

Supplementary information to:

Profiling the outer membrane proteome during growth and development of the social bacterium *Myxococcus xanthus* by selective biotinylation and analyses of outer membrane vesicles

Jörg Kahnt, Kryssia Aguiluz, Jürgen Koch, Anke Treuner-Lange, Anna Konovalova, Stuart Huntley, Michael Hoppert[#], Lotte Søgaaard-Andersen^{*}, and Reiner Hedderich

Department of Ecophysiology, Max Planck Institute for Terrestrial Microbiology, Karl-von-Frisch Str., 35043 Marburg, Germany

[#] Institute of Microbiology & Genetics, Georg-August-Universität Göttingen, 37077 Göttingen, Germany

^{*} Corresponding author

Tel. +49-6421-178201

E-mail: sogaard@mpi-marburg.mpg.de

This file contains:

Figure S1. SDS-PAGE gel stained with Coomassie Brilliant Blue R-250 of proteins isolated after biotinylation and of outer membrane vesicles of *M. xanthus*.

Tables S1. Proteins detected by the biotinylation method and/or in outer membrane vesicles of *M. xanthus* sorted according to MXAN#.

Table S2. Proteins detected by the biotinylation method and/or in outer membrane vesicles of *M. xanthus* sorted according to detection patterns.

References.

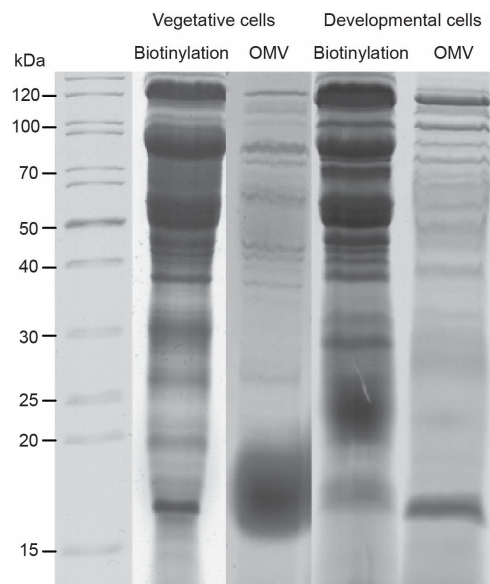


Figure S1. SDS-PAGE gel stained with Coomassie Brilliant Blue R-250 of proteins isolated after biotinylation and of outer membrane vesicles of *M. xanthus*. 50 μ g of proteins were loaded for samples purified following biotinylation and 20 μ g of proteins were loaded for OMV. Size of molecular weight markers in kDa are shown to the left.

Table S1. Proteins detected by the biotinylation method and/or in outer membrane vesicles of *M. xanthus* sorted according to MXAN#.

Systematic gene name	Gene name	Predicted subcellular localization & annotation ^a	Molecular mass	Phylogenetic distribution ^b	Vegetative cells	Vegetative cells	Developmental cells	Developmental cells
					Biotinylation	OMV ^c	Biotinylation	OMV ^c
		Integral outer membrane proteins						
MXAN0162		conserved hypothetical protein	38801	Conserved			1	1
MXAN0219		hypothetical protein	66396	Conserved	1		1	1
MXAN0518		TonB-dependent receptor	103688	Conserved	1		1	
MXAN0562		Porin O/P-like protein	51258	Conserved	1	1	1	1
MXAN0585		alpha-2-macroglobulin family protein	168605	Conserved	1		1	
MXAN0620		hypothetical protein	29095	Conserved		1		1
MXAN0821		TonB-dependent receptor	99456	Conserved	1	1		1
MXAN0856		TonB-dependent receptor	95420	Conserved	1		1	
MXAN0924		hypothetical protein	22449	Myxococcales	1	1		1
MXAN1329		conserved hypothetical protein	26665	Myxococcales				1
MXAN1424		hypothetical protein	29903	Myxococcales	1	1		1
MXAN1450	<i>oar</i>	TonB-dependent receptor	122449	Conserved	1	1	1	1
MXAN1916		hypothetical protein	44419	Myxococcales	1	1	1	1
MXAN2090		OmpA domain protein	68768	Conserved	1		1	1
MXAN2426		hypothetical protein	58641	Conserved	1			
MXAN2466		hypothetical protein	25104	Myxococcales	1	1	1	1
MXAN2514	<i>gspD1</i>	outer membrane secretin	91843	Conserved	1	1	1	1
MXAN2539		conserved hypothetical protein	29501	Conserved	1		1	
MXAN2540		conserved hypothetical protein	27780	Conserved	1	1	1	1
MXAN2659		hypothetical protein	55630	Myxococcales	1	1	1	1
MXAN2865		hypothetical protein	42096	Myxococcales	1			
MXAN3106	<i>gspD2</i>	outer membrane secretin	51881	Conserved		1		1

MXAN3553		hypothetical protein	47395	Myxococcales	1	1	1	1
MXAN3667		hypothetical protein	28658	<i>M. xanthus</i>			1	1
MXAN3830		hypothetical protein	35882	Myxococcales	1	1	1	1
MXAN3905		TolC-like protein	49876	Conserved	1		1	
MXAN4092		hypothetical protein	37629	Myxococcales		1		
MXAN4176		TolC-like protein	48920	Conserved	1		1	
MXAN4400		hypothetical protein	21887	<i>M. xanthus</i>	1	1	1	1
MXAN4440		hypothetical protein	127397	Conserved	1	1	1	1
MXAN4559		TonB-dependent receptor	98524	Conserved	1		1	1
MXAN4686		hypothetical protein	30292	Myxococcales	1		1	1
MXAN4727		outer membrane protein, OmpH family	20843	Conserved	1			
MXAN4728	<i>yaeT</i>	Omp85 family protein	92425	Conserved	1		1	
MXAN4746		TonB-dependent receptor	109122	Conserved	1	1	1	1
MXAN4866		hypothetical protein	22008	Myxococcales	1	1	1	1
MXAN4976		hypothetical protein	24933	Myxococcales	1			1
MXAN5023		TonB-dependent receptor	89210	Conserved	1	1	1	1
MXAN5030		TolC-like protein	48825	Conserved	1	1	1	
MXAN5042		OmpA domain protein	68144	Conserved	1			1
MXAN5102		hypothetical protein	29167	<i>M. xanthus</i>		1		
MXAN5375		hypothetical protein	57920	<i>M. xanthus</i>	1			
MXAN5491		hypothetical protein	26896	<i>M. xanthus</i>	1		1	
MXAN5686		hypothetical protein	19807	Myxococcales	1	1	1	1
MXAN5772	<i>pilQ</i>	type IV pilus secretin	95730	Conserved				1
MXAN5809		hypothetical protein	31849	Conserved	1	1	1	1
MXAN5855		hypothetical protein	42556	Conserved	1	1	1	1
MXAN5931		hypothetical protein	74260	Myxococcales	1	1	1	1
MXAN6044		TonB-dependent receptor	89601	Conserved	1			1
MXAN6090		hypothetical protein	34806	Conserved	1	1	1	1
MXAN6196		hypothetical protein	30792	Conserved	1			

MXAN6246		OmpA domain protein	56657	Conserved	1	1	1	1
MXAN6366		hypothetical protein	22027	Myxococcales		1		1
MXAN6487		TolC-like protein	50243	Conserved	1	1	1	1
MXAN6579		TonB-dependent receptor	75491	Conserved	1		1	1
MXAN6751		hypothetical protein	49462	Myxococcales	1	1	1	1
MXAN6911		TonB-dependent receptor	75903	Conserved	1	1	1	1
MXAN7040	<i>fadL</i>	long-chain fatty acid transport protein	42116	Conserved	1	1	1	1
MXAN7203		hypothetical protein	26532	Conserved	1		1	1
MXAN7317		hypothetical protein	25675	Myxococcales	1	1	1	1
MXAN7331		TonB-dependent receptor	86552	Conserved	1		1	1
MXAN7340		hypothetical protein	18273	Myxococcales	1	1	1	1
MXAN7407		hypothetical protein	21633	Myxococcales	1	1	1	1
MXAN7436		TolC-like protein	48546	Conserved	1		1	1
		Lipoproteins						
MXAN0026		hypothetical protein	15482	<i>M. xanthus</i>	1			
MXAN0283		putative lipoprotein	32530	Myxococcales		1		1
MXAN0522		putative lipoprotein	57581	Myxococcales	1		1	1
MXAN0662		hypothetical protein	18655	<i>M. xanthus</i>	1	1	1	
MXAN0751		conserved protein, periplasmic binding protein	79089	Conserved	1		1	
MXAN0793		putative lipoprotein	57944	Myxococcales		1		1
MXAN0805		peptidase, M10A/M12A subfamilies	52385	Myxococcales		1	1	
MXAN0855		OmpA domain protein	29563	Conserved	1			
MXAN0936		glutaminy-peptide cyclotransferase family protein	28985	Conserved	1		1	
MXAN0962		putative lipoprotein	117034	Myxococcales	1	1	1	1
MXAN1063		putative lipoprotein	29174	Myxococcales				1
MXAN1162		putative lipoprotein	134761	Conserved	1		1	
MXAN1176		peptidylprolyl cis-trans isomerase, cyclophilin-type	26264	Conserved	1		1	
MXAN1231		putative lipoprotein	46483	<i>M. xanthus</i>		1		

