

# Single-molecule long-read sequencing of the full-length transcriptome of *Rhododendron lapponicum* L.

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K16329+K16329+K16329+K16329+K16329+K03011+K03011+K03011+K03011+K14641+K14641+K00876+K01464+K01464+K03024+K03025+K03025+K02320+K02320+K02320+K00940+K00940+K00940+K00940+K00940+K00940+K00940+K00940+K00940+K00940+K00940+K00940+K00940+K01431+K01431+K01431+K01431+K01431+K00940+K03040+K03020+K03020+K13800+K13800+K03013+K03013+K02328+K03025+K03025+K03025+K03505+K03505+K03505+K00761+K00761+K01489+K01489+K03013+K03014+K03014+K03019+K03007+K03016+K03016+K03013+K03013+K00940+K00940+K03012+K03012+K03012+K02685+K03506+K03002+K03002+K03002+K03002+K03013+K03013+K03013+K02684+K02684+K00609+K00609+K03000+K03000+K10808+K03021+K03021+K03021+K02325+K02325+K00940+K00940+K02326+K02999+K02999+K02999+K02999+K02999+K01081+K01081+K03021+K03021+K03021+K03021+K03021+K03021+K03021+K01240+K01240+K01240+K01240+K01240+K01240+K02327+K02327+K02327+K02327+K03010+K03010+K03010+K03010+K03010+K03010+K03010+K03010+K03010+K09903+K00857+K00857+K00857+K14721+K14721+K14721+K14721+K14721+K14721+K14721+K14721+K14721+K14721+K00962+K00962+K00962+K00962+K00962+K03014+K03014+K03014+K03014+K03014+K03014+K01955+K01955+K01955+K01955+K01955+K01955+K01955+K01955+K01955+K01955+K01955+K01955+K01955+K01955+K03006+K03006+K03006+K03006+K03006+K00384+K00384+K00384+K00384+K10807+K10807+K03043+K03043+K13421+K13421+K13421+K13421+K13421+K00876+K00876+K00876+K00876+K00876+K00876+K00876+K00876+K00876+K00876+K00876+K00876+K00876+K00876+K00876+K00876+K00876+K00876+K00876+K13998+K13998+K13998+K13998+K13998+K13998+K13998+K13998+K13998+K13998+K13998+K13998+K01937+K01937+K01937+K01937+K01937+K01937+K01937+K01937+K00207+K00207+K00207+K00207+K00207+K00207+K00207+K00207+K00207+K00207+K02335+K02335+K02335+K03013+K03504+K03504+K03504+K03787+K03787+K03787+K03787+K00962+K14641+K14641+K00761+K01464+K01464+K01464+K01489+K01464+K01464+K01464+K01464+K01464+K01464+K01464+K01464+K01464+K14641+K14641+K01464+K14641+K14641+K01464+K14641+K01464+K14641+K01464+K00962+K02327+K01464+K00962+K00962+K03040+K03040+K03040+K03040+K03040+K03040+K00962+K00761+K03018+K01937+K03018+K03040+K00962+K14641+K14641+K03043+K03046+K13800+K13800+K13800+K13800+K13800+K13800+K13800+K13800+K03007+K03007+K03007+K03007+K03012+K03012+K03012+K03012+K03023+K01937+K01937+K00254+K00254+K00254+K02325+K02325+K02325+K02325+K02325+K01956+K01956+K01956+K03787+K03787+K03787+K03787+K03787

Alanine, aspartate ko00250 211  
and glutamate  
metabolism

K00261+K00261+K14454+K14454+K14454+K14454+K14454+K14455+K14455+K14455+K01915+K13566+K13566+K13566+K00811+K00811+K00811+K16871+K00827+K00827+K01940+K01940+K01940+K01940+K00814+K00814+K01580+K01580+K01580+K00609+K00609+K01755+K01755+K01755+K01755+K01755+K01755+K01755+K01755+K01755+K01755+K01755+K01755+K01940+K01940+K01940+K01940+K01940+K01940+K00261+K00261+K00261+K01915+K01915+K01915+K01915+K01915+K01915+K01915+K01915+

