Pneumocystis carinii Nomenclature: Response to Cushion and Stringer

To the Editor—In their response [1] to my recent viewpoint article [2] entitled “Pneumocystis carinii: Has the Name Really Been Changed?,” Drs. Cushion and Stringer characterize my views and comments as inaccurate, disingenuous, a mischaracterization, and based on misconceptions. Rather than attempt to rebut Cushion and Stringer [1] point by point, which would take far too much space, I will simply say that I stand by my viewpoint article as being an accurate reflection of the issues surrounding P. carinii nomenclature. However, I will specifically comment on 4 issues, each of which can be easily validated by those interested in this topic.

First, Cushion and Stringer [1] suggest that I am misrepresenting the presentation and discussion of the new nomenclature for P. carinii, which took place at the International Workshop on Opportunistic Protists Meeting in Cincinnati, Ohio, in 2001. In fact, Dr. Jacob K. Frenkel made a presentation at the end of one of the scientific sessions and reviewed the process by which he fulfilled the criteria of the International Code of Botanical Nomenclature for introducing the name Pneumocystis jirovecii to refer to human-derived P. carinii. The name was “submitted” for consideration (i.e., published) in 1999 by Frenkel [3]. Two Web sites that deal with mycology, Index Fungorum [4] and doctorfungus [5], both list 1999 as the “submission” date for the nomenclature P. jirovecii. [3]. The roundtable to which Cushion and Stringer [1] refer occurred after Frenkel’s presentation. Thus, the discussion by the scientific community interested in P. carinii referred to by Cushion and Stringer clearly occurred “after the fact.”

Second, Cushion and Stringer [1] state that I am one of the few holdouts unwilling to accept this new nomenclature. I disagree. For example, there are 20–30 well known investigators who consistently publish on the topic of P. carinii. A PubMed search of these authors makes it quite clear that there is no consensus on the proposed nomenclature for P. carinii; some authors use the new nomenclature, and some authors do not. Many have opted out of this debate by simply using the genus name alone. For further evidence that others are also questioning this new nomenclature, one need only consult the doctorfungus Web site [5]. This is a Web site dedicated to the dissemination of information relevant to medical mycology. Its editorial board consists of several highly respected individuals in the field of medical mycology. In an article about Pneumocystis species on this Web site, dated 11-17-05; 2:18:01 PM GMT, the pros and cons of the “new” Pneumocystis nomenclature are discussed. The following sentence closes that section: “Although we did for a time support this new nomenclature without caveat, it now appears more appropriate to use “P. carinii (P. jirovecii)” as a reminder of the current state of confusion” [6].

Third, Cushion and Stringer [1] continue to muddle the fact that there is not 1 system of nomenclature being proposed, but, rather, 2 parallel systems—the first based on the host species from which the organism is derived, and a second based on nucleotide sequence changes that have not been demonstrated to account for any specific biologic characteristic of the organism. This latter system has, in fact, been proposed and championed by Stringer et al. [7] and serves as the basis for naming a second “species” of Pneumocystis in rats [8], as well as for the identification of several other “species” of Pneumocystis that infect the rat [7]. Those who support the new nomenclature seem to take the attitude that it is really not a big deal to make the simple change in name from P. carinii to P. jirovecii for the organism that infects humans. However, it is critical that the user community realize that, as soon as organisms derived from humans are examined in the same detail as rodent P. carinii, there are equally likely to be multiple “species” (based on genotype) of Pneumocystis identified as infecting humans. If these forms are similarly elevated to species level, there will, indeed, be considerable confusion in the clinical literature.

Finally, there are ~10,000 articles in the medical literature that deal with the topic “Pneumocystis.” I am unaware of a single instance in which there is confusion as to which organism the authors are dealing with because of the lack of an adequate system of nomenclature. Quite frankly, the call to introduce new nomenclature for P. carinii to “clarify communication” [9] is an attempt to fix a problem that does not exist.

