

## Supporting Information

1

2

### 3 **Arsenic demethylation by a C·As lyase in cyanobacterium**

### 4 ***Nostoc* sp. PCC 7120**

5

6 Yu Yan,<sup>†,‡,#</sup> Jun Ye,<sup>†,#</sup> Xi-Mei Xue,<sup>†</sup> and Yong-Guan Zhu<sup>\*,†,§</sup>

7

8 <sup>†</sup>Key Lab of Urban Environment and Health, Institute of Urban Environment,  
9 Chinese Academy of Sciences, Xiamen 361021, People's Republic of China

10 <sup>‡</sup>University of Chinese Academy of Sciences, Beijing 100049, People's Republic of  
11 China

12 <sup>§</sup>State Key Lab of Urban and Regional Ecology, Research Center for  
13 Eco-environmental Sciences, Chinese Academy of Sciences, Beijing 100085,  
14 People's Republic of China

15

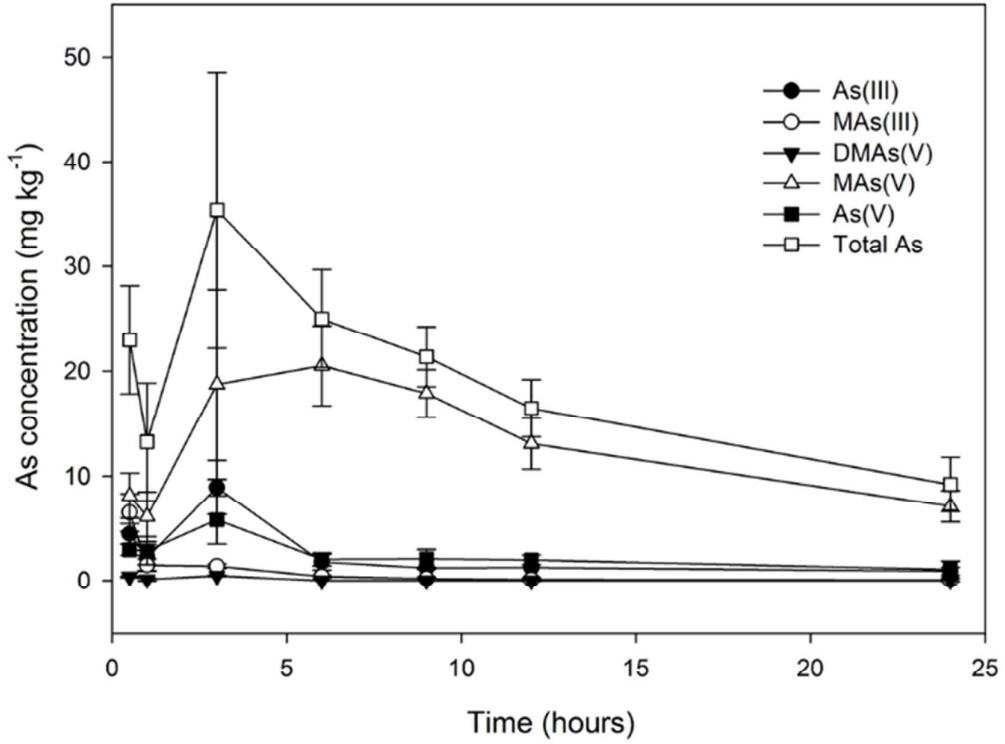
16 \*Corresponding author e-mail: ygzhu@rcees.ac.cn

17 #These authors contributed equally to this work

18

19 Number of pages: 5

20 Number of figures: 4



21

22 **Figure S1.** As species in the cell lysate of *Nostoc* exposed to MAs(III) for the  
 23 indicated times.