MXAN1262		receptor family ligand-binding protein	50052	Conserved	1			
MXAN1342		putative lipoprotein	51742	Conserved				1
MXAN1451	<i>nlpA</i>	putative lipoprotein	24618	Myxococcales	1	1	1	1
MXAN1623		peptidase, M16 (pitrilysin) family	53184	Conserved	1		1	
MXAN1981		hypothetical protein	64198	Myxococcales			1	1
MXAN2091		peptidase, M16 (pitrilysin) family	58860	Conserved	1		1	
MXAN2183		putative lipoprotein	46444	<i>M. xanthus</i>				1
MXAN2194		putative lipoprotein	27879	Conserved	1			
MXAN2286		peptidyl-dipeptidase Dcp	85685	Conserved	1		1	
MXAN2290		putative lipoprotein	61988	Conserved				1
MXAN2373		M38 (beta-aspartyl dipeptidase) family protein	55069	Conserved	1		1	
MXAN2417		conserved hypothetical protein	207088	Conserved	1		1	
MXAN2423		putative lipoprotein	57258	Conserved	1		1	1
MXAN2470		5-nucleotidase family protein	53571	Conserved	1			
MXAN2660		putative lipoprotein	71267	Myxococcales	1		1	1
MXAN2792		putative lipoprotein	42129	<i>M. xanthus</i>	1		1	
MXAN2831		putative lipoprotein	36985	Conserved	1		1	
MXAN2866		putative lipoprotein	31269	Conserved	1			
MXAN3060	<i>cglB</i>	adventurous gliding motility protein CglB	44434	Myxococcales	1			
MXAN3084	<i>tgl</i>	social gliding motility protein Tgl	28284	Conserved	1			
MXAN3103		putative lipoprotein	72915	Myxococcales	1		1	
MXAN3160		peptidase, M13 (neprilysin) family	76549	Conserved	1	1	1	
MXAN3417		putative lipoprotein	36130	Conserved			1	
MXAN3440		peptidase, M13 (neprilysin) family	79107	Conserved	1		1	
MXAN3573		putative lipoprotein	25392	Conserved	1			
MXAN3581		peptidyl-dipeptidase A	76791	Conserved	1			
MXAN3698		putative lipoprotein	27336	Myxococcales	1	1		
MXAN3957		hypothetical protein	32522	Myxococcales	1	1		1
MXAN4208		tetratricopeptide repeat protein	28750	Conserved	1			

MXAN4447		tetratricopeptide repeat protein	41033	Conserved	1			
MXAN4534		chitinase, class I	43259	Conserved		1		
MXAN4641		hypothetical protein	56622	Myxococcales	1	1	1	1
MXAN4653		putative lipoprotein	25083	Myxococcales			1	1
MXAN4668		hypothetical protein	30531	Conserved			1	
MXAN4747		putative lipoprotein	48930	Conserved	1		1	1
MXAN4900		putative lipoprotein	42520	Myxococcales	1	1	1	
MXAN4966		putative lipoprotein	39120	Conserved	1		1	
MXAN5024		conserved domain protein	51453	Conserved		1		1
MXAN5152		OmpA domain protein	26334	Conserved	1			
MXAN5325		5'-nucleotidase family protein	62231	Conserved	1			
MXAN5331		putative lipoprotein	19144	Conserved	1		1	
MXAN5337		putative lipoprotein	24330	Myxococcales	1			
MXAN5361		putative 5'-nucleotidase	60716	Conserved	1			
MXAN5374		glycosyl hydrolase, family 13	85406	Conserved	1			
MXAN5408		hypothetical protein	134947	Conserved		1	1	
MXAN5508		putative lipoprotein	19450	<i>M. xanthus</i>	1			
MXAN5683		putative lipoprotein	45575	Conserved	1			
MXAN5684		putative lipoprotein	24954	Conserved	1	1	1	1
MXAN5711		lipoprotein, BMP family	41582	Conserved	1		1	
MXAN5734		putative lipoprotein	20086	Conserved	1			
MXAN5752		hypothetical protein	38039	Myxococcales		1		1
MXAN5771		putative lipoprotein	23811	Myxococcales	1			
MXAN5933		peptidase, M48 (Ste24 endopeptidase) family	29200	Conserved	1	1	1	
MXAN6082		cytochrome c family protein	21957	Conserved	1		1	
MXAN6106	<i>fibA</i>	matrix-associated zinc metalloprotease	79807	Conserved	1		1	
MXAN6313		putative lipoprotein	36216	Conserved	1			
MXAN6367		putative lipoprotein	19944	Myxococcales	1	1	1	
MXAN6521		putative lipoprotein	21716	Conserved	1			

MXAN6658		putative lipoprotein	71261	Myxococcales	1			1
MXAN6660		hypothetical protein	25336	Myxococcales	1		1	
MXAN6709		putative lipoprotein	54018	<i>M. xanthus</i>	1	1	1	
MXAN6720		putative lipoprotein	11440	Myxococcales	1	1	1	1
MXAN6749		bacterial Ig-like domain protein	51082	Conserved	1			1
MXAN6884		hypothetical protein	18609	Myxococcales	1		1	
MXAN6985		hypothetical protein	52771	Conserved		1		
MXAN7089		putative lipoprotein	22029	<i>M. xanthus</i>	1		1	
MXAN7108		putative lipoprotein	20732	Conserved	1			
MXAN7110		peptidyl-prolyl cis-trans isomerase, FKBP-type	27313	Conserved	1		1	
MXAN7179		putative lipoprotein	21324	Conserved	1			
MXAN7332		putative lipoprotein	26722	Myxococcales	1	1		1
MXAN7333		putative lipoprotein	30650	Conserved	1	1	1	1
		Periplasmic proteins						
MXAN0100		peptidase, M28D (aminopeptidase ES-62) subfamily	52006	Conserved	1		1	
MXAN0133		hypothetical protein	38346	Myxococcales			1	
MXAN0220		lipase, alpha/beta fold family	43051	Conserved	1		1	1
MXAN0411		hypothetical protein	77497	Conserved	1			
MXAN0515		dipeptidyl peptidase IV	85019	Conserved	1			
MXAN0533		NAD dependent epimerase/dehydratase family (Tat signal sequence)	41935	Conserved	1	1	1	
MXAN0572		hypothetical protein	29182	<i>M. xanthus</i>	1			
MXAN0735		hypothetical protein	69209	Myxococcales	1	1	1	
MXAN0770		iron ABC transporter, periplasmic iron-binding protein	42828	Conserved	1			
MXAN0791		peptidase, M16 (pitrilysin) family	53929	Conserved	1			
MXAN0792		peptidase, M16 (pitrilysin) family	53347	Conserved	1			
MXAN0870		conserved hypothetical protein	75815	Conserved	1		1	
MXAN0987		N-acetylmuramoyl-L-alanine amidase, family 2	22015	Conserved	1			

MXAN1020		hypothetical protein	158757	<i>M. xanthus</i>			1	
MXAN1151		receptor family ligand-binding protein	37646	Conserved	1		1	
MXAN1193		conserved domain protein	135011	Conserved	1			
MXAN1197		peptidase, M1 (aminopeptidase N) family	98793	Conserved	1		1	
MXAN1299		hypothetical protein	21868	<i>M. xanthus</i>	1			
MXAN1365		hypothetical protein	160856	Conserved	1			
MXAN1394		metallo-beta-lactamase family protein	28647	Conserved	1		1	
MXAN1426		hypothetical protein	26980	Myxococcales	1			
MXAN1624		peptidase, M16 (pitrilysin) family	51094	Conserved	1		1	
MXAN1650		peptidase, S1A (chymotrypsin) subfamily	39059	Conserved		1		
MXAN1769		NlpC/P60 family protein	49906	Conserved			1	
MXAN1898		hypothetical protein	53893	Myxococcales		1		
MXAN2092		peptidase, M16 (pitrilysin) family	50659	Conserved	1		1	
MXAN2208		conserved hypothetical protein	18308	Conserved	1			
MXAN2253		putative peptidase, S37 family	74957	Conserved	1	1		
MXAN2422		hypothetical protein	132883	Conserved			1	
MXAN2427		hypothetical protein	29941	Conserved	1			
MXAN2498		conserved hypothetical protein	79573	Conserved	1		1	
MXAN2541		tetratricopeptide repeat protein	75994	Conserved	1	1	1	
MXAN2563		putative lipoprotein	65486	Myxococcales	1			
MXAN2595		hypothetical protein	38799	Myxococcales	1	1		
MXAN2661		5-nucleotidase family protein	87674	Conserved	1		1	1
MXAN2674		hypothetical protein	14928	Myxococcales	1			
MXAN2708		putative organic solvent tolerance protein	95984	Conserved				1
MXAN2710		putative lipoprotein	56880	Conserved	1	1	1	1
MXAN2814		putative N-acetylmuramoyl-L-alanine amidase	100666	Conserved	1	1	1	
MXAN2876		hypothetical protein	125778	Conserved		1		1
MXAN2906		penicillin acylase family protein	91435	Conserved	1	1	1	1

