The nomenclatural type of the genus *Methanocorpusculum* Zellner *et al.* 1988 and the selection of the correct name

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A recent Request for an Opinion has raised the issue of the inter-relationship between *Methanocorpusculum parvum* Zellner *et al.* 1988, the type species of the genus *Methanocorpusculum* Zellner *et al.* 1988 as defined at the time of valid publication of the genus name and the subsequent recognition of *Methanocorpusculum aggregans* (Ollivier *et al.*, 1985) Xun *et al.* 1989 as an earlier heterotypic synonym. Examination of the relevant literature indicates that there are a number of misunderstandings that have arisen. In particular misinterpretation of Rule 15 of the International Code of Nomenclature of Prokaryotes continues to be a source of confusion. Additional problems centre on whether the nomenclatural type of a taxon continues to be the nomenclatural type even if that name is not treated as the correct name and would not appear in a list of names in a given classification. It would be appropriate to clarify these issues.

Oren & Garrity (2015) have submitted a Request for an Opinion with the title 'The correct name of the type species of the genus *Methanocorpusculum*'. While such matters are to be dealt with by the Judicial Commission and where appropriate an 'Opinion' issued, background work on the 'Request for an Opinion' highlighted a number of issues that suggest there are problems with the interpretation of the wording of the International Code of Nomenclature of Prokaryotes (Parker *et al.*, 2015). As currently formulated the 'Request for an Opinion' cannot be answered because it combines two elements that are independent of one another and cannot be linked. The relevant background literature is to be found in Boone *et al.* (1993), Chong & Boone (2001), Garcia *et al.* (2006), Ollivier *et al.* (1985), Xun *et al.* (1989) and Zellner *et al.* (1987, 1989). In essence the situation is that *Methanocorpusculum parvum* Zellner *et al.* 1988 is the nomenclatural type of the genus *Methanocorpusculum* Zellner *et al.* 1988, but evidence has been presented that *Methanocorpusculum parvum* Zellner *et al.* 1988 is a heterotypic synonym of *Methanocorpusculum aggregans* (Ollivier *et al.*, 1985) Xun *et al.* 1989 (Boone *et al.*, 1993; Chong & Boone, 2001), the consequences of which are that the correct name of the taxon that includes both the type strain of *Methanocorpusculum parvum* Zellner *et al.* 1988 and the type strain of *Methanocorpusculum aggregans* (Ollivier *et al.*, 1985) Xun *et al.* 1989 is *Methanocorpusculum aggregans* (Ollivier *et al.*, 1985) Xun *et al.* 1989. However, when this is the case the nomenclatural type of the genus *Methanocorpusculum* Zellner *et al.* 1988 remains *Methanocorpusculum parvum* Zellner *et al.* 1988, even if it is not treated as a correct name and not listed as a currently used species combination within the genus *Methanocorpusculum* Zellner *et al.* 1988. The statement by Oren & Garrity (2015) that:

‘If one accepts the proposal by Boone *et al.* (1993), the type species of the genus *Methanocorpusculum* becomes *Methanocorpusculum aggregans* because Rule 23a and Principle 8 dictate that there can only be one correct name applied to a given circumscription, position and rank, and that name is based on priority.’

is not in accordance with the wording of the Code because there is no wording in the Code that requires the nomenclatural type of the genus to be changed if the nomenclatural type is shown to be a later synonym of another species in the same (or another) genus. Boone *et al.* (1993) also do not make that proposal.

Similarly the wording (Oren & Garrity, 2015):

‘the correct name of the type species of the genus, as based on Principle 8, Rules 15, 23a, 41a(2) and 42, is *Methanocorpusculum aggregans*, with strain MSt as the type permanently associated with this name.’

is not in accordance with the Principles and Rules of the Code cited because while the combination *Methanocorpusculum aggregans* may indeed be the correct name, that does not make it the nomenclatural type of the genus *Methanocorpusculum* Zellner *et al.* 1988.

The major misunderstanding that arises is the failure to distinguish between nomenclature (in the form of validly published names and designated nomenclatural types) and classification where in the case of the recognition of synonyms only one
**Table 1.** Time line of the changes in the nomenclature and classification of members of the genus *Methanocorpusculum*

1: *Methanocorpusculum* Zellner et al. 1988  
**Species names used in the genus**  
*Methanocorpusculum parvum* Zellner et al. 1988  
(nomenclatural type of the genus *Methanocorpusculum* Zellner et al. 1988)  
legitimate, validly published, correct name

2: *Methanocorpusculum* Zellner et al. 1988 *sensu* Zhao et al. 1989  
**Species names used in the genus**  
*Methanocorpusculum parvum* Zellner et al. 1988  
(nomenclatural type of the genus *Methanocorpusculum* Zellner et al. 1988)  
*Methanocorpusculum labreanum* Zhao et al. 1989  
legitimate, validly published, correct name

**Species names used in the genus**  
*Methanocorpusculum parvum* Zellner et al. 1988  
(nomenclatural type of the genus *Methanocorpusculum* Zellner et al. 1988)  
*Methanocorpusculum aggregans* (Ollivier et al. 1985) Xun et al. 1989  
*Methanocorpusculum labreanum* Zhao et al. 1989  
legitimate, validly published, correct name

**Species names used in the genus**  
*Methanocorpusculum parvum* Zellner et al. 1988  
(nomenclatural type of the genus *Methanocorpusculum* Zellner et al. 1988)  
*Methanocorpusculum bavaricum* Zellner et al. 1989  
*Methanocorpusculum sinense* Zellner et al. 1989  
legitimate, validly published, correct name

5: *Methanocorpusculum* Zellner et al. 1988 *sensu* Chong and Boone 2001  
**Species names used in the genus**  
*Methanocorpusculum parvum* Zellner et al. 1988  
(nomenclatural type of the genus *Methanocorpusculum* Zellner et al. 1988)  
*Methanocorpusculum bavaricum* Zellner et al. 1989  
*Methanocorpusculum sinense* Zellner et al. 1989  
Name not used because it is treated as a later homotypic synonym  
[Methanocorpusculum aggregans* (Ollivier et al. 1985) Xun et al. 1989]  
legitimate, validly published, later heterotypic synonym of *Methanocorpusculum parvum* Zellner et al. 1988 treated as not being a correct name
validly published name must be selected in accordance with the Rules of the Code, i.e. the correct name.

