(315–319) Proposals to amend Article 11.8 and its Examples to remove ambiguity in the sanctioning of dual nomenclature for dinoflagellates, and an emendation of Article 11.7, Example 29

Martin J. Head,1 Robert A. Fensome,2 Patrick S. Herendeen3 & Judith E. Skog4

1 Department of Earth Sciences, Brock University, 1812 Sir Isaac Brock Way, St. Catharines, Ontario L2S 3A1, Canada
2 Natural Resources Canada, Geological Survey of Canada (Atlantic), Bedford Institute of Oceanography, P.O. Box 1006, Dartmouth, Nova Scotia B2Y 4A2, Canada
3 Chicago Botanic Garden, 1000 Lake Cook Road, Glencoe, Illinois 60022, U.S.A.
4 Department of Environmental Science and Policy and Department of Biology, George Mason University, 4400 University Drive, Fairfax, Virginia 22030-4444, U.S.A.

Author for correspondence: Martin J. Head, mjhead@brocku.ca

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Dinoflagellates are predominantly single-celled organisms with a life cycle that includes a motile stage and, in some species, also a resting cyst (hereafter “cyst”). With rare exceptions, only the cyst, or more properly its wall, is geologically preservable. The deep fossil record of dinoflagellates extending down to the Middle Triassic is based almost exclusively on fossilized cysts. This has led to the development of two systems of classification and resulting nomenclature at the generic level and below: one for modern (non-fossil) organisms, which is usually based on the motile stage but potentially encompasses all aspects of the life cycle including the cyst; and another based exclusively on fossil cysts. Since the 1960s, cysts recovered from modern marine sediments have been assigned an existing fossil-based name where available. Where no such name exists, these modern cysts have often been treated as fossils and new fossil-based names given accordingly. This practice is facilitated under Art. 13.3 of the International Code of Nomenclature for algae, fungi, and plants (the Melbourne Code; McNeill & al. in Regnum Veg. 154. 2012), which distinguishes as fossil any material having stratigraphic context at the site of original occurrence.

Meanwhile, life cycle studies of living dinoflagellates have succeeded increasingly in establishing equivalencies between the names based on the motile stage (the non-fossil species name) and those based on the cyst (the fossil-species name). This has resulted in dual nomenclature, where a non-fossil species name can be used alongside a fossil-species name even when the two names represent specimens belonging to the same biological species. Hence the name Tuberculodinium vancampoae (Rossignol) D. Wall (1967), which is based on a fossil type, can still be used for the cyst now known to be produced by the non-fossil species Pyrophacus steinii (Schiller) D. Wall & B. Dale (1971). While dual nomenclature unconditionally allows two parts of the life cycle of a single living organism to carry different names, it: (1) links the motile stage to the fossil record of its cyst and those of its relatives; (2) recognizes that the two names represent different concepts because one is based on the entire life cycle but typified usually by reference to the motile stage, and the other (the fossil-taxon name) on the morphology of the cyst alone; and (3) acknowledges the dominant nomenclatural practice of those who study fossil and modern cyst distributions, a practice that extends back more than 40 years and has left an extensive literature.

Dual nomenclature in dinoflagellates is supported by Art. 1.2, 11.1, and 11.7 of the Code. Article 1.2 states that “A taxon (diatom taxa excepted) the name of which is based on a fossil type is a fossil-taxon. A fossil-taxon comprises the remains of one or more parts of the parent organism, or one or more of their life history stages, in one or more preservational states, as indicated in the original or any subsequent description or diagnosis of the taxon”. This acknowledges a fossil-taxon that is distinct from its living (non-fossil) counterpart. Article 11.1 states that “the use of separate names is allowed for fossil-taxa that represent different parts, life-history stages, or preservational states of what may have been a single organismal taxon or even a single individual (Art. 1.2)”. This allows names for fossil cysts even when it is accepted that they represent only part of the life cycle of the organism. Article 11.7 states that “For purposes of priority, names of fossil-taxa (diatom taxa excepted) compete only with names based on a fossil type.” This specifically sanctions dual nomenclature in that names of fossil cysts can be used alongside names of equivalent taxa based on living (non-fossil) types without consideration of priority. In the above example, the cyst-based species name Tuberculodinium vancampoae (Rossignol, 1962) D. Wall (1967) can be used alongside Pyrophacus steinii (Schiller, 1935) D. Wall & B. Dale (1971), even though the latter has priority.