MXAN2974		conserved hypothetical protein	222371	Conserved	1		1	
MXAN3129		peptidase, S9A (prolyl oligopeptidase) family	79577	Conserved	1		1	
MXAN3159		hypothetical protein	120884	Conserved	1		1	
MXAN3285		peptidase, S8A (subtilisin) subfamily	64028	Conserved			1	
MXAN3564		peptidase, M36 (fungalsin) family	185183	Conserved	1	1	1	1
MXAN3676		hypothetical protein	74614	Conserved				1
MXAN3719		Mce family protein	55695	Conserved			1	1
MXAN3744		hypothetical protein	62026	Conserved	1		1	
MXAN3745		hypothetical protein	21384	Conserved	1			
MXAN3774		conserved hypothetical protein	78850	Conserved	1		1	
MXAN3776		hypothetical protein	23831	Myxococcales	1			
MXAN3807		hypothetical protein	39267	Conserved				1
MXAN3810		hydrolase, CocE/NonD family	73000	Conserved	1		1	
MXAN3971		putative lipoprotein	57187	Conserved	1	1		1
MXAN4153		putative lipoprotein	22438	Myxococcales	1			
MXAN4181		hypothetical protein	124485	Conserved	1		1	1
MXAN4269		conserved hypothetical protein	22737	Conserved				1
MXAN4329		hypothetical protein	22738	Myxococcales	1			
MXAN4433		peptidase, S1C (protease Do) subfamily	47743	Conserved			1	
MXAN4439		hypothetical protein	105796	Myxococcales			1	
MXAN4561		tetratricopeptide repeat protein	90325	Conserved	1			
MXAN4829		isoquinoline 1-oxidoreductase, beta subunit (Tat signal sequence)	80484	Conserved	1		1	
MXAN4859		MORN variant repeat protein	17328	Conserved	1			
MXAN4870		tetratricopeptide repeat protein	142516	Conserved	1		1	
MXAN4915		conserved domain protein	35318	Conserved				1
MXAN4984		putative lipoprotein	52527	<i>M. xanthus</i>	1		1	
MXAN5097		M20 (carboxypeptidase Ss1) subfamily protein	46073	Conserved	1			
MXAN5098		putative Ig domain protein	76624	<i>M. xanthus</i>	1			

MXAN5326		putative phytase	42274	Conserved		1		1
MXAN5391		hypothetical protein	47249	Myxococcales				1
MXAN5485		conserved hypothetical protein	48430	Conserved		1		
MXAN5587		hypothetical protein	45034	Conserved				1
MXAN5685		hypothetical protein	30764	Myxococcales	1	1	1	1
MXAN5756		tolB protein	46034	Conserved	1			
MXAN5862		superoxide dismutase, Cu-Zn	20119	Conserved	1		1	
MXAN5877		Ycel-like family protein	21762	Conserved	1		1	
MXAN5953		transglutaminase-like superfamily domain protein	55606	Conserved	1			
MXAN5970		peptidase, S8 (subtilisin) family	82452	Conserved		1		1
MXAN6038		peptidase, S9B (dipeptidyl peptidase IV) subfamily	81341	Conserved	1		1	
MXAN6078		putative cytochrome c	24590	Conserved	1		1	
MXAN6116		hypothetical protein	45202	Myxococcales			1	
MXAN6185		hypothetical protein	30953	Myxococcales	1			
MXAN6192		conserved hypothetical protein	92349	Conserved	1			
MXAN6352		conserved domain protein	58816	Conserved	1	1	1	1
MXAN6539		extracellular protease domain protein	19797	Conserved	1			
MXAN6577		putative lipoprotein	54353	Conserved	1			
MXAN6589		peptidase, family C69	63055	Conserved	1		1	
MXAN6622		putative lipoprotein	17144	Myxococcales	1			
MXAN6665		putative branched chain amino acid ABC transporter, periplasmic amino acid-binding protein	42108	Myxococcales	1		1	
MXAN6745		dehydrogenase, glucose/sorbose family	41714	Myxococcales	1		1	1
MXAN6811		peptidase, S9A (prolyl oligopeptidase) subfamily	77103	Conserved	1		1	
MXAN6891		tetratricopeptide repeat protein	48399	Conserved	1			
MXAN7112		conserved hypothetical protein	56131	Conserved	1	1	1	
MXAN7199		putative lipoprotein	69366	Myxococcales	1	1	1	1

MXAN7220		putative lipoprotein	54405	Conserved	1		1	
MXAN7497		peptidase, M16B (mitochondrial processing peptidase beta-subunit) family	105020	Conserved	1			
		Integral inner membrane proteins						
MXAN1081		NADH dehydrogenase I, M subunit	66824	Conserved			1	
MXAN1448		transporter, MotA/TolQ/ExbB proton channel family	23842	Conserved	1		1	
MXAN2088		thiol-disulfide oxidoreductase resA	19392	Conserved	1		1	
MXAN2429		ABC transporter, permease protein	77260	Conserved	1			
MXAN2480		signal peptide peptidase SppA, 36K type	88857	Conserved	1	1	1	1
MXAN2510	<i>gspG</i>	general secretion pathway protein G	15208	Conserved	1			
MXAN2644		peptidylprolyl cis-trans isomerase	57658	Conserved	1		1	
MXAN2720		hypothetical protein	10465	Myxococcales	1			
MXAN3319	<i>secY</i>	preprotein translocase	48710	Conserved			1	
MXAN3554		M23 peptidase domain protein	42152	Myxococcales			1	
MXAN4134		putative membrane protein	56198	Conserved				1
MXAN4157		hypothetical protein	37122	Myxococcales	1		1	
MXAN4344		putative lipoprotein	25777	Myxococcales	1			
MXAN4690	<i>secF</i>	protein-export membrane protein	42405	Conserved	1		1	
MXAN4691	<i>secD</i>	protein-export membrane protein	64444	Conserved			1	
MXAN5716		hypothetical protein	25769	Myxococcales	1	1	1	1
MXAN5743		hypothetical protein	64783	Myxococcales	1		1	
MXAN6080		oxidoreductase membrane subunit, NrfD family	53859	Conserved	1			
MXAN6081		conserved hypothetical protein	19492	Conserved	1		1	
MXAN6083		putative membrane protein	46515	Conserved	1		1	
MXAN6084		hypothetical protein	16593	Myxococcales	1			
MXAN6086		cytochrome c oxidase, subunit II	39364	Conserved	1		1	
MXAN6088		cytochrome c oxidase, subunit III	24577	Conserved	1		1	
MXAN6483		MotA/TolQ/ExbB proton channel family protein	27450	Conserved	1		1	

MXAN6861		biopolymer transport protein, ExbD/TolR family	17387	Conserved	1			
MXAN6862		MotA/TolQ/ExbB proton channel family protein	25938	Conserved	1			
MXAN7196		hypothetical protein	55991	Myxococcales	1			
MXAN7498		signal peptide peptidase SppA, 67K type	72823	Conserved	1			
		Cytoplasmic proteins						
MXAN0075		WD40-like repeat/amidohydrolase domain protein	116079	Conserved	1		1	
MXAN0094		amidohydrolase family protein	40062	Conserved			1	
MXAN0412		conserved hypothetical protein	27879	Conserved				1
MXAN0534		putative lipoprotein	55682	<i>M. xanthus</i>	1		1	
MXAN0584		hypothetical protein	56494	Myxococcales	1		1	
MXAN0657		hypothetical protein	75860	Conserved	1			
MXAN0659		putative lipoprotein	64305	Conserved	1	1	1	1
MXAN0764		peptidase, M24 (methionyl aminopeptidase 1) family	52379	Conserved	1			
MXAN0804		hypothetical protein	68718	Myxococcales			1	
MXAN0822		putative lipoprotein	33206	Myxococcales	1	1	1	1
MXAN0875		hypothetical protein	20745	Myxococcales	1	1		
MXAN0964		peptidase, M14 family	67491	Conserved	1		1	
MXAN1160		asparaginase family protein	36600	Conserved	1			
MXAN1383		gamma-glutamyltransferase	62851	Conserved	1		1	
MXAN1389		putative alkaline phosphatase	81402	Conserved	1	1	1	1
MXAN1632		hypothetical protein	93360	Myxococcales		1		1
MXAN1896		serine/threonine protein kinase	70533	Myxococcales			1	
MXAN1899		hypothetical protein	61590	Conserved		1		
MXAN1942		tetratricopeptide repeat protein	170422	Conserved	1			
MXAN2016		prolyl endopeptidase precursor Pep	83253	Conserved	1	1	1	
MXAN2160		putative lipoprotein	102291	Conserved		1		1
MXAN2215		putative lipoprotein	53500	Myxococcales	1		1	