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hypotaurine metabolism			K10712+K10712+K01580+K01580+K01580+K01580+K01580+K10712+K10712+K10712+K10712
Selenocompound metabolism	ko00450	122	K00384+K00384+K00384+K13811+K01761+K01761+K01761+K01761+K01761+K01761+K01761+K01761+K01761+K01761+ K01761+K00549+K00549+K08247+K08247+K08247+K08247+K08247+K08247+K08247+K13811+K13811+K13811+K13811+K13811+ K13811+K01760+K01760+K01760+K01760+K01739+K01739+K01739+K01739+K01739+K01739+K01739+K01739+K01739+ K01739+K01739+K00384+K00384+K00384+K00384+K11717+K11717+K11717+K11717+K11717+K11717+K00549+K00549+K00549+ K00549+K00549+K00549+K00549+K00549+K00549+K00549+K00549+K00549+K00549+K00549+K00549+K00549+K00549+ K00549+K00549+K00549+K00549+K00549+K00549+K00549+K00549+K00549+K00549+K00549+K00549+K00549+K00549+ K00549+K00549+K00549+K00549+K00549+K01874+K01874+K01874+K01874+K01874+K01874+K01874+K01874+K01874+ K01874+K01874+K01874+K01874+K01874+K01874+K01874+K01874+K01874+K01874+K01761+K01761+K01761+K01761+K13811+ K13811+K13811
Cyanoamino acid metabolism	ko00460	224	K01455+K01455+K01455+K01455+K01455+K01455+K13034+K13034+K13034+K01188+K01188+K01188+K01188+K01188+K01188+ K13035+K13035+K13035+K13035+K13035+K13034+K13034+K01188+K05350+K05350+K05350+K05350+K01188+K01188+K01188+ K01188+K05349+K05350+K05350+K01188+K05349+K05349+K05350+K05350+K05350+K05350+K05350+K05350+K05349+ K05349+K05349+K05349+K01188+K01188+K01188+K01188+K01188+K01188+K01188+K01188+K01188+K01188+ K01188+K01188+K00600+K00600+K00600+K00600+K00600+K00600+K18592+K18592+K18592+K18592+K18592+K18592+K18592+ K18592+K01188+K01188+K01188+K01188+K01188+K01188+K01188+K01188+K00600+K00600+K00600+K00600+K00600+ K00600+K05349+K05349+K05349+K05350+K05349+K05349+K05349+K01188+K01188+K01188+K01188+K01188+K01188+ K01188+K05349+K01188+K05349+K05349+K01188+K05349+K01188+K01188+K01188+K01188+K05349+K05349+K05350+ K01188+K01188+K01188+K05350+K05349+K01188+K05349+K01188+K05349+K01188+K01188+K05349+K01188+K01188+ K01188+K01188+K05349+K01188+K05349+K05349+K05349+K05349+K01188+K05349+K05349+K05349+K05349+K05349+ K05349+K05349+K05349+K05349+K05349+K05349+K05349+K05349+K05349+K05350+K05349+K05349+K05349+K13035+ K13035+K05350+K05349+K05349+K05349+K05349+K00600+K00600+K00600+K00600+K00600+K00600+K00600+K00600+ K00600+K00600+K00600+K00600+K00600+K00600+K01188+K01188+K01188+K01188+K01188+K01188+K01188+K01188+ K01188+K01188+K01188+K01188+K01188+K01188+K00600+K00600+K00600+K01188+K01188+K01188

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Glutathione metabolism	ko00480	321	K00797+K00797+K00797+K00797+K00797+K00797+K00797+K00799+K00799+K00799+K00799+K00434+K00434+K00432+K00432+ K00432+K00432+K00432+K00432+K00033+K00799+K00799+K00799+K00799+K00797+K00797+K00797+K00797+K00797+K00797+ K00797+K00797+K00434+K00434+K00434+K00434+K00434+K00434+K00434+K00434+K00434+K00434+K00434+K00434+K00434+ K00434+K00434+K00799+K00031+K00031+K00031+K00031+K00031+K00031+K00031+K00031+K00031+K00031+K00432+K00432+K00432+K00434+ K00434+K00434+K00434+K00434+K00434+K00434+K00434+K00434+K00434+K00434+K00434+K00434+K00434+K00434+K00434+ K00434+K00434+K00033+K00033+K00033+K00033+K00033+K00033+K00033+K00799+K00799+K00799+K00799+K00799+K00799+ K00799+K00799+K01581+K01581+K01581+K00434+K00799+K00799+K00799+K00799+K00799+K00799+K00799+K00799+K00799+ K00799+K00036+K00799+K00799+K00799+K00799+K00432+K00432+K00799+K00799+K00799+K00434+K00434+K00799+K00799+ K00799+K00799+K00799+K00799+K00799+K00799+K10808+K00799+K00799+K01581+K01255+K00799+K00799+K00799+ K00799+K00799+K00799+K01919+K00434+K00434+K00434+K00434+K00434+K00434+K01469+K01469+K01469+K01469+K01469+ K00036+K00036+K00036+K00036+K00036+K00036+K00036+K00036+K00036+K00036+K00036+K00036+K00036+K00036+K00036+ K00036+K00036+K00036+K00036+K00036+K00432+K00432+K00432+K00432+K00799+K00799+K00799+K00799+K00799+K00799+ K00799+K00799+K00799+K00799+K10807+K10807+K00799+K00036+K00036+K00036+K00036+K00036+K00036+K00036+K00036+ K00036+K01920+K01920+K01920+K01920+K00434+K00434+K00434+K00799+K18592+K18592+K18592+K18592+K18592+K18592+ K18592+K18592+K18592+K01919+K01919+K01919+K01919+K01919+K01919+K01919+K01919+K01919+K01919+K00383+K00383+K00383+ K00383+K00383+K00383+K00432+K00432+K00432+K00432+K00432+K00432+K00432+K00036+K00036+K00036+K00036+ K00036+K00036+K00036+K00799+K00799+K01255+K00036+K00036+K00434+K00434+K00031+K00031+K01255+K01255+K00036+K01255+ K01255+K00797+K01255+K01255+K01255+K01256+K00383+K01256+K01256+K01256+K00036+K00383+K00036+K00799+K00036+ K00799+K01256+K00036+K01256+K00036+K00036+K01256+K01255+K01256+K01256+K01256+K01256+K00797+K00797+K00797+ K01255+K01256+K01256+K01256+K00031+K01255+K01256+K01256+K00797+K01256+K01256+K01256+K01256+K00031+K01256+ K00383+K00434+K01256+K01256+K00434+K00036+K00036+K00031+K00799+K00799+K00799+K00434+K00434+K00434+K00434+ K00434+K00031+K00031+K00033+K00033+K00033
Starch and sucrose metabolism	ko00500	839	K08679+K08679+K08679+K08679+K08679+K01176+K01176+K01176+K01176+K01177+K00847+K00847+K00847+K00847+K01051+ K01051+K01051+K00975+K01188+K01188+K01188+K01188+K01179+K00963+K00963+K00963+K00963+K08679+K08679+K01188+ K01188+K01835+K16055+K16055+K16055+K16055+K16055+K16055+K16055+K16055+K16055+K16055+K16055+K16055+K16055+K1177+K1177+K1177+ K01177+K01177+K01177+K01177+K01177+K01177+K01188+K13648+K13648+K13648+K13648+K13648+K13648+K13648+K13648+K13648+K13648+K05350+K05350+



