

Table S2. The content and distribution of alkaline phosphatase families in *Cobetia* spp. isolates

Original Strain title	Actual species	Accession ID	ID protein	ALP family	Isolation source
<i>C. amphilecti</i> KMM 296*	<i>C. amphilecti</i>	GCF_000754225.1	WP_043332298.1	PafA	Coelomic fluid of mollusc <i>C. grayanus</i> (Russia: The Sea of Japan)
			WP_043333989.1	PhoD	
			WP_245163010.1	PhoA*	
			WP_043336117.1	PhoX	
			WP_052384691.1	PhoD	
<i>Cobetia</i> sp. UCD-24C*	<i>C. amphilecti</i>	GCF_001306765.1	WP_082388216.1	PhoD	Seagrass <i>Zostera</i> sp. sediment
			WP_054555671.1	PhoD	
			WP_054555885.1	PafA	
			WP_235507008.1	PhoA*	
			WP_054557251.1	PhoX	
<i>C. amphilecti</i> B2M13*	<i>C. amphilecti</i>	GCF_018860945.1	WP_244994940.1	PhoD	Alginate 40-100 m particle (artificial) (USA: Canoe Beach)
			WP_234368129.1	PhoA*	
			WP_216060785.1	PhoX	
			WP_216060931.1	PafA	
			WP_216061230.1	PhoD	
<i>Cobetia</i> sp. 1AS1*	<i>C. amphilecti</i>	GCF_029846435.1	WP_279838219.1	PafA	Coastal seawater (Russia: the Sea of Japan, Vostok Bay)
			WP_279838543.1	PhoA*	
			WP_279838774.1	PhoX	
			WP_279839461.1	PhoD	
			WP_279839645.1	PhoD	
<i>Cobetia</i> sp. 1CM21F*	<i>C. amphilecti</i>	GCF_023161745.1	WP_248377282.1	PhoA*	Sea cave (Portugal: Algarve)
			WP_248377879.1	PhoX	
			WP_248378997.1	PafA	
			WP_248380112.1	PhoD	
			WP_248380900.1	PhoD	
<i>C. amphilecti</i> NRIC 0815T*	<i>C. amphilecti</i>	GCA_030010415.1	WP_284726718.1	PhoD	The finger sponge <i>A. digitatus</i> (The Sea of Okhotsk, Sakhalin Island, Piltun Bay)
			WP_284726808.1	PhoA*	
			WP_284726995.1	PhoX	
			WP_284727213.1	PhoD	
			WP_284727576.1	PafA	
<i>Cobetia</i> sp. AM6*	<i>C. amphilecti</i>	GCF_009617955.1	WP_172978613.1	PhoD	Exterior surface of the shell of an abalone sold in a fish market (Tokyo, Japan)
			WP_153635520.1	PafA	
			WP_153635957.1	PhoX	
			WP_242007665.1	PhoA*	
			WP_153636482.1	PhoD	
<i>Cobetia</i> sp. 2AS1	<i>C. amphilecti</i>	GCF_014876835.1	WP_192837404.1	PhoD	Coastal sediment (Russia: the Sea of Japan, Nakhodka harbor)
			WP_192838056.1	PafA	
			WP_225996507.1	PhoD	
			WP_192839216.1	PhoX	
			WP_192838056.1	PafA	
<i>Cobetia</i> sp. 2AS	<i>C. amphilecti</i>	GCF_029846355.1	WP_192839216.1	PhoX	Sediments (Russia: the Sea of Japan, Vostok Bay)
			WP_225996507.1	PhoD	
			WP_192837404.1	PhoD	
			WP_249330383.1	PhoD	
			WP_279830791.1	PafA	
<i>C. litoralis</i> NRIC 0814T	<i>C. amphilecti</i>	GCF_029846315.1	WP_279833222.1	PhoX	Sandy sediment (Russia: the Sea of Japan)