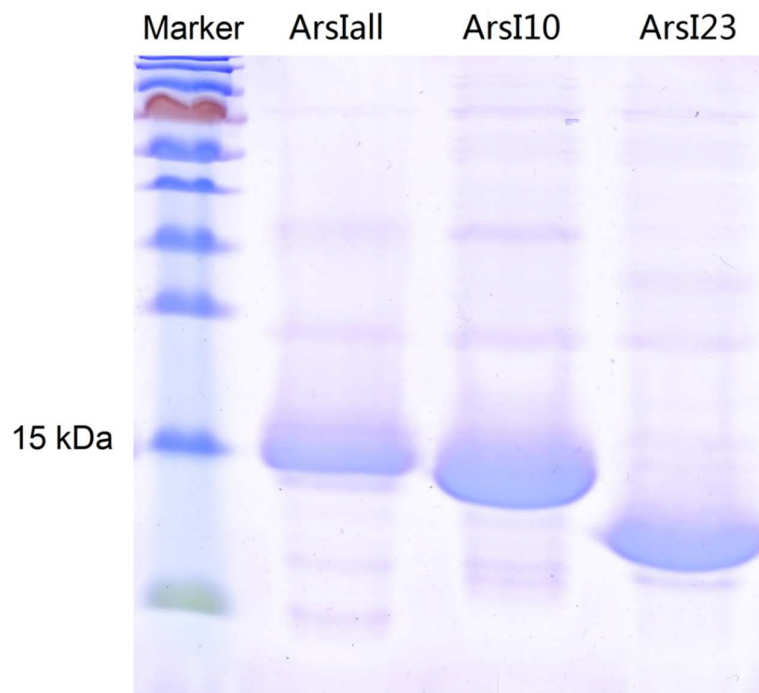
```

Nostoc      : MSV MKT HVAL NVTNLEKSVTFYRAMFCLEPVKYKTDYAKEDIPNPALNLTLLNLTNNVQIG : 60
Tolypothrix : MSV LKTHVAL NVTNLEKSVAFYRAMFCVEEMKYKADYAKEDIPNPALNLTLLNLTDSVQSG : 60
Synechococcus : MATYKTHIALKVEDVERSVAFYQALFETPPKHKVGYAKLDIENPSLNLTLLNATGTPLOQT : 60
Sorangium   : MNV LKPHISLNI SNIDASVAFYERAFVRAKRRRPGYAKEDLASPSLNLTLM--QEAPRTG : 58
Bacillus_MD1 : --M KYAHVGLNVTNLEKSTEFYSKLFCAEPVKVKPDYAKELLESPGLNFTLLNLRDEVN-G : 57
Bacillus_105MF : --M QYVHVGLNVTNLEKSTEFYSKVFCVTEPVKVRREDYAKELLENPGLNFTLLNVRNEVK-G : 57
          Δ
Nostoc      : GAU SHLCVQVESTQEVQSAIERFNEAGHDLF-TEDNTDCCYALQDKVWVTDPDGNRWEVF : 119
Tolypothrix : GAU SHLCVQVESTQEV EASIKRFTDAGLALF-TEBNTNCCYALQDKVWVTDPDGNRWEVF : 119
Synechococcus : GKU SHFCIQVDSADSVVSAIARLKAAGLNPS-EEFNDCCYALQDKAWISDPDGNEWEVF : 119
Sorangium   : VNASHFCIQVASTEDVLEAKSRFEAAELKTF-TEEDTACCYAVQDKWVIEDPDGNSWEVF : 117
Bacillus_MD1 : NQV GHFCIQVESTEVEVAHKNRLAENCHLSQYDEINTTCCYALQDKRWIHDPDGNEWEVF : 117
Bacillus_105MF : NQV NHFCIQVENQVEHILLHKEERLEKEEFFAR-EEFNNTCCYAVQDKRWVTDPDGNEWEVF : 116
          Δ
Nostoc      : VVK----VADTAPEK--NLATVSSS-----GEIQ---AVKKSCCA : 150
Tolypothrix : VVK----VADTAPEE--NIAANANS-----EELAP--VLKKPCCA : 151
Synechococcus : VVH----VADTAPEL--NIDTAFSQ-----PETAEKDYCAPTCCR : 153
Sorangium   : VVKGDADVMSQPAMP SKNDASCCA-----PACCVPAKLNDGAAR : 157
Bacillus_MD1 : YTK----TTVEENS-THPPTCCVNEPNVEKAECSSPTASSNKDTSNCCS : 161
Bacillus_105MF : YTK----ADSEIHK-VETSSCCVS-----SDEK SIN--STS CC- : 147

```

24

25 **Figure S2.** Multiple alignment of ArsI homologues. ArsI from *Nostoc* sp. PCC 7120  
26 (WP\_010995277) was aligned with homologues from another two cyanobacteria  
27 [*Tolypothrix* sp. PCC 7601 (WP\_045871810), *Synechococcus* sp. PCC 7335  
28 (WP\_006454626)], one Gram-negative bacterium [*Sorangium celluloseum*  
29 (WP\_012238244)], and three Gram-positive bacteria [*Phycoccus jejuensis*  
30 (WP\_030528615), *Bacillus* sp. MD1 (AIA09488), *Bacillus* sp. 105MF  
31 (WP\_018766215)]. Residues as predicted Fe<sup>2+</sup> binding site was indicated by  
32 triangles, and the conserved cysteine pair that are probably involved in MAs(III)  
33 binding was indicated by underling.