MXAN2236		putative 5-nucleotidase	68226	Conserved				1
MXAN2382		peptidase, M18 (aminopeptidase I) family	48430	Conserved		1	1	1
MXAN2462		hypothetical protein	31131	Conserved	1		1	
MXAN2730		NADH dehydrogenase I, C subunit	22670	Conserved	1		1	
MXAN2787		homogentisate 1,2-dioxygenase	48655	Conserved				1
MXAN2903		putative lipoprotein	59316	Conserved	1	1	1	
MXAN3102		putative lipoprotein	56085	Myxococcales	1			
MXAN3108		FHA domain/tetratricopeptide repeat protein	80652	Conserved			1	
MXAN3143		putative xanthine dehydrogenase	136581	Conserved				1
MXAN3182		serine/threonine protein kinase	64961	Myxococcales			1	
MXAN3206		DsbA-like thioredoxin domain protein	71404	Conserved	1		1	
MXAN3323		ribosomal protein S13	14214	Conserved	1			
MXAN3325		ribosomal protein S4	23936	Conserved	1			
MXAN3539		succinate dehydrogenase, flavoprotein subunit	69243	Conserved	1		1	
MXAN3540		succinate dehydrogenase, iron-sulfur protein	29340	Conserved	1		1	
MXAN3556		hypothetical protein	32507	Conserved			1	1
MXAN3656		hypothetical protein	120929	Conserved		1		
MXAN3723		hypothetical protein	25682	Myxococcales	1			
MXAN3764		peptidylprolyl cis-trans isomerase, cyclophilin-type	21376	Conserved	1			
MXAN3792		WD domain G-beta repeat protein	85512	<i>M. xanthus</i>	1		1	
MXAN3953		hypothetical protein	94877	Myxococcales	1		1	1
MXAN3977		hypothetical protein	38836	<i>M. xanthus</i>		1		
MXAN4219		alpha keto acid dehydrogenase complex, E3 component, lipoamide dehydrogenase	49673	Conserved				1
MXAN4293		hypothetical protein	16389	Myxococcales	1			
MXAN4467		chaperonin GroEL	58145	Conserved	1			
MXAN4494		putative Phage tail sheath protein	83947	Conserved				1

MXAN4495		conserved hypothetical protein	16419	Conserved				1
MXAN4564		2-oxoisovalerate dehydrogenase complex, E1 component, alpha subunit	37106	Conserved				1
MXAN4565		2-oxoisovalerate dehydrogenase complex, E1 component, beta subunit	38271	Conserved				1
MXAN4648		FHA domain protein	62018	Conserved	1			
MXAN4676		peptidylprolyl cis-trans isomerase, cyclophilin-type	15700	Conserved	1		1	
MXAN4685		hypothetical protein	43556	Myxococcales	1	1	1	
MXAN4796		fibronectin type III domain protein	43210	Conserved	1	1		
MXAN4830		isoquinoline 1-oxidoreductase, alpha subunit	17175	Conserved	1			
MXAN4860		hypothetical protein	33461	Myxococcales	1	1	1	1
MXAN4867		FHA domain/TonB domain protein	66438	Conserved	1			
MXAN4935		putative esterase	43809	Conserved		1		
MXAN4895		chaperonin GroEL	57893	Conserved	1		1	
MXAN5025		hypothetical protein	46753	Conserved	1	1		
MXAN5143		tetratricopeptide repeat protein	35735	Conserved	1			
MXAN5146		hypothetical protein	34148	<i>M. xanthus</i>		1		
MXAN5162		hypothetical protein	28824	Conserved	1			
MXAN5197		thioredoxin domain protein	38744	Conserved	1		1	
MXAN5265		Kelch domain protein	113862	Conserved			1	
MXAN5266		hypothetical protein	38684	<i>M. xanthus</i>			1	
MXAN5297		putative lipoprotein	36329	<i>M. xanthus</i>	1	1	1	1
MXAN5315		putative lipoprotein	30968	Conserved	1			
MXAN5404		conserved hypothetical protein	43296	Conserved	1			
MXAN5407		choloylglycine hydrolase family protein	38679	Conserved				1
MXAN5453		hypothetical protein	63953	Conserved	1	1	1	
MXAN5582		conserved hypothetical protein	37715	Conserved	1			1
MXAN6050		conserved domain protein	71510	Conserved	1		1	
MXAN6079		putative molybdopterin oxidoreductase, iron-sulfur binding subunit	116580	Conserved	1		1	

MXAN6121		hypothetical protein	34493	Conserved	1			
MXAN6172		putative lipoprotein	21332	<i>M. xanthus</i>	1			
MXAN6245		kelch motif/HYR domain protein	137608	Conserved	1	1	1	1
MXAN6266		putative 2,3-cyclic-nucleotide 2-phosphodiesterase	65267	Conserved	1	1	1	1
MXAN6270		hypothetical protein	71507	<i>M. xanthus</i>		1		
MXAN6574		putative lipoprotein	53122	Myxococcales	1	1	1	1
MXAN6601		peptidase, S9C (acylaminoacyl-peptidase) subfamily	82668	Conserved	1		1	1
MXAN7004		hypothetical protein	16742	Myxococcales	1			
MXAN7023		putative lipoprotein	81128	Conserved	1			1
MXAN7039		putative lipoprotein	107333	Conserved	1	1	1	1
MXAN7104		peptidase, M3 (thimet oligopeptidase) family	76860	Conserved	1		1	
MXAN7212		hypothetical protein	14822	Myxococcales	1		1	
MXAN7366		putative lipoprotein	65357	<i>M. xanthus</i>	1			

^a Subcellular localization of proteins were predicted on the basis of the following criteria: Integral outer membrane proteins: N-terminal signal peptide with a signal peptidase I cleavage site predicted using SignalP3 ¹ and TatP ² and a potential beta-barrel structure using TMBB (<http://bioinformatics2.biol.uoa.gr/PRED-TMBB>); lipoproteins: N-terminal signal peptide with signal peptidase II cleavage site predicted using LipoP ³; periplasmic proteins: Signal peptidase I cleavage site but no inner membrane or outer membrane protein prediction; integral inner membrane proteins: One or more trans-membrane helices predicted using TMHMM ⁴; cytoplasmic proteins: no signal peptidase cleavage site and no inner membrane or outer membrane prediction.

^b Orthologous proteins were identified using a pair wise reciprocal best BLASTP hit method ⁵ in combination with an expect score cutoff of 1e⁻⁵ and homology over at least one-third of the query sequence length. The phylogenetic distribution of proteins is as follows: Proteins labelled conserved have orthologs in least one species outside the Myxococcales; proteins labelled Myxococcales

have orthologs in at least two of the four Myxococcales species with completely sequenced genomes (*Anaeromyxobacter dehalogenans* ⁶, *Stigmatella aurantiaca* (<http://www.ncbi.nlm.nih.gov/sites/entrez?Db=genome&Cmd=ShowDetailView&TermToSearch=5526>, *Sorangium cellulosum* ⁷ and *M. xanthus* ⁸); proteins labelled *M. xanthus* have no orthologs outside *M. xanthus*.

^c OMV, outer membrane vesicles

Table S2. Proteins detected by the biotinylation method and/or in outer membrane vesicles of *M. xanthus* sorted according to detection patterns.