			WP_279832006.1	PhoD	
			WP_249330383.1	PhoD	Fish-landing facility
<i>Cobetia</i> sp. MC34	<i>C. amphilecti</i>	GCF_018340035.1	WP_213114436.1	PhoX	(Norway: Troms, Tromsvik)
			WP_213114659.1	PhoD	
			WP_279835410.1	PhoD	The finger sponge
<i>Cobetia</i> sp. 29-18-1	<i>C. amphilecti</i>	GCF_029846405.1	WP_279835708.1	PhoX	<i>Amphilectus digitatus</i>
			WP_279836670.1	PafA	(The Sea of Okhotsk, Sakhalin Island, Piltun Bay)
			WP_279836807.1	PhoD	
			WP_215824272.1	PafA	Current Humbolt system, <i>Heterostera chilensis</i> (Chile: Puerto Aldea)
<i>Cobetia</i> sp. 4B	<i>C. amphilecti</i>	GCF_018831605.1	WP_240548688.1	PhoD	
			WP_215822940.1	PhoX	
			WP_215823407.1	PhoD	
			WP_225347537.1	PhoD	The marine sediment (Atlantic Ocean: Scotia Sea)
<i>C. amphilecti</i> N-80	<i>C. amphilecti</i>	GCF_020217465.1	WP_225347908.1	PafA	
			WP_225346724.1	PhoX	
			WP_225347230.1	PhoD	
			WP_253061861.1	PafA	Coral surface mucus layer and tissue, <i>Diploria labyrinthiformis</i> (USA: FL, Dry Tortugas)
<i>Cobetia</i> sp. Dlab-2-U	<i>Cobetia</i> sp.	GCF_024124585.1	WP_253063154.1	PhoD	
			WP_253064500.1	PhoX	
			WP_253064933.1	PhoD	
			WP_253061861.1	PafA	Coral surface mucus layer and tissue, <i>Diploria labyrinthiformis</i> (USA: FL, Dry Tortugas)
<i>Cobetia</i> sp. Dlab-2-AX	<i>Cobetia</i> sp.	GCF_024124625.1	WP_253063154.1	PhoD	
			WP_253064500.1	PhoX	
			WP_253064933.1	PhoD	
			WP_175089240.1	PhoD	Aquarium water (Brazil: Rio de Janeiro)
<i>C. marina</i> 402	<i>Cobetia</i> sp.	GCF_013350055.1	WP_175090103.1	PhoX	
			WP_254627190.1	PhoD	
			WP_175090544.1	PafA	
			WP_233593417.1	PhoD	Rotten brown algae, <i>Sargassum fusiforme</i> (China: Zhejiang)
<i>Cobetia</i> sp. cqz5-12	<i>Cobetia</i> sp.	GCF_016495405.1	WP_200019524.1	PafA	
			WP_200016943.1	PhoX	
			WP_200017549.1	PhoD	
			WP_240916767.1	PhoD	Sea cucumber gut (Viet Nam: Hon Tre, Nha Trang Bay)
<i>Cobetia</i> sp. MB87	<i>Cobetia</i> sp.	GCF_011319755.1	WP_166020003.1	PhoD	
			WP_084208519.1	PhoX	Namhae, the red algae
<i>C. pacifica</i> GPM2	<i>C. marina</i>	GCF_009931455.1	WP_254696557.1	PhoD	<i>Pyropia tenera</i> (South Korea)
			WP_254696414.1	PhoD	
			WP_279854649.1	PhoX	The red algae
<i>Cobetia</i> sp. 10Alg 146	<i>C. marina</i>	GCF_029846385.1	WP_279856192.1	PhoD	<i>Ahnfeltia tobuchiensis</i> (Russia: The Sea of Okhotsk, Kuril Isles)
			WP_279856235.1	PhoD	
			WP_240499655.1	PhoD	Coastal seawater (Russia: The Sea of Japan, Vostok Bay)
<i>Cobetia</i> sp. 3AK	<i>C. marina</i>	GCF_029846335.1	WP_279874635.1	PhoD	
			WP_084208519.1	PhoX	
			WP_284728477.1	PhoD	Sandy sediment (Russia: the Sea of Japan)
<i>C. pacifica</i> NRIC 0813 ^T	<i>C. marina</i>	GCA_030010515.1	WP_240704267.1	PhoX	
			WP_084208519.1	PhoX	
<i>Cobetia</i> sp. MMG027	<i>C. marina</i>	GCF_027947415.1	WP_271302424.1	PhoD	missing (USA: Mission Beach, San Diego)
			WP_084208519.1	PhoX	