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K05349+K00705+K00700+K00700+K00705+K01810+K05349+K00688+K05349+K01188+K00695+K01188+K01188+K01188+K01835+K00700+K01188+K01188+K01188+K01188+K01810+K05349+K00705+K01188+K05349+K01810+K05349+K00695+K01188+K01187+K01835+K00844+K00705+K05349+K01188+K01188+K00844+K01188+K01188+K01188+K05349+K01810+K05349+K05350+K01188+K01188+K01188+K05350+K05349+K01188+K05349+K01188+K01835+K05349+K01810+K01188+K01188+K05349+K00700+K01188+K01188+K00844+K01835+K01188+K00975+K00700+K01188+K01188+K05349+K00705+K01188+K00844+K05349+K01810+K01810+K01810+K01810+K00700+K01835+K01810+K00696+K01187+K01810+K05349+K05349+K01188+K01810+K00695+K00700+K00844+K05349+K00844+K00696+K01810+K05349+K05349+K05349+K00700+K00700+K00700+K00700+K00700+K00975+K01835+K01187+K01810+K00705+K00705+K00705+K00705+K00695+K05350+K05349+K01810+K00700+K01835+K05349+K05349+K00695+K00695+K05349+K00695+K05349+K05349+K01187+K01188+K01835+K01835+K01835+K01835+K01835+K01835+K01835+K01835+K01835+K01835+K01835+K00695+K01835+K05349+K01835+K01835+K01835+K01835+K01835+K01835+K01835+K01187+K00700+K00975+K05349+K00705+K05349+K05349+K01810+K00700+K00700+K00695+K01188+K00695+K00695+K05350+K00705+K00700+K01187+K00975+K00844+K00844+K00844+K00844+K00844+K00844+K00844+K00844+K00844+K00844+K00844+K00844+K00844+K00844+K05349+K05349+K05349+K05349+K05349+K05349+K05349+K05349+K05349+K05349+K05349+K05349+K05349+K00695+K00700+K01187+K00695+K00700+K00700+K05350+K00695+K00695+K00695+K00700+K00695+K00695+K00700+K00695+K00695+K00700+K00696+K05349+K00696+K00700+K01835+K01835+K00696+K05349+K01835+K00705+K00695+K01810+K16055+K16055+K05349+K00688+K00695+K00695+K00700+K16055+K00695+K16055+K00844+K00695+K00688+K00688+K00700+K01810+K01810+K00705+K00700+K01810+K16055+K16055+K00688+K16055+K00844+K00688+K00700+K05349+K01810+K16055+K16055+K00700+K01176+K16055+K00688+K00700+K00695+K00688+K00688+K00695+K16055+K01810+K01176+K00695+K00695+K01810+K00695+K01810+K00695+K00700+K00705+K05350+K00700+K16055+K00688+K00688+K00844+K16055+K05349+K00700+K05349+K13648+K01187+K01810+K00688+K00695+K00700+K00844+K00688+K00695+K00695+K00705+K01187+K05349+K00975+K00700+K00700+K05349+K00696+K01051+K01051+K01051+K01051+K01188+K01188+K16055+K16055+K16055+K16055+K16055+K16055+K16055+K01188+K01188+K01188+K01188+K01188+K01188+K01188+K01188+K01194+K01194+K01194+K01194+K01194+K01194+K01194+K01188+K01188+K01051+K01051+K01193+K01193+K01193+K01193+K01193+K01193+K08679+K08679+K08679+K00847+K00847+K00847+K01188+K01188+K01188+K00012+K00012+K00012+K00012+K00012+K00012+K00012+K00012+K01051+K01051+K01051+K01051+K01051+K01051+K01051+K01051+K01051+K01051+K00963+K00963+K00963+K00963+K01188+K01188+K01188