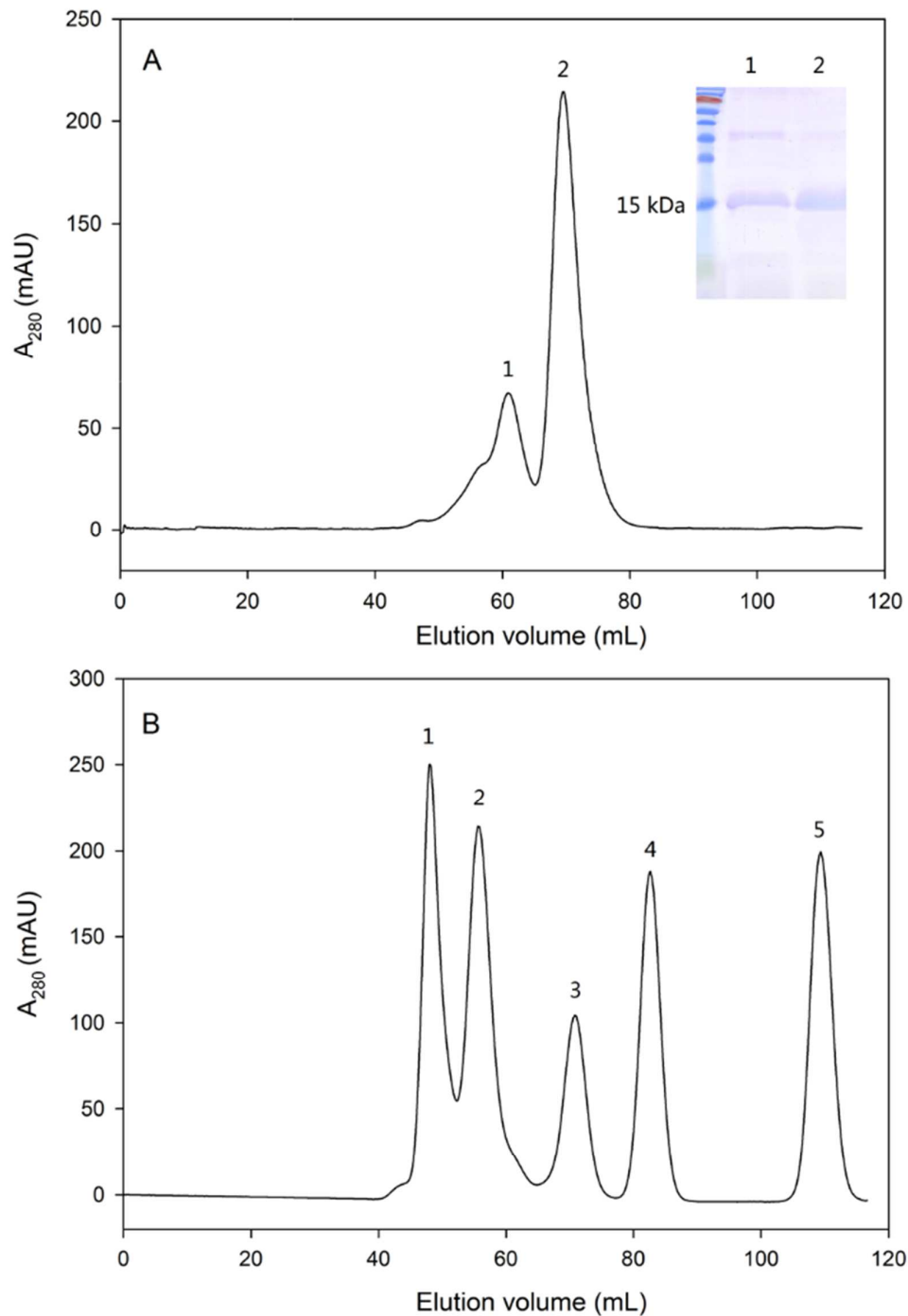


34

35 **Figure S3.** The graph of SDS-PAGE for purified full-length NsArsI (ArsIall) and

36 two truncated derivatives (ArsI10 and ArsI23).

37



38

39 **Figure S4.** Elution profiles of NsArsI (A) and molecular-mass standards (B) from a HiLoad  
 40 16/600 Superdex 75 column. Inset of (A) is SDS-PAGE graph of each portion collected  
 41 according to the peaks of size-exclusion chromatography. The peaks in (B): 1.  
 42 Thyroglobulin (bovine), MW 670 kDa; 2.  $\gamma$ -Globulin (bovine), MW 158 kDa; 3. Ovalbumin  
 43 (chicken), MW 44 kDa; 4. Myoglobin (horse), MW 17 kDa; 5. Vitamin B<sub>12</sub>, MW 1.35 kDa.