			WP_240499655.1	PhoD	
<i>C. marina</i>	<i>C. marina</i>	GCF_900119965.1	WP_077375791.1	PhoX	Eulitoral intertidal
MM1IDA2H-1AD			WP_255303155.1	PhoD	pond at sea level
			WP_258038356.1	PhoD	(Chile: Valparaiso)
			WP_255303113.1	PhoD	Seaweed (Japan: Iwate,
<i>Cobetia</i> sp. 5-11-6-3	<i>C. marina</i>	GCF_013374055.1	WP_255303155.1	PhoD	Ofunato Bay)
			WP_084208519.1	PhoX	
			WP_240704252.1	PhoD	Salt water (USA: New
<i>C. marina</i> T1	<i>C. marina</i>	GCF_005144735.1	WP_240704267.1	PhoD	Hampshire, Hampton
			WP_136939347.1	PhoX	Beach)
<i>C. marina</i> NBRC	<i>C. marina</i>	GCF_006540105.1	WP_136939347.1	PhoX	missing
15607			WP_240704267.1	PhoX	
			WP_255304446.1	PhoD	Seaweed (Japan: Iwate,
<i>Cobetia</i> sp. 5-25-4-2	<i>C. marina</i>	GCF_013374075.1	WP_255304452.1	PhoD	Ofunato Bay)
			WP_176494061.1	PhoX	
			WP_127734507.1	PhoD	The green algae <i>Ulva</i>
<i>Cobetia</i> sp. ICG0124	<i>C. marina</i>	GCF_004006355.1	WP_084208519.1	PhoX	(United Kingdom:
			WP_240665388.1	PhoD	Aberystwyth)
			WP_240499655.1	PhoD	Littoral water sample
<i>C. marina</i> JCM	<i>C. marina</i>	GCF_001720485.1	WP_084208519.1	PhoX	(USA: Woods
21022 ^T			WP_240499593.1	PhoD	Hole, MA)
			WP_233266401.1	PhoD	Beach, brown algae
			WP_024952594.1	PhoX	(Arctic Ocean)
<i>Cobetia</i> sp. L2A1	<i>Cobetia</i> sp.	GCF_009796845.1	WP_158773983.1	PafA	
			WP_158774142.1	PhoX	
			WP_158774696.1	PhoD	
			WP_246116512.1	PhoA *	Seawater (China:
<i>Cobetia</i> sp. QF-1*	<i>C. crustatorum</i>	GCF_002213105.1	WP_088743230.1	PhoD	Qingdao)
			WP_088743763.1	PhoX	
			WP_088743908.1	PhoX	
			WP_144726746.1	PhoD	Surface seawater
<i>C. crustatorum</i>	<i>C. crustatorum</i>	GCF_007786215.1	WP_088743763.1	PhoD	(Kongsfjorden, Arctic)
SM1923*			WP_144727163.1	PhoX	
			WP_246116512.1	PhoA *	
			WP_144728015.1	PhoD	
			WP_248623642.1	PhoA *	Fermented shrimp
<i>C. crustatorum</i> JO1 ^T *	<i>C. crustatorum</i>	GCF_000591415.1	WP_282705494.1	PhoD	(South Korea: Daejeon)
			WP_282705495.1	PhoD	
			WP_024952594.1	PhoX	

* The strains containing **PhoA** family.