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K07407+K07407+K14085+K06118+K00679+K00679+K00901+K13523+K13523+K13523+K13523+K13523+K13523+K00901+K00901+K00864+K00864+K00864+K00864+K00864+K06119+K06119+K06119+K06119+K13508+K13508+K13508+K13508+K00128+K00128+K00128+K00128+K00128+K00128+K00128+K00128+K00128+K00128+K15728+K15728+K15728+K15728+K15728+K15728+K15728+K15918+K15918+K15918+K15918+K15918+K15918+K15918+K15918+K15918+K15918+K09480+K09480+K09480+K09480+K09480+K09480+K09480+K09480+K13513+K13513+K13513+K00128+K00128+K00128+K00128+K00128+K00128+K00128+K00128+K00128+K00128+K00128+K00128+K00128+K00128+K15728+K15728+K15728+K15728+K15728+K15728+K15728+K15728+K00901+K00901+K00901+K00901+K13506+K13506+K13506+K13506+K13506+K13506+K13506+K13506+K13506+K13506+K00679+K00679+K00679+K00679+K00679+K00679+K00679+K00679+K00679+K00679+K00679+K00679+K00679+K00679+K00679+K00679+K00679+K00679+K00679+K11155+K11155+K11155+K00128+K00128+K00128+K00128+K00128+K00128+K00128+K00128+K00128+K00128+K00128+K00128+K00128+K00128+K07407+K07407+K00128+K00128+K00128+K00128+K00128+K00128+K09480+K09480+K09480+K09480+K09480+K09480+K09480+K09480+K09480+K09480+K09480+K14674+K14674+K14674+K14674+K14674+K14674+K14674+K14674+K14674+K14674+K14674+K14674+K14674+K00901+K00901+K03715+K00901+K00901+K00901+K00128+K00901+K06119+K00901+K00901+K00901+K00128+K06119+K00863+K03715+K00901+K03715+K00901+K00901+K00901+K00901+K03715+K00901+K06119+K00901+K07407+K06118+K00901+K00901+K00901+K00863+K06118+K00128+K00128+K00863+K00901+K00128+K00901+K00901+K00901+K00901+K06118+K06118+K00863+K00128+K07407+K00863+K00901+K00863+K00901+K00901+K00901+K13523+K00863+K00901+K00901+K00901+K00901+K00901+K00901+K00901+K00901+K00901+K00863+K00901+K00901+K00901+K00901+K00901+K00901+K00901+K00901+K00128+K00128+K00128+K13508+K13508+K03715+K03715+K03715+K03715+K07407+K07407+K07407+K07407+K13508+K13508+K13508+K13508

Inositol phosphate ko00562 242  
metabolism

K00913+K00913+K00913+K00913+K00913+K01803+K01803+K01803+K01803+K01803+K01803+K01803+K01803+K00915+K00915+K00915+K00913+K00913+K00469+K00469+K00469+K00469+K00469+K00469+K00921+K00921+K00921+K00921+K00921+K00921+K00921+K00921+K00921+K00921+K01114+K10572+K10572+K10572+K10572+K10572+K00921+K00921+K00921+K00921+K00921+K00921+K00921+K00921+K15422+K15422+K01803+K01803+K01803+K01114+K01114+K01092+K01092+K00999+K00999+K00999+K00999+K00999+K00999+K00999+K00999+K00913+K01110+K01110+K01110+K01110+K01110+K01110+K01110+K01803+K01803+K01803+K01803+K01803+K01803+K01803+K01803+K01803+K01803+K01803+K01803+K01803+K01803+K01803+K01803+K01803+K00889+K00889+K00889+K00889+K00889+K00889+K00889+K00889+K01106+K01106+K00889+K00889+K00889+K00889+K00140+K00140+K00140+K00140+K00140+K00140+K00140+K00140+K00914+K00914+K

