

Supplemental Figure 2. Alignment of Selected Plant and Cyanobacterial ARC6-like Proteins.

Also included are the *Arabidopsis* ARC6 homologue At3g19180, and the *E. coli* DnaJ. Accession numbers and organism names are given in Table 2. Shaded columns indicate similarity (gray) and identity (black) greater than 70%. The J domain position is indicated below the sequence. Underlining in each sequence indicates the position of a transmembrane (TM) domain, as predicted by the DAS server (see Methods).

Nostoc	1	-----
Scc_PCC7942	1	-----
Syn_PCC6803	1	-----
Pm_MED4	1	-----
Oryza	1	<u>MEGFHNLLARPNSAPFAFSLPRPRPRRRRPPHPSPAACRAASRWAERLFADFHLLPTAAPSDP-PSPAPAPAAAAPSASPFVPLFPDAAE</u>
Arabidopsis	1	<u>MEALSHVGIG--LSPFQLCRLPPATTKLRRSHNTSTTIC-SASKWADRLLSDFNFTSDSSSS----SFATATTTATLVSP--PPSIDRPE</u>
At3g19180	1	<u>MPVAYTFPVLPSCLLCGISNRSTSFVVDRELOISGLLVVRSESGEFFGSGLSLRRFQREGRRRLNAAGGGIHVVVDNAPSRTSSLAAST</u>
Eco DnaJ	1	-----
Nostoc	1	--MRIPLDYRILGLPLAASEEQLRQAYS DRIVQ-LPRREYSQA AISSRKQLIEEAYVVLSDPKQRSTYDQLYL AHAYDPDNLAAA AVAQ
Scc_PCC7942	1	--MRIPLDYRILCVGVQASADKLAESYRDRINQ-SPSHEFSELALQARRQLLEAAIAE LSDPEQRDRYDRRFFQG-----
Syn_PCC6803	1	--MFIPLDFYRILGIPPQSGGETIEQAYQDRLLQ-LPRREFSDAAVTLRNQLLAIAIAYETLRDPEKROAYDQEWGAMDEALG-----
Pm_MED4	1	--MELPLDHFRLIGVSPSATSEEILRAFQLRLDK-TPDEGFTYEVLTORSELLRLTADLLTDPDSRRDYENLLNG-----
Oryza	90	<u>RSLPLQVDFYKVLGAEPHFLGDGIRRAFEARIAK-PPQYGYSTDALVGRROMLQIAHDTLMNQNSRTQYDRALSEN-----</u>
Arabidopsis	82	<u>RHVPIPIDFYQVLGAQTHFLTGDGIRRAFEARVSK-PPQFGFSDDALISRRQILQAACETLSNPRSRREYNEGLLDD-----</u>
At3g19180	91	<u>STIELPVTCTYQLIGVSEQA EKDEVVKSVINLKKT-DAEEGYTMEAAAARQDILMDVVRDKLLFESEYAGNLKEKIAP-----</u>
Eco DnaJ	1	---MAKQDYIEILGVSKTAEEREIRKAYKRLAMKYHPDRNQGDKEAEAKFKEIKEAYEVLTD SQKRAAYDQYGHAA-----
		----- J Domain -----
Nostoc	88	<u>ENRTESTKRGSDTQSLGIEITQDELVGALLILQELGEYELVLKLG RPYLVNKN SATSSRKSNNLADEE IYESAEHPDVVLTVALACLELG</u>
Scc_PCC7942	73	-----GLEAIEPSLELEDWQRIGALLILLELGEYDRVSQ LAEELL PDYD-----ASA EVRDQFARGDIALAIALSQQSLG
Syn_PCC6803	79	-----EALPLTTPELECSPEQEIGALLILLDLGEYELVVKYGE PVLHDPN-----PPAGGLPQDYLLSVILAHWELS
Pm_MED4	73	-----ASGLDLSSNREVAGLILLWESGSSKEAFKITRKALQPPQ-----TPALGSSREADLTLLAALTSRDAA
Oryza	164	-----REEALTMDIAWDK-----EAGEALAVLVTGEQLLDRP-----PKR FKQDVVLAMALAYVDLS
Arabidopsis	156	-----EEATVITDVPWDKVP GALCVLQEGGETEIVLRVGEALLKERL-----PKSFKQDVVLV MALAFLDVS
At3g19180	165	-----KSPIRIPWAWLPGALCLLQEVGQEKLVLDIGRAALRNLD-----SKPYIHDIFLSMALAECAIA
Eco DnaJ	73	-----F-----EQGG-----MG-----GGGFGGADFSDFG--DVF