Examination of the literature indicates that although Boone et al. (1993) recognised that Methanocorpusculum parvum Zellner et al. 1988 and Methanocorpusculum aggregans (Ollivier et al. 1985) Xun et al. 1989 should be treated as heterotypic synonyms they continue to use the name Methanocorpusculum parvum Zellner et al. 1988 rather than Methanocorpusculum aggregans (Ollivier et al. 1985) Xun et al. 1989. The reasons are not clear from the text. However, Chong & Boone (2001) clearly state that they consider Methanocorpusculum aggregans (Ollivier et al. 1985) Xun et al. 1989 to be a junior subjective (i.e. a later heterotypic) synonym of Methanocorpusculum parvum Zellner et al. 1988. The reasons are unclear, but one possibility is that the authors applied priority to the authors of the combinations Methanocorpusculum parvum Zellner et al. 1988 and Methanocorpusculum aggregans (Ollivier et al. 1985) Xun et al. 1989 rather than as required by Rule 23a Note 1 and Rule 42 to the respective epithets (parvum Zellner et al. 1988 vs aggregans Ollivier et al. 1985).

Garcia et al. (2006) add further confusion by stating:

‘The high level of DNA reassociation suggests that M. parvum and M. aggregans may be subjective (i.e. heterotypic) synonyms (Boone et al., 1993). If further investigations support this conclusion, M. aggregans would have precedence over M. parvum, which would then have to be reclassified as M. aggregans subspecies parvum. This reclassification would then invalidate the genus Methanocorpusculum as well as the family Methanocorpusculaceae.’

The current wording of Rule 15 clearly indicates that:

The [nomenclatural] type ‘is that element of the taxon with which the name is permanently associated, whether as a correct name or as a later heterotypic synonym.’

Proposals have been made to change this wording (Tindall, 2015a), but in essence it confirms that the nomenclatural type of the genus Methanocorpusculum Zellner et al. 1988, is Methanocorpusculum parvum Zellner et al. 1988. Furthermore when treated as a later heterotypic synonym of Methanocorpusculum aggregans (Ollivier et al. 1985) Xun et al. 1989 it remains the nomenclatural type. Consequently, the genus name Methanocorpusculum and the family name Methanocorpusculaceae are the validly published and correct names at their respective ranks.

It is also important to emphasise that when the combination Methanocorpusculum parvum Zellner et al. 1988 is treated as a later heterotypic synonym of Methanocorpusculum aggregans (Ollivier et al. 1985) Xun et al. 1989 and is also treated as not being a correct name there is no wording in the Code that makes the combination Methanocorpusculum parvum Zellner et al. 1988 illegitimate. This would also not ‘invalidate’ either the genus name Methanocorpusculum Zellner et al. 1988 or the family name Methanocorpusculaceae Zellner et al. 1989.
Reference to Rule 44 as given by Oren & Garrity (2015) is the reason that if Methanogenium aggregans Ollivier et al. 1985 is considered not to be in the same genus as the nomenclatural type of the genus Methanogenium Romesser et al. 1981, Methanogenium cariaci Romesser et al. 1981, but in the same genus and a synonym of Methanocorpusculum parvum Zellner et al. 1988, the nomenclatural type of the genus Methanocorpusculum Zellner et al. 1988, then the consequences as proposed by Xun et al. (1989) are that a new combination must be created, Methanocorpusculum aggregans (Ollivier et al. 1985) Xun et al. 1989. In contrast, if Methanocorpusculum parvum Zellner et al. 1988 were to be considered to be in the same genus as Methanogenium cariaci Romesser et al. (1981) then the principle of priority applies to the names at the rank of genus and a new combination using the genus name Methanogenium would have to be created for Methanocorpusculum parvum Zellner et al. 1988. However, if Methanocorpusculum parvum Zellner et al. 1988 were to be considered to be a later heterotypic synonym of Methanogenium aggregans Ollivier et al. 1985 no new combination needs to be created. However, in both cases Methanocorpusculum parvum Zellner et al. 1988 remains the nomenclatural type of Methanocorpusculum Zellner et al. 1988 even if that genus name were to be treated as a later heterotypic synonym of Methanogenium Romesser et al. 1981 and not as a correct name.

Much of the current confusion centres round the wording of Rule 15 and the fate of nomenclatural types when they are treated as later heterotypic synonyms. This issue arises at regular intervals in both the incorrect interpretation (Asakawa & Nagaoka, 2003; Chong & Boone, 2001; Lindström & Young, 2011; Losey et al., 2013; Oren & Garrity, 2015; Whitman et al., 2015) and in the interpretation consistent with the wording of the Code (Tindall, 2008, 2014a, b, 2015b). It should however, be remembered that by allowing a nomenclatural type that is treated as a later heterotypic synonym to remain the nomenclatural type serves an important role central to Principle 1, ‘to aim at the stability of names.’

In order to clarify and summarise the current example Table 1 gives a time line of the changes in the nomenclature and classification of members of the genus Methanocorpusculum.

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References


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