Systematic gene name	Gene name	Predicted subcellular localization & annotation ^a	Molecular mass	Phylogenetic distribution ^b	Vegetative cells	Vegetative cells	Developmental cells	Developmental cells
					Biotinylation	OMV ^c	Biotinylation	OMV ^c
		Integral outer membrane proteins						
MXAN0562		Porin O/P-like protein	51258	Conserved	1	1	1	1
MXAN1450	<i>oar</i>	TonB-dependent receptor	122449	Conserved	1	1	1	1
MXAN1916		hypothetical protein	44419	Myxococcales	1	1	1	1
MXAN2466		hypothetical protein	25104	Myxococcales	1	1	1	1
MXAN2514	<i>gspD1</i>	outer membrane secretin	91843	Conserved	1	1	1	1
MXAN2540		conserved hypothetical protein	27780	Conserved	1	1	1	1
MXAN2659		hypothetical protein	55630	Myxococcales	1	1	1	1
MXAN3830		hypothetical protein	35882	Myxococcales	1	1	1	1
MXAN4400		hypothetical protein	21887	<i>M. xanthus</i>	1	1	1	1
MXAN4440		hypothetical protein	127397	Conserved	1	1	1	1
MXAN3553		hypothetical protein	47395	Myxococcales	1	1	1	1
MXAN4746		TonB-dependent receptor	109122	Conserved	1	1	1	1
MXAN4866		hypothetical protein	22008	Myxococcales	1	1	1	1
MXAN5023		TonB-dependent receptor	89210	Conserved	1	1	1	1
MXAN5686		hypothetical protein	19807	Myxococcales	1	1	1	1
MXAN5809		hypothetical protein	31849	Conserved	1	1	1	1
MXAN5855		hypothetical protein	42556	Conserved	1	1	1	1
MXAN5931		hypothetical protein	74260	Myxococcales	1	1	1	1
MXAN6090		hypothetical protein	34806	Conserved	1	1	1	1
MXAN6246		OmpA domain protein	56657	Conserved	1	1	1	1
MXAN6487		ToiC-like protein	50243	Conserved	1	1	1	1
MXAN6751		hypothetical protein	49462	Myxococcales	1	1	1	1

MXAN6911		TonB-dependent receptor	75903	Conserved	1	1	1	1
MXAN7040	<i>fadL</i>	long-chain fatty acid transport protein	42116	Conserved	1	1	1	1
MXAN7317		hypothetical protein	25675	Myxococcales	1	1	1	1
MXAN7340		hypothetical protein	18273	Myxococcales	1	1	1	1
MXAN7407		hypothetical protein	21633	Myxococcales	1	1	1	1
MXAN5030		TolC-like protein	48825	Conserved	1	1	1	
MXAN0219		hypothetical protein	66396	Conserved	1		1	1
MXAN2090		OmpA domain protein	68768	Conserved	1		1	1
MXAN4559		TonB-dependent receptor	98524	Conserved	1		1	1
MXAN4686		hypothetical protein	30292	Myxococcales	1		1	1
MXAN6579		TonB-dependent receptor	75491	Conserved	1		1	1
MXAN7203		hypothetical protein	26532	Conserved	1		1	1
MXAN7331		TonB-dependent receptor	86552	Conserved	1		1	1
MXAN7436		TolC-like protein	48546	Conserved	1		1	1
MXAN0821		TonB-dependent receptor	99456	Conserved	1	1		1
MXAN0924		hypothetical protein	22449	Myxococcales	1	1		1
MXAN1424		hypothetical protein	29903	Myxococcales	1	1		1
MXAN0518		TonB-dependent receptor	103688	Conserved	1		1	
MXAN0585		alpha-2-macroglobulin family protein	168605	Conserved	1		1	
MXAN0856		TonB-dependent receptor	95420	Conserved	1		1	
MXAN2539		conserved hypothetical protein	29501	Conserved	1		1	
MXAN3905		TolC-like protein	49876	Conserved	1		1	
MXAN4176		TolC-like protein	48920	Conserved	1		1	
MXAN4728	<i>yaeT</i>	Omp85 family protein	92425	Conserved	1		1	
MXAN5491		hypothetical protein	26896	<i>M. xanthus</i>	1		1	
MXAN0620		hypothetical protein	29095	Conserved		1		1
MXAN3106	<i>gspD2</i>	outer membrane secretin	51881	Conserved		1		1
MXAN6366		hypothetical protein	22027	Myxococcales		1		1
MXAN0162		conserved hypothetical protein	38801	Conserved			1	1

MXAN3667		hypothetical protein	28658	<i>M. xanthus</i>			1	1
MXAN4976		hypothetical protein	24933	Myxococcales	1			1
MXAN5042		OmpA domain protein	68144	Conserved	1			1
MXAN6044		TonB-dependent receptor	89601	Conserved	1			1
MXAN2426		hypothetical protein	58641	Conserved	1			
MXAN2865		hypothetical protein	42096	Myxococcales	1			
MXAN4727		outer membrane protein, OmpH family	20843	Conserved	1			
MXAN5375		hypothetical protein	57920	<i>M. xanthus</i>	1			
MXAN6196		hypothetical protein	30792	Conserved	1			
MXAN4092		hypothetical protein	37629	Myxococcales		1		
MXAN5102		hypothetical protein	29167	<i>M. xanthus</i>		1		
MXAN1329		conserved hypothetical protein	26665	Myxococcales				1
MXAN5772	<i>pilQ</i>	type IV pilus secretin	95730	Conserved				1
		Lipoproteins						
MXAN0962		putative lipoprotein	117034	Myxococcales	1	1	1	1
MXAN1451	<i>nlpA</i>	putative lipoprotein	24618	Myxococcales	1	1	1	1
MXAN4641		hypothetical protein	56622	Myxococcales	1	1	1	1
MXAN5684		putative lipoprotein	24954	Conserved	1	1	1	1
MXAN6720		putative lipoprotein	11440	Myxococcales	1	1	1	1
MXAN7333		putative lipoprotein	30650	Conserved	1	1	1	1
MXAN0662		hypothetical protein	18655	<i>M. xanthus</i>	1	1	1	
MXAN3160		peptidase, M13 (neprilysin) family	76549	Conserved	1	1	1	
MXAN4900		putative lipoprotein	42520	Myxococcales	1	1	1	
MXAN5933		peptidase, M48 (Ste24 endopeptidase) family	29200	Conserved	1	1	1	
MXAN6709		putative lipoprotein	54018	<i>M. xanthus</i>	1	1	1	
MXAN6367		putative lipoprotein	19944	Myxococcales	1	1	1	
MXAN0522		putative lipoprotein	57581	Myxococcales	1		1	1
MXAN2423		putative lipoprotein	57258	Conserved	1		1	1
MXAN2660		putative lipoprotein	71267	Myxococcales	1		1	1

MXAN4747		putative lipoprotein	48930	Conserved	1		1	1
MXAN3957		hypothetical protein	32522	Myxococcales	1	1		1
MXAN7332		putative lipoprotein	26722	Myxococcales	1	1		1
MXAN0751		conserved protein, periplasmic binding protein	79089	Conserved	1		1	
MXAN0936		glutaminyl-peptide cyclotransferase family protein	28985	Conserved	1		1	
MXAN1162		putative lipoprotein	134761	Conserved	1		1	
MXAN1176		peptidylprolyl cis-trans isomerase, cyclophilin-type	26264	Conserved	1		1	
MXAN1623		peptidase, M16 (pitrilysin) family	53184	Conserved	1		1	
MXAN2091		peptidase, M16 (pitrilysin) family	58860	Conserved	1		1	
MXAN2286		peptidyl-dipeptidase Dcp	85685	Conserved	1		1	
MXAN2373		M38 (beta-aspartyl dipeptidase) family protein	55069	Conserved	1		1	
MXAN2417		conserved hypothetical protein	207088	Conserved	1		1	
MXAN2792		putative lipoprotein	42129	<i>M. xanthus</i>	1		1	
MXAN2831		putative lipoprotein	36985	Conserved	1		1	
MXAN3103		putative lipoprotein	72915	Myxococcales	1		1	
MXAN3440		peptidase, M13 (neprilysin) family	79107	Conserved	1		1	
MXAN4966		putative lipoprotein	39120	Conserved	1		1	
MXAN5331		putative lipoprotein	19144	Conserved	1		1	
MXAN5711		lipoprotein, BMP family	41582	Conserved	1		1	
MXAN6082		cytochrome c family protein	21957	Conserved	1		1	
MXAN6106	<i>fibA</i>	matrix-associated zinc metalloprotease	79807	Conserved	1		1	
MXAN6660		hypothetical protein	25336	Myxococcales	1		1	
MXAN6884		hypothetical protein	18609	Myxococcales	1		1	
MXAN7089		putative lipoprotein	22029	<i>M. xanthus</i>	1		1	
MXAN7110		peptidyl-prolyl cis-trans isomerase, FKBP-type	27313	Conserved	1		1	
MXAN0283		putative lipoprotein	32530	Myxococcales		1		1
MXAN0793		putative lipoprotein	57944	Myxococcales		1		1