Nostoc 178 REQWQQG--HYENAAISLETGQELLVREGL---FSSIQAETIADLYKLRPYRILELLALPQ--EKTAERSQGLELLQNLLEDRCGIDGTN
Scc_PCC7942 144 RECROQG--LYEQAAQHFRSQSALADHQ---FPELSRTLHOEQQLRPYRILERLAQPL--TADSDRQOGLLLQAMLDDRQIEGPG
Syn_PCC6803 147 RERWQQQ--QYEFAAATASLKALARLQDND---FPALAEAIROELYRLRPYRILELLAKEG--QGEEQRQOGLLALQAMVQDRGGIEGKG
Pm_MED4 137 IQEQDQR--SYSNAADFLOEGIQLLQRMGK---LGELRKTLEEDLVSLLPYRILDLLSRDLN--DYDSHKKGLSMLNLI IKRGGLECKN
Oryza 218 RDAMAASPPDVIGCCEVLERALKLLIQEDGASNLAPDILLSQIDETLEEITPRCVLELLSLPIDTEHHKKRQEGLOGARNILWSVGRG-GIA
Arabidopsis 219 RDAMALDPPDFITGYEFVEEALKLLIQEEGASSLAPDLRAQIDETLEEITPRYVLELLGLPLGDDYAAKRLNGLSGVRNIIWSVGGG-GAS
At3g19180 225 KAAFEVN--KVSQGFELARAQSFLKSKVTLG-KLALLTQIEESLEGLAPPCTLDLLGLPRTPENAEERRGATAALRELLRQGLSVEASC
Eco DnaJ 99 GDIFGGG-----RGRQRAARGADLRYN-----MELTLEEAARGVTKEIRIPTLEECDCVCHGSGAKPGTQPQTCTCHGSGQVQMRQ

Nostoc 261 ND--ESGLNIDDFLRFIQQLRNHLTVAEQHKLFEAQSK--RSSAV-----ATYLAVYALIARGFAQROPALIROARQMLVRLGKR---
Scc_PCC7942 227 DD--GSGLTLDNFMFLQOIRGYLTLAEQQLLFESEAR--RPSA-----ASFFACYTLIARGFCDHOPSLIHRASLLHHEIKSR---
Syn_PCC6803 230 ED--YSGLGNDDFLKFQHQLRCHLTVAEQNALFLPESQ--RPSLV-----ASYLAVHSLMAEGVKEQDPMAIVEAKSLIIQLENC---
Pm_MED4 220 KSEYNDFLNQEFESFQOIKPFLTVQDQIDLFLLELOK--RGSSE-----AGFLAFLSLTAIGFARRKPAKLFARKILKKNLNSG---
Oryza 307 TV--GGGFSR---EAFMNEAFLRMTSIEQMDFFSKTPNSIPPEWF-----EIYNVALAHVAQAIISKRPQFI MMADDLFEQLQKFNIG
Arabidopsis 308 AL--VGGLTR---EKFMNEAFLRMTAAEQVDLFFVATPSNIPAESF-----EVYEVALALVAQAFIGKPHLLQDADKQFQOLQOAKVM
At3g19180 312 QIQDWPCFLSQAISRLIATEIVDLLPWDDLAIITRKNKKSLESHNQRVVIDFNCFYMVLLGHIAVGFSGKQNETINKAKTI CECLIASEG-
Eco DnaJ 175 G-----EFVAVQOTCPHCQGRGTILIKDPCN-----KCHGHGRVRSKTL SVKIPAG---

