The distribution of cyanobacteria across physical and chemical gradients in hot springs in northern Thailand

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Abstract

We mapped the distribution of mat forming cyanobacteria along the thermal gradient from 30 to 80 °C, in nine hot spring districts in northern Thailand. Nineteen genera and 36 species were identified by morphometric analysis. Water temperature was the predominant determinant of community structure in the springs. The diversity of cyanobacterial morphotypes fell as temperature increased. Water chemistry (pH, alkalinity and ammonia concentration) was a much weaker descriptor of the floral similarity between the springs. The morphotypes which dominated all springs were Synechococcus lividus and Synechococcus sp. (>40 and <80°C) and Phormidium boryanum (>30 and <60°C). The occurrence of Synechococcus lividus and Synechococcus sp. in every spring at 70 °C or more, implied there was no regional barrier to the distribution of these highly thermophilic taxa. Conversely, there were regional differences in the diversity of mat communities growing below 60 °C. The most depauperate flora were in the northernmost springs (SKP, TPN, PD, JS) and the springs further south around Chiang Mai had more diverse flora, suggestive of barriers to the dispersal of some taxa. More discriminating analyses using molecular
tools will be required to determine whether the ubiquitous distribution
*Synechococcus* morphotypes above 60 °C masks a genotypic diversity, comparable
to the morphotype diversity observed below 60 °C.