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Biotin metabolism	ko00780	40	K01652+K01652+K01652+K01653+K01653 K00059+K00059+K00059+K00059+K00059+K09458+K00208+K00208+K00208+K00208+K01942+K01942+K01942+K00059+K00059+ K02372+K02372+K00208+K00208+K00208+K01012+K00059+K00059+K00059+K00059+K00833+K00833+K01942+K01942+K09458+ K09458+K09458+K09458+K09458+K09458+K00652+K00652+K09458+K09458+K09458
Lipoic acid metabolism	ko00785	12	K03801+K03801+K03801+K03801+K03644+K03644+K03644+K03644+K03644+K03644+K03644+K03644
Folate biosynthesis	ko00790	67	K01307+K01307+K01307+K01307+K01307+K01307+K18482+K18482+K18482+K13950+K13950+K13950+K13950+K01495+K01113+ K01113+K01113+K01307+K01307+K03635+K03635+K01633+K01633+K01633+K01633+K01633+K01633+K03635+K03635+ K03635+K03635+K01930+K01930+K01930+K01930+K01930+K01930+K01930+K01930+K01930+K13998+K13998+K13998+K13998+ K13998+K13998+K13998+K13998+K13998+K13998+K13998+K13941+K13941+K13941+K01930+K01930+K01930+K01930+K01930+ K01930+K01930+K01495+K01495+K01495+K01495+K01495
Porphyrin and chlorophyll metabolism	ko00860	167	K04040+K04040+K04040+K04040+K04040+K02257+K02257+K00510+K00510+K00510+K00510+K00510+K00228+K00228+K00228+ K00228+K01599+K01599+K01599+K01599+K01599+K01698+K10960+K10960+K10960+K10960+K00218+K00218+K00218+K00218+ K13606+K01749+K01749+K04035+K00218+K01599+K01599+K08099+K02257+K01885+K00218+K00218+K02259+K02259+K13545+ K03404+K03404+K03404+K03404+K03404+K03404+K03404+K03403+K03403+K03403+K03403+K03403+K03403+K03403+K18010+ K18010+K18010+K18010+K13600+K13600+K13600+K13600+K01885+K01885+K01885+K01885+K01885+K01885+K01885+K01885+ K01885+K01885+K01885+K01885+K01885+K01885+K01885+K01885+K10960+K10960+K13545+K13545+K08099+K08099+K08099+K08099+ K08099+K00231+K00231+K00231+K00231+K00231+K00231+K00231+K00231+K00231+K00218+K00218+K00218+K00218+K00218+K00218+ K00218+K00218+K00218+K00218+K00218+K00218+K04035+K04035+K04035+K04035+K04035+K02492+K02492+K02492+K02492+K02492+ K02492+K13606+K13606+K03405+K03405+K03405+K00231+K00231+K00231+K01845+K01845+K01845+K01772+K01772+K01772+ K01772+K01772+K01772+K01772+K13606+K13071+K13071+K13606+K01885+K13071+K01885+K13071+K13071+K01772+K01885+ K13071+K13606+K13606+K01885+K01885+K01772+K01885+K01885+K01772+K01772+K02492+K02492+K01719+K01719+K01719+ K01719+K01719
Terpenoid backbone biosynthesis	ko00900	210	K05356+K03527+K03527+K13789+K13789+K13789+K13789+K13789+K13789+K13789+K13789+K13789+K00991+K00991+K01597+K01597+K01597+ K00869+K00869+K00869+K00869+K00869+K00869+K00869+K00919+K00919+K05906+K05906+K15891+K00021+K14066+K01823+K01823+ K01823+K01823+K01823+K10960+K10960+K10960+K10960+K00099+K13789+K13789+K13789+K05955+K05955+K05955+K01770+