Nostoc 336 -----QDVHLEQSLCALLLIGOTEAEATRVLELSQEY-----EALAFIREKSQDS--PDLPLGLCLYAEQWLQHEVFPHF
Scc_PCC7942 302 -----MDVHIEQAIASILLIGOPEEAEALLVQSQDE-----ETLSQIRALAQG--EALIVGLCRFTETWLATKVFPDF
Syn_PCC6803 305 -----QDLALEKVICELLIGOTEVVLAADIDQGDPK-----IVAGLESKLATG--EDPLTAFYTFTEQWLEEEIVPYF
Pm_MED4 298 -----LDSMPLIGCLDLLADVEQSSARFLSSSDE-----KLRDWLNYPGE-----KLEAICIFCKNWLNDVVLVGY
Oryza 384 ----SHYAYDN----EMDLALERAFCSLLVGDVSKCRMWLGIDNESSPYRDPKILEFIVTNSSISENDLPLGCKLLETWLI FEFVFRS
Arabidopsis 386 AMEIPAMLYDTRNNWEIDFGIERGLCALLIGKVDECRMWLGLDSEDSQYRNPAIVEFVLENSNR--DDNDLPLGCKLLETWLAGVVFPRF
At3g19180 400 -----VDLKFEAEAFCSFLLKQSGSEAEALEKCLKLES-----NSDSAVRNSILG--KESRSTSATPSLEAWLMESVLANF
Eco DnaJ 219 -----VDTGDRIRLAGEGEAGEHGAPAG-----DLY--VQVQVK-----

Nostoc 403 RDLANQQAFLKDYFANQOVQAYLEALPTDAQTTNEWAVINPQYFPQAKAKNTHFHNNSTKTSASFNHSRVPNPD-----LPETPTKE
Scc_PCC7942 368 RDLKERTAPLQPYEDDPVQTYLDAI-----VELPSDLMPTP-----LPVEPLEV
Syn_PCC6803 371 RDLSPETLSPKAYFNNPSVQOYLEQLEPDSFTTDN-SFASPALLSTATESETPMVHSSAALPDRPLTSTVPSR-----RGRSPRRS
Pm_MED4 362 RDIDLKEIDLDSWFEDREIQEFIEQIEKKSNTTVFKSGPQNKPIFOAQESLKDSSTGPDLSNDNFEEGRLLPLPGG-----VREDGOEV
Oryza 467 RDTRGMQFRI GDYYDDPEVLSYLERMEGGASH----LAAAAIAKLGQAATAALGTVKSNAIQAFNKVFP-----LIE
Arabidopsis 475 RDTKDKKFKLGDYYDDPMVLSYLERVEVVGSP----LAAAAAMARIGAEH----VKASAMQALQKVFPSPRYTDRNSAEPKDVQETVF
At3g19180 468 PDTRGCSPSLANFFRAEKKYPENKMGSPSIMNHKTNRPLSTTQFVNSSQHLYTAVEQLTPTDLQSPVVS AK-----NNDETSA
Eco DnaJ 251 -----QHPIEFEREGNNLYCEVP-----

Nostoc 485 TSEYPNFSPPMWSSSGSIKSEVP-AAERMSRGTN-QHLNGSAKSAASHGNQKRRRRKPTPSASRERI PDNRPHSRRPRRRRTFANTIEGK
Scc_PCC7942 413 RSSLLAKELPTPATPG-----VAPPPRRRRRDRSERPARTAKRLP-----
Syn_PCC6803 451 RDDVFPADNSSGLAVTTLSPAI-AYDTHSLGTNGIGDSTSNFGSSNSAPESTSKHKSPPRRRKRVT-----RGRSPRRS
Pm_MED4 445 IEENIYTDEI IKNKSI EFKYKIAIEKIAELKFVFGAELENYRIFNKSSYLTYLYAFLILFAFGLGVGFVRN-----
Oryza 537 QLDRSAMENTKDG-PGGYL-----ENFDQ-----ENAPAHDSRNAA-----
Arabidopsis 555 SVDPVGNVGRDGE PGVFIAEAVRPSENFETN-----DYAIRAGVSESSVDETTVEMSVADMLKEAS-----
At3g19180 548 SMPVQLKRNLGVHKNKIWDEWLSQSSLI GRVSVVALLGCTVFFSLKLSGIRSGRLQSMPI SVSARPHSE-----
Eco DnaJ 268 -----INFAMAALGG-----