Whereas Art. 1.2, 11.1, and 11.7 effectively sanction dual nomenclature in dinoflagellates, Art. 11.8 states “Names of organisms (diatoms excepted) based on a non-fossil type are treated as having priority over names of the same rank based on a fossil type”. This article is meant to address the priority of names based on a
non-fossil type that are considered to be synonyms of those based on a fossil type when these names are applied to a non-fossil taxon. However, it could be interpreted to mean that a name based on a non-fossil type must also be applied to a fossil-taxon if both non-fossil and fossil-taxa are considered equivalent, such as when they represent different parts of the same life cycle. This would then be at odds with dual nomenclature and potentially contradict Art. 11.7.

A key feature of dual nomenclature is that the non-fossil taxon and its equivalent fossil-taxon are conceptually different. Their respective names can be united or combined by life cycle studies, but this equivalency does not automatically mean that they are synonyms.

Given the ambiguity created by the present Art. 11.8, we propose the following amendments to the Code.

(315) Amend Art. 11.8 as follows (new text in bold):

“11.8. Names of organisms (diatoms excepted) based on a non-fossil type are treated as having priority over names of the same kind are known to be part of the life cycle of the non-fossil species because it has a fossil type and therefore does not compete for priority with P. oblongum.”

Examples 3l and 34 create ambiguity with respect to our proposed emendation of Art. 11.8 because their use of “combined” and “united”, terms not defined in the Code, might be confused with “equivalency” in dual nomenclature. For the sake of clarity, we propose the following two amendments to the Code.

(316) Amend Art. 11.8 Ex. 3l as follows (new text in bold, deleted text in strikethrough):

“Ex. 3l. If Platycarya Siebold & Zucc. (1843), a non-fossil genus, and Petrophiloides Bowerb. (1840), a fossil-genus, are united treated as heterotypic synonyms for a non-fossil genus, the name Platycarya is correct for the combined genus, although even though it is antedated by Petrophiloides.”

(317) Amend Art. 11.8 Ex. 34 as follows (new text in bold, deleted text in strikethrough):

“Ex. 34. Boalch and Guy-Ohlson (in Taxon 41: 529–531. 1992) united synonymized the two non-diatom algal genera Pachysphaera Ostenf. (1899) and Tasmanites E. J. Newton (1875) (Prasinophyta). Pachysphaera is based on a non-fossil type and Tasmanites on a fossil type. Under the Code in effect in 1992, Tasmanites had priority and was therefore adopted. Under the current Art. 11.8, which excepts only diatoms and not algae in general, Pachysphaera is the correct name for the combined non-fossil genus that includes both of these heterotypic synonyms.”

We introduce a new example for our amended Art. 11.8 that illustrates how dual nomenclature is supported when the names of fossil-taxa are not required to compete for priority with those based on non-fossil types.

(318) Add a new example under Art. 11.8 as follows:

“Ex. 34bis. Reid (in Nova Hedwigia 29: 429–462. 1977) indicated that his new fossil-species Votadinium calvum was the resting cyst of the non-fossil dinoflagellate Peridinium oblongum (Auriv., 1898) Cleve (1900). Contrary to the opinion of Lentin & Williams (in Contr. Ser. Amer. Assoc. Stratigr. Palynologists 28: viii +1–856. 1993), F. calvum can be used as the correct name for the cyst-fossil species—because it has a fossil type and therefore does not compete for priority with P. oblongum.”

In relation to Votadinium calvum, Fensome & Williams (in Contr. Ser. Amer. Assoc. Stratigr. Palynologists 42: 681. 2004) cited Art. 52.1, with the implication that citation of the name of a non-fossil species in the synonymy of the name of a new fossil species would render the latter superfluous. In fact, this would not be a threat to the name of the cyst fossil-species (in this case V. calvum) because Art. 52.1 includes the phrase “a name that ought to have been adopted”. From the practice of dual nomenclature, it follows that the name of the living (non-fossil) species need not be adopted.

Dual nomenclature in dinoflagellates derives from equivalency at the species level, and cannot usually be applied between genera, where different sets of taxonomic criteria apply to cysts and motile stages. Consequently, we propose the following amendment to the Code.

(319) Amend Art. 11.7 Ex. 29 as follows (new text in bold, deleted text in strikethrough):

Ex. 29. The name Tuberculodinium D. Wall (1967) Tuberculodinium vancampae (Rossignol, 1962) D. Wall (1967) may be retained for a fossil-genus fossil-species of cysts even though cysts of the same kind are known to be part of the life cycle of the non-fossil genus Pyrophacus F. Stein (1883) species Pyrophacus steinii (Schiller, 1935) D. Wall & B. Dale (1971).

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