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Carbon  
metabolism

ko01200 1378

K10256+K10256+K10256+K10256+K00232+K00232+K00232+K00232+K00232+K00232+K00232+K00232+K07513+K07513+K07513+K07513+K07513+K07513+K07513+K07513+K00232+K07513+K10257+K10257+K10257+K10257+K10257+K10257+K10257+K00161+K00161+K00161+K00161+K01455+K01455+K01455+K01455+K01455+K01455+K01455+K00236+K00855+K00855+K00855+K00855+K00855+K00927+K00927+K00927+K00927+K00235+K00235+K00235+K00235+K00235+K00235+K13034+K13034+K13034+K13034+K01623+K01623+K01623+K01623+K01623+K01623+K01623+K00121+K00121+K00121+K00121+K00121+K00121+K00121+K00121+K01803+K01803+K01803+K01803+K01803+K01803+K01803+K01803+K01803+K00616+K00616+K00616+K00616+K00616+K00616+K00616+K00616+K00616+K00640+K00640+K00640+K00640+K00121+K00121+K02160+K02160+K02160+K02160+K00033+K05605+K05605+K05605+K14454+K14454+K14454+K14454+K14454+K14454+K01738+K01738+K01738+K01738+K00122+K00122+K01057+K01057+K00030+K00030+K14455+K14455+K14455+K01807+K01807+K01807+K15634+K15634+K05605+K05605+K05605+K05605+K01689+K00030+K00030+K00030+K00030+K00030+K00030+K00030+K00025+K00025+K00025+K00025+K00025+K00025+K00025+K00025+K00025+K00025+K00025+K01623+K01623+K01623+K01623+K01623+K01623+K01623+K01623+K01623+K01623+K01623+K01623+K01623+K13034+K13034+K00031+K00031+K00031+K00031+K00031+K00031+K00031+K00031+K00029+K00927+K00927+K00927+K00927+K00927+K00927+K00026+K00026+K00026+K00026+K00026+K00026+K00026+K00026+K01057+K00162+K00162+K00162+K00162+K00162+K00162+K00162+K00162+K01738+K01738+K01738+K01738+K01738+K01738+K01738+K01738+K01738+K01738+K01738+K01738+K01738+K01738+K01738+K01738+K01079+K01079+K01070+K01070+K01070+K01070+K01623+K01623+K01623+K01623+K01623+K01623+K01623+K01623+K01623+K01623+K01623+K01623+K01623+K01623+K01623+K00616+K00616+K01602+K01602+K01602+K01602+K01602+K01602+K01602+K01602+K01602+K01602+K01602+K01602+K01602+K01057+K01057+K00033+K00033+K00033+K00033+K00033+K00033+K00161+K00025+K01602+K01602+K01602+K01602+K01602+K01602+K01602+K01602+K01602+K01057+K01057+K01057+K01057+K01057+K01783+K01783+K01783+K05605+K05605+K05605+K00026+K00026+K00026+K01595+K01595+K00640+K00640+K01738+K01738+K01738+K00640+K00640+K05605+K05605+K05605+K00873+K01803+K01803+K01803+K00121+K00121+K00131+K00131+K00131+K00851+K00851+K01679+K00605+K00605+K00626+K00626+K00626+K00626+K00626+K00626+K00831+K00831+K00831+K03841+K03841+K01807+K01807+K01807+K05298+K05298+K05298+K05298+K05298+K05298+K05298+K00051+K00051+K00051+K00051+K00161+K00161+K00036+K01834+K01834+K01834+K01834+K01963+K00025+K00025+K00058+K00850+K05605+K05605+K05605+K05605+K05605+K05605+K05605+K05605+K05605+K00058+K00058+K00058+K00058+K00058+K00058+K00058+K00058+K00058+K00058+K00058+K01057+K01057+K01057+K01810+K01810+K00121+K00121+K00814+K00814+K00026+K00026+K00026+K00026+K00616+K01738+K00121+K00121+K00121+K01623+K01623+K00030+K00030+K01899+K01899+K01899+

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K01647+K01647+K01647+K03841+K03841+K03841+K03841+K03841+K03841+K03841+K00850+K00850+K00850+K00850+K00850+K00850+K00850+K00850+K00850+K00850+K01938+K01938+K01938+K01938+K01938+K01938+K01938+K01938+K01938+K00948+K00948+K00297+K00297+K00297+K00297+K00297+K00297+K00600+K00600+K00600+K00600+K00600+K00600+K00600+K00051+K01754+K01754+K01754+K00382+K00382+K00382+K00382+K18121+K18121+K00030+K00030+K00030+K00814+K00036+K00036+K00036+K00036+K00036+K00036+K00029+K01810+K00627+K00281+K00281+K00873+K00873+K00873+K00814+K00814+K00814+K01595+K01595+K00051+K00134+K01623+K00029+K00036+K00234+K01595+K00036+K01595+K00873+K01595+K01595+K01810+K00627+K00029+K01595+K00134+K01810+K00134+K01595+K00051+K00844+K01595+K00031+K00873+K01610+K01610+K00134+K00844+K00134+K00030+K01610+K00850+K00605+K00031+K01610+K01610+K01623+K01595+K01610+K00850+K01595+K01610+K01610+K00873+K01610+K01610+K01595+K00627+K01738+K00873+K01810+K01623+K01681+K00029+K00873+K00029+K01738+K01963+K00036+K00863+K05298+K00134+K01595+K01738+K00029+K01810+K01623+K01595+K00134+K00873+K01595+K00134+K00234+K00134+K00134+K01595+K05298+K00873+K00873+K01595+K01595+K00844+K01595+K01601+K01679+K00134+K00850+K00873+K01595+K01595+K00134+K00844+K00051+K01595+K00249+K01810+K01810+K01810+K01810+K01810+K00029+K01681+K01810+K00029+K01810+K00873+K00029+K00873+K00051+K00844+K00164+K00029+K01610+K00140+K01681+K00844+K00164+K00029+K00029+K00029+K01595+K00051+K01595+K00873+K00029+K01810+K00029+K00029+K00234+K00164+K00029+K00140+K00863+K00873+K00234+K00029+K00234+K01895+K00873+K01681+K01810+K00140+K01738+K00051+K00036+K00029+K00030+K00030+K00029+K00029+K00627+K01895+K01810+K00036+K00029+K00029+K00029+K00029+K00029+K00029+K00029+K00029+K00029+K00029+K00281+K00029+K00029+K00029+K00029+K01679+K01679+K00873+K01679+K01679+K01679+K01679+K01679+K01679+K01679+K01679+K00863+K00029+K00029+K00234+K00850+K00627+K00234+K00234+K00627+K01810+K00036+K00029+K01738+K00029+K00029+K00036+K00036+K00627+K00029+K00029+K00029+K00036+K00844+K00844+K00844+K00844+K00844+K00844+K00844+K00844+K00844+K00844+K00844+K00844+K00844+K00844+K00844+K00844+K00844+K00844+K00844+K00029+K00134+K00627+K00029+K00140+K00140+K00140+K01963+K01963+K01963+K01963+K01963+K00627+K00627+K00029+K01679+K01623+K00029+K01623+K01899+K00029+K00029+K00850+K00029+K00029+K01610+K00863+K00605+K00051+K00029+K00029+K00029+K00029+K00029+K00029+K00029+K00029+K00850+K00031+K01610+K00863+K00234+K01810+K00164+K01681+K01602+K00164+K01895+K00281+K00164+K00140+K00164+K01602+K01602+K00873+K00863+K00164+K00814+K00281+K01681+K05298+K00281+K00627+K01895+K01681+K00164+K00844+K01681+K00164+K00281+K01681+K00627+K00627+K01810+K00873+K00814+K00164+K01810+K01810+K00164+K00164+K01681+K00164+K01681+K00844+K01681+K01895+K01681+K01895+K00164+K01810+K05298+K00140+K00873+K00281+K00164+K01681+K00164+K01681+K00281+

