

Table S1 Reference sequences in each cluster.

BPHD-f3	BPHD-r1	Protein IDs	Substrates
F23	R4	A1TDE1,O69363	
F34		A3KCY4,A3KCZ6,A3KD13,Q208M6	
	R8	A1SEH3	
F24	R5	Q07944,P0C618,A5W4F2,Q49KD8,Q798Y6,A5HFU4,P72256,Q53122,Q588I9,Q8VQU6,A7XK01,O69795,A6NA94,Q24676,Q52383,Q52757,Q53086,Q79EP8,Q52438,Q46372,O86136,Q2VLC4,Q84EP4,O51848,P95566,Q51743,Q9K4S4,Q9R956,Q8KZP9,P37333,Q9RHA5,O50578,Q52028,Q9AEY5,A1VUW1,Q46155,Q75W73	Benzene, Toluene, Biphenyl, Isopropylbenzene
F26		A2TC55,Q83VJ3,A4XDS7,O85966,Q6REQ7,Q934B6,Q75WN5,Q8GJF2,Q4IUC5,Q47B05	
F29		P0ABR6,P0ABR5,A8A344,Q0T1Y1,Q31XV2,Q3YZ15,Q8FN43,Q7N4W0	
F30		Q8L0Y4	
F32		A3JSP3	
			A2TC87,Q65AT1,A4XDY3,O85843,Q1HCP6,Q7WUA0,
F35	R7	Q51494,Q9ZI73,P0A110,P0A111,O07824,Q1XGM0,Q938R9,Q0KK81,Q79P84,Q7B7H3,Q7WQQ3,Q83K39,Q6XUJ7,Q52142,Q52382,Q3S4D0,Q9L5D2,A1WAE6,P95564,Q8RTL4,Q45695,Q8VUD4,Q6BDD0,Q9ZHH3,Q93NA8,Q9WXG8,A2TC57,Q83VJ1,A4XDS5,O85964	Naphthalene
F27		A5VGW0,Q86899	
F30		Q85283	
F36		Q4J778	
F37		A3Q490	
		R9	A3LC83,A3LCA8,Q9X4W9,Q13HF5,Q1NH89,A5V4P1,Q86909
F25	R10	A1T2I3,A1UDK4,A1UQA4,A3PX19,A4T3I3,A4T5D7,Q1B0P3,Q1BBE4	
F28		A8C9M7,Q8L182,Q93UV3,Q2WGA2	
F38		Q0KJ72	
F31		A5VEA4,Q86913	
F33	R6	Q88I40	Benzoate
		A0AWL3,A1T2H7,A1UDJ3,A1UQB3,A3PX13,A4T3H4,Q1B0N4,Q1BBF1,A0AWN0,Q9AGK6,A3Q4B5,Q8GI63,A1T2B0,A1UDE6,A3PWW6,A4T3D5,A4T578,Q1BBK1,Q6UP13,A4ZXZ3,Q0RWD5,Q6REL0,Q93RE4,Q2VMX5,A0QIF3,Q73WC6	
F39	R11	A0FKG1,A1UDL1,A2SW63,A3PX26,A4T3J0,Q1BBD5,Q3Y541,Q84EU7,A1T2J0,Q0PET4,Q9X3R9,Q2W6G94,Q6TML2,Q6TMM0,Q76BV8,Q9X593,A1T2G9,A1UDI5,A1UPR3,A1UQC1,A3PX05,A4T3G6,Q1B0M6,Q1BBF8,Q2FBP3,Q45RF7,Q7DJF2,Q9R6Z7,A1T2D3,A1UDG3,A1UPQ0,A2SW54,A3PWY3,A3PYP6,A4T3F8,A4T599,Q199A4,Q199A5,Q1BBI2,Q3Y534,Q6H2Y8,Q6H2Z0,Q6H2Z2,Q716X0,Q716X6,Q8GFY7,Q8GFY9,Q8GFZ1,Q9KHU1,Q84EU3,Q6L6S9,Q7WZF1	
F40		A0AY82,A2W0L6,Q392K9,Q0B4M1,Q13YH6,Q2T8H1,A4QGD4,Q5KRD5,Q0SCT9,Q5YVU9,A0P0I5,A3K7A2,A6VWC1,A4XFG2,A5V495,Q2IT72,A5VE12	
