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The homothallic mating-type locus of the conifer needle endophyte *Phialocephala scopiformis* DAOMC 229536 (Order *Helotiales*)

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1 **The homothallic mating-type locus of the conifer needle endophyte**

2 ***Phialocephala scopiformis* DAOMC 229536 (Order *Helotiales*)**

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11 **Abstract**

12

13 We describe the complete mating-type (*MAT*) locus for *Phialocephala*
14 *scopiformis* DAOMC 229536 – a basal lineage within *Vibrisseaceae*. This strain is of
15 interest due to its ability to produce the important anti-insectan rugulosin. We also
16 provide some of the first insights into the genome structure and gene inventory of non-
17 clavicipitalean endophytes. Sequence was obtained through shotgun sequencing of the
18 entire *P. scopiformis* genome, and the *MAT* locus was then determined by comparing this
19 genomic sequence to known *MAT* loci within the *Phialocephala fortinii* s.l. – *Acephala*
20 *applanata* species complex. We also tested the relative levels of sequence conservation
21 for *MAT* genes within *Vibrisseaceae* (n = 10), as well as within the *Helotiales* (n = 27).
22 Our results: (1) show a homothallic gene arrangement for *P. scopiformis* [*MAT1-1-1*,
23 *MAT1-2-1*, and *MAT1-1-3* genes are present], (2) increase the genomic survey of
24 homothallism within *Vibrisseaceae*, (3) confirm that *P. scopiformis* contains a unique
25 *SAM-Mtase* gene proximal to its *MAT* locus, while also lacking an *sla2* gene, and (4)
26 indicate that *MAT1-1-1* is the more useful molecular marker amongst the *MAT* genes for
27 phylogenetic reconstructions aimed at tracking evolutionary shifts in reproductive
28 strategy and/or *MAT* loci gene composition within the *Helotiales*.

29

30 **Keywords:** endophyte, *MAT* gene, idiomorph, rugulosin

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