MXAN5024		conserved domain protein	51453	Conserved		1		1
MXAN5752		hypothetical protein	38039	Myxococcales		1		1
MXAN3698		putative lipoprotein	27336	Myxococcales	1	1		
MXAN1981		hypothetical protein	64198	Myxococcales			1	1
MXAN4653		putative lipoprotein	25083	Myxococcales			1	1
MXAN0805		peptidase, M10A/M12A subfamilies	52385	Myxococcales		1	1	
MXAN5408		hypothetical protein	134947	Conserved		1	1	
MXAN6658		putative lipoprotein	71261	Myxococcales	1			1
MXAN6749		bacterial Ig-like domain protein	51082	Conserved	1			1
MXAN0026		hypothetical protein	15482	<i>M. xanthus</i>	1			
MXAN0855		OmpA domain protein	29563	Conserved	1			
MXAN1262		receptor family ligand-binding protein	50052	Conserved	1			
MXAN2194		putative lipoprotein	27879	Conserved	1			
MXAN2470		5-nucleotidase family protein	53571	Conserved	1			
MXAN2866		putative lipoprotein	31269	Conserved	1			
MXAN3060	<i>cglB</i>	adventurous gliding motility protein CglB	44434	Myxococcales	1			
MXAN3084	<i>tgl</i>	social gliding motility protein Tgl	28284	Conserved	1			
MXAN3573		putative lipoprotein	25392	Conserved	1			
MXAN3581		peptidyl-dipeptidase A	76791	Conserved	1			
MXAN4208		tetratricopeptide repeat protein	28750	Conserved	1			
MXAN4447		tetratricopeptide repeat protein	41033	Conserved	1			
MXAN5152		OmpA domain protein	26334	Conserved	1			
MXAN5325		5'-nucleotidase family protein	62231	Conserved	1			
MXAN5337		putative lipoprotein	24330	Myxococcales	1			
MXAN5361		putative 5'-nucleotidase	60716	Conserved	1			
MXAN5374		glycosyl hydrolase, family 13	85406	Conserved	1			
MXAN5508		putative lipoprotein	19450	<i>M. xanthus</i>	1			
MXAN5683		putative lipoprotein	45575	Conserved	1			
MXAN5734		putative lipoprotein	20086	Conserved	1			

MXAN5771		putative lipoprotein	23811	Myxococcales	1			
MXAN6313		putative lipoprotein	36216	Conserved	1			
MXAN6521		putative lipoprotein	21716	Conserved	1			
MXAN7108		putative lipoprotein	20732	Conserved	1			
MXAN7179		putative lipoprotein	21324	Conserved	1			
MXAN1231		putative lipoprotein	46483	<i>M. xanthus</i>		1		
MXAN4534		chitinase, class I	43259	Conserved		1		
MXAN6985		hypothetical protein	52771	Conserved		1		
MXAN3417		putative lipoprotein	36130	Conserved			1	
MXAN4668		hypothetical protein	30531	Conserved			1	
MXAN1063		putative lipoprotein	29174	Myxococcales				1
MXAN1342		putative lipoprotein	51742	Conserved				1
MXAN2183		putative lipoprotein	46444	<i>M. xanthus</i>				1
MXAN2290		putative lipoprotein	61988	Conserved				1
		Periplasmic proteins						
MXAN2710		putative lipoprotein	56880	Conserved	1	1	1	1
MXAN2906		penicillin acylase family protein	91435	Conserved	1	1	1	1
MXAN3564		peptidase, M36 (fungalsin) family	185183	Conserved	1	1	1	1
MXAN5685		hypothetical protein	30764	Myxococcales	1	1	1	1
MXAN6352		conserved domain protein	58816	Conserved	1	1	1	1
MXAN7199		putative lipoprotein	69366	Myxococcales	1	1	1	1
MXAN0533		NAD dependent epimerase/dehydratase family (Tat signal sequence)	41935	Conserved	1	1	1	
MXAN0735		hypothetical protein	69209	Myxococcales	1	1	1	
MXAN2541		tetratricopeptide repeat protein	75994	Conserved	1	1	1	
MXAN2814		putative N-acetylmuramoyl-L-alanine amidase	100666	Conserved	1	1	1	
MXAN7112		conserved hypothetical protein	56131	Conserved	1	1	1	
MXAN0220		lipase, alpha/beta fold family	43051	Conserved	1		1	1
MXAN2661		5-nucleotidase family protein	87674	Conserved	1		1	1

MXAN4181		hypothetical protein	124485	Conserved	1		1	1
MXAN6745		dehydrogenase, glucose/sorbose family	41714	Myxococcales	1		1	1
MXAN3971		putative lipoprotein	57187	Conserved	1	1		1
MXAN0100		peptidase, M28D (aminopeptidase ES-62) subfamily	52006	Conserved	1		1	
MXAN0870		conserved hypothetical protein	75815	Conserved	1		1	
MXAN1151		receptor family ligand-binding protein	37646	Conserved	1		1	
MXAN1197		peptidase, M1 (aminopeptidase N) family	98793	Conserved	1		1	
MXAN1394		metallo-beta-lactamase family protein	28647	Conserved	1		1	
MXAN1624		peptidase, M16 (pitrilysin) family	51094	Conserved	1		1	
MXAN2092		peptidase, M16 (pitrilysin) family	50659	Conserved	1		1	
MXAN2498		conserved hypothetical protein	79573	Conserved	1		1	
MXAN2974		conserved hypothetical protein	222371	Conserved	1		1	
MXAN3129		peptidase, S9A (prolyl oligopeptidase) family	79577	Conserved	1		1	
MXAN3159		hypothetical protein	120884	Conserved	1		1	
MXAN3744		hypothetical protein	62026	Conserved	1		1	
MXAN3774		conserved hypothetical protein	78850	Conserved	1		1	
MXAN3810		hydrolase, CocE/NonD family	73000	Conserved	1		1	
MXAN4829		isoquinoline 1-oxidoreductase, beta subunit (Tat signal sequence)	80484	Conserved	1		1	
MXAN4870		tetratricopeptide repeat protein	142516	Conserved	1		1	
MXAN4984		putative lipoprotein	52527	<i>M. xanthus</i>	1		1	
MXAN5862		superoxide dismutase, Cu-Zn	20119	Conserved	1		1	
MXAN5877		Ycel-like family protein	21762	Conserved	1		1	
MXAN6038		peptidase, S9B (dipeptidyl peptidase IV) subfamily	81341	Conserved	1		1	
MXAN6078		putative cytochrome c	24590	Conserved	1		1	
MXAN6589		peptidase, family C69	63055	Conserved	1		1	
MXAN6665		putative branched chain amino acid ABC transporter, periplasmic amino acid-binding protein	42108	Myxococcales	1		1	

MXAN6811		peptidase, S9A (prolyl oligopeptidase) subfamily	77103	Conserved	1		1	
MXAN7220		putative lipoprotein	54405	Conserved	1		1	
MXAN2876		hypothetical protein	125778	Conserved		1		1
MXAN5326		putative phytase	42274	Conserved		1		1
MXAN5970		peptidase, S8 (subtilisin) family	82452	Conserved		1		1
MXAN2253		putative peptidase, S37 family	74957	Conserved	1	1		
MXAN2595		hypothetical protein	38799	Myxococcales	1	1		
MXAN3719		Mce family protein	55695	Conserved			1	1
MXAN0411		hypothetical protein	77497	Conserved	1			
MXAN0515		dipeptidyl peptidase IV	85019	Conserved	1			
MXAN0572		hypothetical protein	29182	<i>M. xanthus</i>	1			
MXAN0770		iron ABC transporter, periplasmic iron-binding protein	42828	Conserved	1			
MXAN0791		peptidase, M16 (pitrilysin) family	53929	Conserved	1			
MXAN0792		peptidase, M16 (pitrilysin) family	53347	Conserved	1			
MXAN0987		N-acetylmuramoyl-L-alanine amidase, family 2	22015	Conserved	1			
MXAN1193		conserved domain protein	135011	Conserved	1			
MXAN1299		hypothetical protein	21868	<i>M. xanthus</i>	1			
MXAN1365		hypothetical protein	160856	Conserved	1			
MXAN1426		hypothetical protein	26980	Myxococcales	1			
MXAN2208		conserved hypothetical protein	18308	Conserved	1			
MXAN2427		hypothetical protein	29941	Conserved	1			
MXAN2563		putative lipoprotein	65486	Myxococcales	1			
MXAN2674		hypothetical protein	14928	Myxococcales	1			
MXAN3745		hypothetical protein	21384	Conserved	1			
MXAN3776		hypothetical protein	23831	Myxococcales	1			
MXAN4153		putative lipoprotein	22438	Myxococcales	1			
MXAN4329		hypothetical protein	22738	Myxococcales	1			
MXAN4561		tetratricopeptide repeat protein	90325	Conserved	1			