Nostoc 573 **TRLVWRVFISLVSILVFWVLATTTFGWLKNLFFPQPSPPD--LQLFVQINQPPLPIPDNRK--PESEEGPLTNAEAEV IHTWLS TKAA**
 Scc_PCC7942 452 **--LPW---IGLG-VVVVLGGGTGVWAWRSRSNSTPPTPP----P---VVQTLPEAVPAPS----PAPVTVALDRAQAETVLQNWLAAKAA**
 Syn_PCC6803 517 **-IKPVRFGIFLLCLAGIVGGATALIINRTGDPLGGLLED----PLDVFLDQPSEFIPDEATSRNLILSQPNFNQQVGMVVQGWLD SKKL**
 Pm_MED4 514 **--NLKKPVQEKI I DNSLSINENKNVFEYGLNQDDKKKVL--DNSKIILSDNAEKVIFSG----EEIKTASPSLEKIENLINTWLVN KSK**
 Oryza 571 **-----LKIISAGALFALLAVIGAKYLPKRRLSAIRSEH-----GSVAVANSVDSTDDPALDE-DPVHI PRMDAKLAEDIVR KWQS I KSK**
 Arabidopsis 616 **-----VKILAAGVAIGLISLFSQKYFLKSS--SSFQRKD-----MVSSMESDVATIGSVRAD--DSEALPRMDARTAENIVSKWQKIKSL**
 At3g19180 618 **SDSFLWKTESGNFRKNLDSVNRNGIVGNIKVLIDMLKMHCGEHPDALYLKSSGQSATSLSHS-ASELHKRPMDEEAEELVRQWENVKAE**
 Eco DnaJ 278 **-----EIEVP**

Nostoc 659 **ALGPNHEINNLEQ I LTGSALSQWRLIAQONKLDNRYRKF DHSLKIESVEKIGLF---ADRAAVEATVKEVTQLYE--NNQFKNSSNDK-L**
 Scc_PCC7942 526 **ALGPQYDRDRLATVLTGEVLQ TWQGFSSQOANTQLTSQFDHKLTVDSVQ-LSDG---DQRAVVQAKVDEVEQVYR--GDQLLETRRDLGL**
 Syn_PCC6803 603 **AFGQNYDVGALQSVLAPNLLAQQRGRAQRDQAQKVYHQYEHKLOILAYQVNPQD---PNRATVTARVEEISQPF TLGNQQQKGSATKDDL**
 Pm_MED4 597 **FLAGKGEIN-LSKIVQDDLIDRLKKERELDIQKGIYKNINAN--IENIVLLTQT---ASRISVSVDLKYSEKILKIDGELINETTFTPFL**
 Oryza 651 **ALGPEHSVASLQEVLDGNMLKVWTDRAAEIERHGWFWEYTLSDVTIDSITISLD---GRRATVEATIDEAGQLTD-VTEPRNND SYDTKY**
 Arabidopsis 693 **AFGPDHRIEMLPEVLDGRMLKIWTDRAAETAQLGLVYDYTLKLSVDSVTVSAD---GTRALVEATLEESACLSD-LVHPENNATDVRTY**
 At3g19180 707 **ALGPTHQVYSLSEVLDSEMLVQWQTLAQTAEAKSCYWRVLLHLEVLQAHIFEDGIAGEAAEIEALLEEAAELVD--ESQPKNAKYYSTY**
 Eco DnaJ 284 **TLDGRVKLKVPGETQTGKIFR-MRGKGVKSVRGAQGDLLCRVVVETPVGLNER----QKQLLQELQESFGGPTGEHNSPRSKSFFDGVK**

Nostoc 743 **RVR YDLIRER-GKWRIQSTSVVNQFTR**
 Scc_PCC7942 610 **VIRYQLVREN-NIWKIASISLVR----**
 Syn_PCC6803 690 **TVRYQLVRHQ-GVWKIDQIQVVNGPR-**
 Pm_MED4 681 **KVKYILGFSN-NSWKLVDYISGV----**
 Oryza 737 **TTRYEMAFSKLGGWKITEGAVLKS---**
 Arabidopsis 779 **TTRYEVFWSKSG-WKITEGSVLAS---**
 At3g19180 795 **KIRYILKKQEDGLWKFCQSDIQIQK--**
 Eco DnaJ 369 **KFFDDLTR-----**