F41	R12	A0P0E5,Q5LTG3,Q28SQ2,A4JM86,A1K6Z5,A5EGP8,Q8Y0F4,Q5LL94,A1WLB4,A0Z5J9,A1WLA6	
F42	R13	A1K4I5,Q9AQN3,A1WJE0,Q39N48,A5V7G8,A5V6H8	
F43		A5VDZ8	
F44		Q7W4H2,Q7WZF5	
F45		A0QMR4,Q7VWV0,Q7W6S4,Q7WHQ8,A1E031	
F46	R14	A0QDY3,A0QFW5,A3Q3W8,Q0RKB2	
F47		A5V754,A5W4G8,Q51974,Q143Q7,Q9XDW6	Benzoate
F48	R15	A3KTM9,A3L8B9,Q02LN0,Q7WPF6	
F49		Q2PQV9	
F50	R16	A0AYN6,A2W071,A2WI08,A4JLI9,Q0B474,Q1BLN6,Q84BZ3,Q393D0,Q13G02,Q13M42,A1UYC1,A2S0A6,A3MB03,A3NMX8,A3P8D3,A4LFM1,A5J9R9,A5XVQ4,A8ENF2,Q3JJW2,Q6E248,Q63J28,Q2T811,Q13VP5,Q706U5,Q0KJU3,A2TC36,Q83VK6,A4XDU5,O85986,Q7WUA1,Q1MWM5,A0HI75,Q3C1E3,Q5D0X6,Q8GRC1,Q3C1D5,Q0RWE4,Q6REK1,A1RD10,Q13RP6,Q13QJ8,A1WRP6,A2TC29,Q83VL2,A4XDV2,O85993,Q65AS5,Q13VQ0,Q5GRB5,Q93AD8,Q9Z5W0	
F51		A1K8H8,Q12EV5,A1TII9,A3RZ19,Q91232,A6VYQ3,Q87618,Q5GRC1,Q8GHI9,A1VQ64,Q3S4D3,Q52379,Q45693,Q0KB56,Q46S17,A5VAU0,Q2KXG8,Q7WM02,Q7N7V1,Q0K331,Q46UQ0,Q2L1S3,Q7VS63,Q7W1S6,Q89PT0	
F52		A1T2D7,A1UDG7,A1UPQ4,A2SW58,A3PWY7,A3PYP2,A4T3G2,Q1BBH8,Q6H2I7,Q716X2,Q13GA9,Q13HX7	
F53	R17		
F53	R18	A1SEW4,P95531,Q58LY9,Q60GF3,Q842F3,Q76KR6,Q44251,Q5FY64,A5EGL0	Benzoate
F54	R19	Q84IK3,Q8GI20,Q9AQM5,	
F55		Q51592,Q75ZJ6,Q8VUJ2	Benzoate
F54		A3KUS0,A3L6Q6,Q79T11,Q05K30,A6V4V0,Q02MW1,O85673,Q3LUW9,Q4KIN7,Q9AQP0,Q2G7Q3	Benzoate
F56	R20	P07769,Q687Z6,A3M401,Q7WTI9,A1UYA3,A2S087,A3MAY4,A3NMZ6,A3P8F1,A4LFN8,A5J9Q2,A5XVN8,A8EN6,Q62E63,Q63J13,Q2T826,A1VP43,A3RZX9,Q0KAA7,Q1LDN2,Q46SX9,Q13LK0,Q1QBA5,P23099,Q6PKX0,Q7AXU6,Q84IA4,Q9R9Z6,A3KUS6,Q05K20,A3L6N9,Q02MW7,Q93SR8,A5W3H9,Q49KH5,Q9L7Y5,Q3KDU2,Q8NN09,Q118W8,Q3KBZ6,Q4K9X5,A6V4U4,A4VK50,Q4J3T6,Q47CC3,A7IEE0,A0QTN6,A1UCP5,A3PWD2,Q1BC99,Q8GH63,A4FHX3,A4T5V4,A4QGC4,Q6M355,Q9I0X0,Q9I0W4,Q0SE47,Q932V1,Q93Q80,Q51601,Q9AJR2,A6EWM6,A3W8Q8,A6E2V8,A3XE47,A0KDJ1,Q0B145,Q1BVZ3,Q3C2D0,Q39N75,A2WIX2,A4JR52,Q3C2D4,A7CJH0,Q9AQS4,A1B188,A5V9M6,Q2GAY8,A6T9N2,Q3LUX4,A3JAJ2,A6EXT4,A2TC33,Q83VK9,A4XDU8,O85989,Q9ZQ8GAY5	Benzoate
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