MXAN4859		MORN variant repeat protein	17328	Conserved	1			
MXAN5097		M20 (carboxypeptidase Ss1) subfamily protein	46073	Conserved	1			
MXAN5098		putative Ig domain protein	76624	<i>M. xanthus</i>	1			
MXAN5756		tolB protein	46034	Conserved	1			
MXAN5953		transglutaminase-like superfamily domain protein	55606	Conserved	1			
MXAN6185		hypothetical protein	30953	Myxococcales	1			
MXAN6192		conserved hypothetical protein	92349	Conserved	1			
MXAN6539		extracellular protease domain protein	19797	Conserved	1			
MXAN6577		putative lipoprotein	54353	Conserved	1			
MXAN6622		putative lipoprotein	17144	Myxococcales	1			
MXAN6891		tetratricopeptide repeat protein	48399	Conserved	1			
MXAN7497		peptidase, M16B (mitochondrial processing peptidase beta-subunit) family	105020	Conserved	1			
MXAN1650		peptidase, S1A (chymotrypsin) subfamily	39059	Conserved		1		
MXAN1898		hypothetical protein	53893	Myxococcales		1		
MXAN5485		conserved hypothetical protein	48430	Conserved		1		
MXAN0133		hypothetical protein	38346	Myxococcales			1	
MXAN1020		hypothetical protein	158757	<i>M. xanthus</i>			1	
MXAN1769		NlpC/P60 family protein	49906	Conserved			1	
MXAN2422		hypothetical protein	132883	Conserved			1	
MXAN3285		peptidase, S8A (subtilisin) subfamily	64028	Conserved			1	
MXAN4433		peptidase, S1C (protease Do) subfamily	47743	Conserved			1	
MXAN4439		hypothetical protein	105796	Myxococcales			1	
MXAN6116		hypothetical protein	45202	Myxococcales			1	
MXAN2708		putative organic solvent tolerance protein	95984	Conserved				1
MXAN3676		hypothetical protein	74614	Conserved				1
MXAN3807		hypothetical protein	39267	Conserved				1
MXAN4269		conserved hypothetical protein	22737	Conserved				1

MXAN4915		conserved domain protein	35318	Conserved				1
MXAN5391		hypothetical protein	47249	Myxococcales				1
MXAN5587		hypothetical protein	45034	Conserved				1
		Integral inner membrane proteins						
MXAN2480		signal peptide peptidase SppA, 36K type	88857	Conserved	1	1	1	1
MXAN5716		hypothetical protein	25769	Myxococcales	1	1	1	1
MXAN1448		transporter, MotA/TolQ/ExbB proton channel family	23842	Conserved	1		1	
MXAN2088		thiol-disulfide oxidoreductase resA	19392	Conserved	1		1	
MXAN2644		peptidylprolyl cis-trans isomerase	57658	Conserved	1		1	
MXAN4157		hypothetical protein	37122	Myxococcales	1		1	
MXAN4690	<i>secF</i>	protein-export membrane protein	42405	Conserved	1		1	
MXAN5743		hypothetical protein	64783	Myxococcales	1		1	
MXAN6081		conserved hypothetical protein	19492	Conserved	1		1	
MXAN6083		putative membrane protein	46515	Conserved	1		1	
MXAN6086		cytochrome c oxidase, subunit II	39364	Conserved	1		1	
MXAN6088		cytochrome c oxidase, subunit III	24577	Conserved	1		1	
MXAN6483		MotA/TolQ/ExbB proton channel family protein	27450	Conserved	1		1	
MXAN2429		ABC transporter, permease protein	77260	Conserved	1			
MXAN2510	<i>gspG</i>	general secretion pathway protein G	15208	Conserved	1			
MXAN2720		hypothetical protein	10465	Myxococcales	1			
MXAN4344		putative lipoprotein	25777	Myxococcales	1			
MXAN6080		oxidoreductase membrane subunit, NrfD family	53859	Conserved	1			
MXAN6084		hypothetical protein	16593	Myxococcales	1			
MXAN6861		biopolymer transport protein, ExbD/TolR family	17387	Conserved	1			
MXAN6862		MotA/TolQ/ExbB proton channel family protein	25938	Conserved	1			
MXAN7196		hypothetical protein	55991	Myxococcales	1			
MXAN7498		signal peptide peptidase SppA, 67K type	72823	Conserved	1			

MXAN1081		NADH dehydrogenase I, M subunit	66824	Conserved			1	
MXAN3319	<i>secY</i>	preprotein translocase	48710	Conserved			1	
MXAN3554		M23 peptidase domain protein	42152	Myxococcales			1	
MXAN4691	<i>secD</i>	protein-export membrane protein	64444	Conserved			1	
MXAN4134		putative membrane protein	56198	Conserved				1
		Cytoplasmic proteins						
MXAN0659		putative lipoprotein	64305	Conserved	1	1	1	1
MXAN0822		putative lipoprotein	33206	Myxococcales	1	1	1	1
MXAN1389		putative alkaline phosphatase	81402	Conserved	1	1	1	1
MXAN4860		hypothetical protein	33461	Myxococcales	1	1	1	1
MXAN5297		putative lipoprotein	36329	<i>M. xanthus</i>	1	1	1	1
MXAN5453		hypothetical protein	63953	Conserved	1	1	1	
MXAN6245		kelch motif/HYR domain protein	137608	Conserved	1	1	1	1
MXAN6266		putative 2,3-cyclic-nucleotide 2-phosphodiesterase	65267	Conserved	1	1	1	1
MXAN6574		putative lipoprotein	53122	Myxococcales	1	1	1	1
MXAN7039		putative lipoprotein	107333	Conserved	1	1	1	1
MXAN2016		prolyl endopeptidase precursor Pep	83253	Conserved	1	1	1	
MXAN2903		putative lipoprotein	59316	Conserved	1	1	1	
MXAN4685		hypothetical protein	43556	Myxococcales	1	1	1	
MXAN3953		hypothetical protein	94877	Myxococcales	1		1	1
MXAN6601		peptidase, S9C (acylaminoacyl-peptidase) subfamily	82668	Conserved	1		1	1
MXAN2382		peptidase, M18 (aminopeptidase I) family	48430	Conserved		1	1	1
MXAN0075		WD40-like repeat/amidohydrolase domain protein	116079	Conserved	1		1	
MXAN0534		putative lipoprotein	55682	<i>M. xanthus</i>	1		1	
MXAN0584		hypothetical protein	56494	Myxococcales	1		1	
MXAN0964		peptidase, M14 family	67491	Conserved	1		1	
MXAN1383		gamma-glutamyltransferase	62851	Conserved	1		1	

MXAN2215		putative lipoprotein	53500	Myxococcales	1		1	
MXAN2462		hypothetical protein	31131	Conserved	1		1	
MXAN2730		NADH dehydrogenase I, C subunit	22670	Conserved	1		1	
MXAN3206		DsbA-like thioredoxin domain protein	71404	Conserved	1		1	
MXAN3539		succinate dehydrogenase, flavoprotein subunit	69243	Conserved	1		1	
MXAN3540		succinate dehydrogenase, iron-sulfur protein	29340	Conserved	1		1	
MXAN3792		WD domain G-beta repeat protein	85512	<i>M. xanthus</i>	1		1	
MXAN4676		peptidylprolyl cis-trans isomerase, cyclophilin-type	15700	Conserved	1		1	
MXAN4895		chaperonin GroEL	57893	Conserved	1		1	
MXAN5197		thioredoxin domain protein	38744	Conserved	1		1	
MXAN6050		conserved domain protein	71510	Conserved	1		1	
MXAN6079		putative molybdopterin oxidoreductase, iron-sulfur binding subunit	116580	Conserved	1		1	
MXAN7104		peptidase, M3 (thimet oligopeptidase) family	76860	Conserved	1		1	
MXAN7212		hypothetical protein	14822	Myxococcales	1		1	
MXAN2160		putative lipoprotein	102291	Conserved		1		1
MXAN0875		hypothetical protein	20745	Myxococcales	1	1		
MXAN4796		fibronectin type III domain protein	43210	Conserved	1	1		
MXAN5025		hypothetical protein	46753	Conserved	1	1		
MXAN3556		hypothetical protein	32507	Conserved			1	1
MXAN1632		hypothetical protein	93360	Myxococcales		1		1
MXAN5582		conserved hypothetical protein	37715	Conserved	1			1
MXAN7023		putative lipoprotein	81128	Conserved	1			1
MXAN0657		hypothetical protein	75860	Conserved	1			
MXAN0764		peptidase, M24 (methionyl aminopeptidase 1) family	52379	Conserved	1			
MXAN1160		asparaginase family protein	36600	Conserved	1			
MXAN1942		tetratricopeptide repeat protein	170422	Conserved	1			

