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## Recognition of the *Parmelia crozalsiana* group as the genus *Crespoa*

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**Abstract:** Recent molecular phylogenetic analyses of the lichen family Parmeliaceae have revealed that the members of the *Parmelia crozalsiana* group form a sister clade to one containing members of the genus *Parmotrema*. The four species in this group were classified first in *Parmelia*, then *Pseudoparmelia*, and later *Canoparmelia*. Recently, the classification of this group was resolved by placing the species in the newly-described *Parmotrema* subg. *Crespoa*. This placement was justified by an absence of characters from the fungal reproductive structures distinguishing members of the group from those classified in *Parmotrema* subg. *Parmotrema*. As this classification obfuscates a morphologically and phylogenetically discrete group of foliose macrolichens that has always been recognized as distinct from *Parmotrema* s. str., we here recognize the group as the genus *Crespoa*. A discussion of taxonomic rank assignment based on character-types that are preconceived as diagnostic is also provided.

**Key words:** Pycnidia, ascospores, macrolichen, taxonomy.

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**Introduction:** The *Parmelia crozalsiana* group represents a well-supported monophyletic clade within the foliose macrolichen family Parmeliaceae (Crespo et al. 2010). Its constituent taxa are characterized by a combination of vegetative thalline morphology and characters of both sexual and asexual fungal reproductive structures (Hawksworth 2011; Hale 1976). Historically, in the context of the disintegration of the genus *Parmelia* Ach., the group was first classified in *Pseudoparmelia* Lynge (Hale 1976), and later *Canoparmelia* Elix & Hale (Elix et al. 1986). However, recent large scale molecular phylogenetic analyses aimed at resolving generic boundaries in the family Parmeliaceae recovered members of the group as a strongly supported clade sister to a clade containing representatives of the genus *Parmotrema* A. Massal. (Crespo et al. 2010). These results indicate that the group is closely related to *Parmotrema* and renders the continued classification of *Parmelia crozalsiana* and its relatives within *Canoparmelia* untenable.

The members of the *Parmelia crozalsiana* group differ markedly from *Parmotrema* in their vegetative thalline morphology (e.g., in having adnate scrobiculate thalli) and represent a strongly supported monophyletic group that is phylogenetically distinct from that genus. Crespo et al. (2011: fig. 2) initially asserted that to resolve the incorrect placement of the group, it should be recognized at the rank of genus. However, Hawksworth (2011) then formally recognized it as *Parmotrema* subgenus *Crespoa* D. Hawksw. because “generic rank is not appropriate...as there are no features from the ascromata or conidiomata that distinguish it...” This argument is concordant with that which was historically used to justify the continued recognition of a broadly circumscribed genus *Parmelia* by Hawksworth et al. (1980). It is, however, discordant with current approaches in lichenology that emphasize the use of non-molecular characters correlated with the results of molecular phylogenetic analyses when delineating taxonomic entities; these approaches

specifically highlight that it is essential to disregard preconceived notions of what non-molecular character-types are “diagnostic” when circumscribing taxa and assigning ranks (see discussions in, e.g., Crespo et al. 2011, Hibbett et al. 2007, Hodkinson et al. 2012, Lendemer 2011, Lendemer & Hodkinson 2009, 2010, Lendemer & O’Brien 2011, Vondrák et al. 2009).

Indeed, subsuming the *Parmelia crozalsiana* group within *Parmotrema*, albeit within its own subgenus, obfuscates a phylogenetically distinct group of taxa that is easily identified by its vegetative morphology in the field. This placement emphasizes one type of character (i.e., those associated with fungal reproductive structures) over other character types when assigning rank. We advocate a holistic approach that does not emphasize any one character-type over another when attempting to delineate taxa or assign rank in lichen-forming fungi (e.g., Lumbsch et al. 1998). It is true that characteristics of vegetative thalli are not always correlated with monophyletic groups in the family Parmeliaceae; however, this situation is far from universal (Crespo et al. 2011). An example is the distinctive bulbate cilia found in the genera *Bulbothrix* Hale and *Relicina* (Hale & Kurok.) Hale (Benatti 2011, Crespo et al. 2011).

It should also be noted that, in addition to over-emphasizing characters of fungal reproductive structures, the treatment of the *Parmelia crozalsiana* group proposed by Hawksworth (2011) overlooked the significant genetic distance between this group and *Parmotrema s. str.* (Crespo et al. 2010). Recent studies have shown that genetic distance is a powerful tool for delineating taxa, especially in the family Parmeliaceae, and requires consideration when assigning taxonomic ranks (Del Prado et al. 2010, Fehrer et al. 2008, Hodkinson et al. 2012, Lendemer 2011).

Thus, we conclude that, based on the available data, *Parmelia crozalsiana* and its relatives represent a well defined group of taxa that is

distinct from *Parmotrema* and warrants recognition at the rank of genus. As such, we elevate *Parmotrema* subgenus *Crespoa* to the rank of genus and make the relevant combinations for the four species in the *Parmelia crozalsiana* group.

Results: The generic name *Crespoa* is formally introduced below, together with the necessary new combinations following Hawksworth (2011). For the sake of brevity, only the basionym for each combination is cited below. For full synonymies the reader should refer to Hawksworth (2011).

*Crespoa* (D. Hawksw.) Lendemer & Hodkinson comb. et stat. nov.

Mycobank #564129.

Synonym: *Parmotrema* subgenus *Crespoa* D. Hawksw., Lichenologist 43: 647. 2011. TYPE SPECIES: *Parmelia crozalsiana* B. de Lesd. ex Harm.

*Crespoa carneopruinata* (Zahlbr.) Lendemer & Hodkinson comb. nov.

Mycobank #564130.

Basionym: *Parmelia carneopruinata* Zahlbr., Sber. Akas. Wiss. Win, Math.-naturw. Kl., Abt. 1, 111: 419. 1902.

*Crespoa crozalsiana* (B. de Lesd. ex Harm.) Lendemer & Hodkinson comb. nov.

Mycobank #564134.

Basionym: *Parmelia crozalsiana* B. de Lesd. ex Harm., Lich. Fr. 4: 555. 1909.

*Crespoa inhaminensis* (C.W. Dodge) Lendemer & Hodkinson comb. nov.

Mycobank #564135.

Basionym: *Parmelia inhaminensis* C.W. Dodge, Ann. Mo. Bot. Gard. 46: 130. 1959.

*Crespoa schelpei* (Hale) Lendemer & Hodkinson comb. nov.

Mycobank #564136.

Basionym: *Parmelia schelpei* Hale, Bryologist 75: 344. 1972.

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