I have been purposely brief in my response to Cushion and Stringer [1], because I feel that I stated my case in my viewpoint article [2]. However, I will close by indicating that this change in nomenclature is premature. If a change in nomenclature is to be made, it should be done, as I indicated in my viewpoint article, by a group of individuals expert not only in the field of P. carinii biology but also in medical mycology, taxonomy, and microbial nomenclature. If such a group does feel that it is best to rename the P. carinii species on the basis of the host of...
To the Editor—Some of the finer points of Pneumocystis carinii taxonomy made by Gigliotti [1] and Cushion and Stringer [2] may not be clear to those unfamiliar with the confusing history and biology of this atypical fungus. The proposed reclassification of P. carinii forma specialis hominis (P. carinii f. sp. hominis) as a new species ("Pneumocystis jirovecii") [3, 4] is not compelling, and it does not "foster scientific understanding and communication" [5, p. 278]. I think that this debate can best be framed by 2 questions: what criteria are required for taxonomic revision, and if revision is required, should historic, widely used taxons be altered?

First, with respect to the criteria for taxonomic revision, there is no question that there are differences in nucleotide sequences between genes of the different special forms of P. carinii that are found among mammalian hosts [6]. However, very few—if any—data on the replication mechanisms and lifestyle (i.e., sexual or asexual reproduction) of the organism have been published since 1994 that would allow one to differentiate evolutionary divergence of Pneumocystis strains infecting separate hosts from true speciation [7, 8]. In fact, recent data suggest that genetic differences among primate-derived P. carinii isolates do, indeed, vary with phylogenetic differences in the hosts (i.e., they are the result of coevolution) [9, 10], but they do not fit the proposed speciation scheme on the basis of the "phenotype" of host specificity or the "genotype" of genetic divergence [9]. At what point does speciation begin and clonality end [7]? How do we determine this point in the absence of a valid, reproducible system for in vitro culture of the organism? Whether phenotypes or genotypes should "drive" taxonomy is not a problem unique to P. carinii; bacteriologists and eukaryotic biologists alike have noted the difficulties of applying molecular genotype differences to phenotypic speciation [11–13]. Until further data on life cycles, horizontal gene flow in nature, genomic DNA-DNA hybridization, and other traditional taxonomic characteristics are available to complement the newer molecular data [8, 11–13], we should continue using (i.e., conserving) the trinomial nomenclature spelled out by the 1994 Third International Workshop on Pneumocystis [14], as has been successfully done over the past decade.

Second, even if we agree that phylogenetic information demands the renaming of the special forms of P. carinii, that renaming has been done incorrectly. Although Cushion, Stringer, and Frenkel followed the International Code of Botanical Nomenclature rules of Latin and English grammar in describing "P. jirovecii" [3–5], they have incorrectly ignored the portion of the code (chapter II, section 4, article 14) that clearly discusses the need for "conservation of names…which best serve stability of nomenclature…[in order to] avoid disadvantageous nomenclatural changes entailed by the strict application of the rules" [15]. It is disadvantageous (i.e., destabilizing) to the scientific literature and confusing to physicians and patients alike to change the name of P. carinii f. sp. hominis to "P. jirovecii." Furthermore, Jirovec's name should not take historic precedence over van der Meer or Brug, who are recognized as having described human-derived P. carinii a decade before Jirovec [16–19]. Even Jirovec's colleague Vaněk published his work on human P. carinii in 1951, a year before Jirovec [16–18]; Vaněk's prior work, along with that of van der Meer and Brug, was clearly cited by Jirovec himself [20]. Perhaps the most widely disseminated work of that decade was the landmark review of D. Carleton Gajdusek, from 1957 [18]. If historical priority is to be ignored, one could easily argue for his name to be used instead, because he is the one who brought Pneumocystis to general attention, although this would cause more taxonomic confusion. Thus, the most accurate, least controversial, and most obvious solution to this debate (as Gigliotti [1] points out) is to retain the name given to the pathogen as clearly described by the Delanoeś in 1912 [21] (reprinted in [17]): Pneu-

Pneumocystis carinii
Nomenclature: 2 Mismomers Are Not Better Than 1

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