MXAN3102		putative lipoprotein	56085	Myxococcales	1			
MXAN3323		ribosomal protein S13	14214	Conserved	1			
MXAN3325		ribosomal protein S4	23936	Conserved	1			
MXAN3723		hypothetical protein	25682	Myxococcales	1			
MXAN3764		peptidylprolyl cis-trans isomerase, cyclophilin-type	21376	Conserved	1			
MXAN4293		hypothetical protein	16389	Myxococcales	1			
MXAN4467		chaperonin GroEL	58145	Conserved	1			
MXAN4648		FHA domain protein	62018	Conserved	1			
MXAN4830		isoquinoline 1-oxidoreductase, alpha subunit	17175	Conserved	1			
MXAN4867		FHA domain/TonB domain protein	66438	Conserved	1			
MXAN5143		tetratricopeptide repeat protein	35735	Conserved	1			
MXAN5162		hypothetical protein	28824	Conserved	1			
MXAN5315		putative lipoprotein	30968	Conserved	1			
MXAN5404		conserved hypothetical protein	43296	Conserved	1			
MXAN6121		hypothetical protein	34493	Conserved	1			
MXAN6172		putative lipoprotein	21332	<i>M. xanthus</i>	1			
MXAN7004		hypothetical protein	16742	Myxococcales	1			
MXAN7366		putative lipoprotein	65357	<i>M. xanthus</i>	1			
MXAN1899		hypothetical protein	61590	Conserved		1		
MXAN3656		hypothetical protein	120929	Conserved		1		
MXAN3977		hypothetical protein	38836	<i>M. xanthus</i>		1		
MXAN4935		putative esterase	43809	Conserved		1		
MXAN5146		hypothetical protein	34148	<i>M. xanthus</i>		1		
MXAN6270		hypothetical protein	71507	<i>M. xanthus</i>		1		
MXAN0094		amidohydrolase family protein	40062	Conserved			1	
MXAN0804		hypothetical protein	68718	Myxococcales			1	
MXAN1896		serine/threonine protein kinase	70533	Myxococcales			1	
MXAN3108		FHA domain/tetratricopeptide repeat protein	80652	Conserved			1	

MXAN3182		serine/threonine protein kinase	64961	Myxococcales			1	
MXAN5265		Kelch domain protein	113862	Conserved			1	
MXAN5266		hypothetical protein	38684	<i>M. xanthus</i>			1	
MXAN0412		conserved hypothetical protein	27879	Conserved				1
MXAN2236		putative 5-nucleotidase	68226	Conserved				1
MXAN2787		homogentisate 1,2-dioxygenase	48655	Conserved				1
MXAN3143		putative xanthine dehydrogenase	136581	Conserved				1
MXAN4219		alpha keto acid dehydrogenase complex, E3 component, lipoamide dehydrogenase	49673	Conserved				1
MXAN4494		putative Phage tail sheath protein	83947	Conserved				1
MXAN4495		conserved hypothetical protein	16419	Conserved				1
MXAN4564		2-oxoisovalerate dehydrogenase complex, E1 component, alpha subunit	37106	Conserved				1
MXAN4565		2-oxoisovalerate dehydrogenase complex, E1 component, beta subunit	38271	Conserved				1
MXAN5407		choloylglycine hydrolase family protein	38679	Conserved				1

^a Subcellular localization of proteins were predicted on the basis of the following criteria: Integral outer membrane proteins: N-terminal signal peptide with a signal peptidase I cleavage site predicted using SignalP3 ¹ and TatP ² and a potential beta-barrel structure using TMBB (<http://bioinformatics2.biol.uoa.gr/PRED-TMBB>); lipoproteins: N-terminal signal peptide with signal peptidase II cleavage site predicted using Lipop ³; periplasmic proteins: Signal peptidase I cleavage site but no inner membrane or outer membrane protein prediction; integral inner membrane proteins: One or more trans-membrane helices predicted using TMHMM ⁴; cytoplasmic proteins: no signal peptidase cleavage site and no inner membrane or outer membrane prediction.

^b Orthologous proteins were identified using a pair wise reciprocal best BLASTP hit method ⁵ in combination with an expect score cutoff of 1e⁻⁵ and homology over at least one-third of the query sequence length. The phylogenetic distribution of proteins is as follows: Proteins labelled conserved have orthologs in least one species outside the Myxococcales; proteins labelled Myxococcales

have orthologs in at least two of the four Myxococcales species with completely sequenced genomes (*Anaeromyxobacter dehalogenans* ⁶, *Stigmatella aurantiaca* (<http://www.ncbi.nlm.nih.gov/sites/entrez?Db=genome&Cmd=ShowDetailView&TermToSearch=5526>, *Sorangium cellulosum* ⁷ and *M. xanthus* ⁸); proteins labelled *M. xanthus* have no orthologs outside *M. xanthus*.

^c OMV, outer membrane vesicles

References

1. Emanuelsson, O.; Brunak, S.; von Heijne, G.; Nielsen, H., Locating proteins in the cell using TargetP, SignalP and related tools. *Nat. Protoc.* **2007**, *2*, 953-971.
2. Bendtsen, J. D.; Nielsen, H.; Widdick, D.; Palmer, T.; Brunak, S., Prediction of twin-arginine signal peptides. *BMC Bioinformatics* **2005**, *6*, 167.
3. Juncker, A. S.; Willenbrock, H.; von Heijne, G.; Brunak, S.; Nielsen, H.; Krogh, A., Prediction of lipoprotein signal peptides in Gram-negative bacteria. *Protein Sci.* **2003**, *12*, 1652-1662.
4. Krogh, A.; Larsson, B.; von Heijne, G.; Sonnhammer, E. L. L., Predicting transmembrane protein topology with a hidden Markov model: Application to complete genomes. *J. Mol. Biol.* **2001**, (305), 567-580.
5. Altschul, S. F.; Gish, W.; Miller, W.; Meyers, E. W.; Lipman, D. J., Basic Local Alignment Search Tool. *J. Mol. Biol.* **1990**, *215* (3), 403-410.
6. Thomas, S. H.; Wagner, R. D.; Arakaki, A. K.; Skolnick, J.; Kirby, J. R.; Shimkets, L. J.; Sanford, R. A.; Löffler, F. E., The mosaic genome of *Anaeromyxobacter dehalogenans* strain 2CP-C suggests an aerobic common ancestor to the Delta-Proteobacteria. *PLoS ONE* **2008**, *3* (5), e2103.
7. Schneiker, S.; Perlova, O.; Kaiser, O.; Gerth, K.; Alici, A.; Altmeyer, M. O.; Bartels, D.; Bekel, T.; Beyer, S.; Bode, E.; Bode, H. B.; Bolten, C. J.; Choudhuri, J. V.; Doss, S.; Elnakady, Y. A.; Frank, B.; Gaigalat, L.; Goesmann, A.; Groeger, C.; Gross, F.; Jelsbak, L.; Jelsbak, L.; Kalinowski, J.; Kegler, C.; Knauber, T.; Konietzny, S.; Kopp, M.; Krause, L.; Krug, D.; Linke, B.; Mahmud, T.; Martinez-Arias, R.; McHardy, A. C.; Merai, M.; Meyer, F.; Mormann, S.; Munoz-Dorado, J.; Perez, J.; Pradella, S.; Rachid, S.; Raddatz, G.; Rosenau, F.; Ruckert, C.; Sasse, F.; Scharfe, M.; Schuster, S. C.; Suen, G.; Treuner-Lange, A.; Velicer, G. J.; Vorholter, F.-J.; Weissman, K. J.; Welch, R. D.; Wenzel, S. C.; Whitworth, D. E.; Wilhelm, S.; Wittmann, C.; Blocker, H.; Puhler, A.; Muller, R., Complete genome sequence of the myxobacterium *Sorangium cellulosum*. *Nat. Biotechnol.* **2007**, *25* (11), 1281-1289.
8. Goldman, B. S.; Nierman, W. C.; Kaiser, D.; Slater, S. C.; Durkin, A. S.; Eisen, J. A.; Ronning, C. M.; Barbazuk, W. B.; Blanchard, M.; Field, C.; Halling, C.; Hinkle, G.; Iartchuk, O.; Kim, H. S.; Mackenzie, C.; Madupu, R.; Miller, N.; Shvartsbeyn, A.;

Sullivan, S. A.; Vaudin, M.; Wiegand, R.; Kaplan, H. B., Evolution of sensory complexity recorded in a myxobacterial genome. *Proc. Natl. Acad Sci. USA* **2006**, *103*, 15200-15205.