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2-Oxocarboxylic acid metabolism ko01210 234







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K14272+K14272+K14272+K14272+K00872+K00872+K00789+K00789+K00789+K00789+K00789+K00789+K00789+K00789+K01647+K00052+K00052+K00615+K00615+K01915+K01915+K00615+K00615+K00615+K00615+K00615+K00615+K00615+K00615+K00615+K00615+K00615+K00615+K00615+K00873+K00873+K00873+K00873+K00264+K00264+K00264+K00264+K00264+K00264+K00264+K00264+K00264+K00264+K00264+K00264+K00264+K00873+K00873+K00873+K00873+K00873+K00873+K00873+K00873+K01689+K01689+K01689+K01689+K01689+K01689+K00873+K00873+K00873+K00873+K00766+K00766+K00766+K00766+K00766+K00789+K00789+K00789+K00789+K12657+K12657+K01687+K01687+K00927+K00927+K00927+K00927+K00600+K00600+K00600+K00600+K00600+K00600+K00640+K15633+K15633+K15633+K15633+K15633+K15633+K15633+K15633+K15633+K15633+K15633+K15633+K15633+K15633+K15633+K00789+K00789+K12657+K12657+K13832+K13832+K13832+K13832+K13832+K13832+K14682+K14682+K14682+K14682+K14682+K01783+K01783+K01783+K01647+K01647+K01647+K01647+K01647+K01647+K00850+K00850+K00850+K00850+K00850+K00850+K00850+K00850+K00850+K00850+K00850+K00850+K00850+K00850+K00948+K00948+K00600+K00600+K00600+K00600+K00600+K00600+K00600+K00600+K01817+K11755+K11755+K01754+K01754+K01754+K00030+K00030+K00030+K00814+K00549+K00549+K00549+K00549+K00873+K00873+K00873+K00053+K00814+K00053+K00814+K00815+K00814+K00928+K00815+K00134+K01623+K00815+K00053+K00549+K00053+K00873+K00053+K13832+K00134+K00815+K00815+K00134+K00031+K00873+K00134+K00134+K00030+K01657+K00850+K00031+K00549+K00815+K00053+K01623+K00053+K00850+K00549+K00873+K01657+K01657+K01738+K00815+K00873+K13832+K01623+K01915+K01681+K00873+K01738+K00053+K00815+K01657+K00053+K00134+K01738+K01623+K00134+K00873+K00815+K00928+K00134+K00134+K00134+K01657+K00053+K00789+K00873+K00873+K00815+K00134+K00850+K01620+K00873+K00815+K00928+K00134+K00815+K00549+K00549+K00549+K01681+K01657+K01657+K00873+K00873+K01657+K00549+K01657+K01681+K00873+K00815+K00549+K00815+K00549+K00549+K00873+K00549+K00549+K00873+K01681+K01738+K00549+K00030+K00030+K00549+K01663+K01663+K00815+K00549+K00549+K01663+K00549+K01438+K00873+K01663+K00549+K00549+K00549+K00826+K00850+K01738+K01663+K01663+K00549+K00549+K00134+K01623+K01623+K01657+K01657+K01657+K01657+K01657+K01657+K01657+K01657+K01657+K01657+K01657+K01657+K01657+K01657+K01657+K00850+K01620+K01620+K00850+K00031+K01681+K00873+K00814+K01681+K01663+K01620+K00549+K00549+K01681+K01681+K00549+K01681+K00549+K00873+K00814+K00549+K01681+K01681+K01681+K01681+K00549+K00873+K01681+K01681+K01438+K01681+K01681+K00549+K01681+K01681+K01681+K00031+K00549+K01681+K01681+K01681+K01681+K00134+K01681+K00549+K01803+K01626+K01663+K01681+K00873+K01681+K01663+K05359+K01681+K01663+K01681+K01681+K00826+K01681+K00873+K01681+K01681+K01681+K01681+K00873+K00549+K01681+K00549+K00549+

