39 publications by 106 different authors published in the last 50 years (1974–2024) using *Adamsia* Forbes, 1840 as a valid name.

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Appendix 2. List of 126 publications by 259 different authors published in the last 50 years (1974–2024) and using *Calliactis* Verrill, 1869 as a valid name.

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