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K03538+K03538+K03538+K12619+K12619+K12619+K12619+K12619+K12619+K12619+K12619+K12619+K12619+K12619+K12845+K12845+K12845+K12845+K14568+K14568+K14568+K14568+K14568+K14568+K14568+K14568+K14556+K14556+K14556+K14556+K14556+K14556+K06943+K03537+K03537+K14565+K14565+K14565+K14565+K14565+K14565+K14565+K14565+K14565+K14565+K14565+K14550+K14550+K14569+K14544+K14544+K14544+K14544+K14521+K14521+K14521+K14521+K14521+K14521+K14567+K14567+K14567+K14567+K14567+K14567+K14567+K14567+K14567+K14567+K14567+K14567+K14566+K14566+K14566+K14566+K11131+K11131+K11131+K11131+K14558+K14558+K07562+K07562+K07562+K07562+K07562+K07562+K07562+K07562+K12619+K12619+K12619+K12619+K12619+K12619+K12619+K12619+K12619+K12619+K12619+K12619+K12619+K12619+K14573+K14573+K14571+K14571+K14571+K14571+K14571+K14571+K12619+K12619+K12619+K12619+K14546+K14546+K01164+K01164+K01164+K01164+K01164+K01164+K01164+K01164+K03097+K03097+K03097+K03097+K03097+K03097+K03097+K14548+K14548+K14548+K14548+K14548+K14554+K14554+K14554+K03115+K03115+K03115+K03115+K11129+K11129+K11129+K11129+K11129+K11129+K11129+K14546+K14546+K14546+K14546+K14546+K14546+K14546+K14546+K14546+K14546+K14546+K14546+K14546+K13288+K03097+K03097+K03097+K03097+K03097+K14570+K14570+K14570+K14570+K07178+K07178+K07178+K07178+K07178+K14538+K14538+K14538+K14538+K14538+K14538+K14521+K14521+K14549+K14549+K14549+K14563+K14563+K14563+K14563+K12619+K11108+K11108+K11108+K11108+K11108+K11108+K14557+K14557+K14539+K14539+K14539+K14539+K14539+K14539+K14559+K14559+K14559+K14559+K14559+K03539+K14573+K14552+K06943+K14552+K14552+K07179+K06943+K14553+K12619+K14552+K14552+K06943+K14552+K14572+K14552+K12619+K06943+K14552+K06943+K14552+K06943+K14555+K14555+K14555+K14555+K06943+K14568+K14568+K14568+K14568+K14568+K14568+K14568+K14568+K14568+K14568+K14568+K06943+K06943+K14553+K14553+K14555+K07179+K07179+K07179+K07179+K07179+K07179+K07179+K07179+K07179+K07179+K07179+K07179+K14536+K12619+K06943+K14555+K14536+K14570+K14570+K11883+K11883+K11883+K14537+K14537+K14537+K14537+K14564+K14564+K14564+K12619

Ribosome ko03010 946

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K02957+K02957+K02957+K02957+K02957+K02905+K02905+K02905+K02905+K02976+K02976+K02976+K02976+K02976+K02867+K02867+K02946+K02946+K02963+K02904+K02961+K02961+K02961+K02961+K02961+K02934+K02883+K02883+K02883+K02884+K02884+K02933+K02941+K02971+K02971+K02971+K02971+K02870+K02870+K02870+K02870+K02870+K02870+K02870+K02870+K02870+K02961+K02961+K02961+K02961+K02937+K02937+K02937+K02937+K02937+K02937+K02876+K02952+K02952+K02952+K02917+K02917+K02917+K02917+K02917+K02917+K02983+K02983+K02983+K02990+K02990+K02942+K02942+K02942+K02942+K02942+K02942+K02942+K02922+K02922+K02896+K02896+K02907+K02907+K02974+K02974+K02974+K02974+K02939+K02990+K02990+K02927+K02927+K02927+K02927+K02927+K02882+K02981+K02981+K02981+K02880+K02880+K02880+K02933+K02933+K02933+K02933+K02933+K02933+K02924+K02924+K02937+K02969+K02969+K02969+K02911+K02911+K02911+K02911+K02887+K02887+K02887+K02887+K02918+K02918+K02918+K02883+K02883+K02916+K02930+K02982+K02982+K02982+K02903+K02903+K02997+K02997+K02997+K02997+K02865+K02865+K02865+K02865+K02865+K02865+K02865+K02954+K02920+K02920+K02896+K02910+K02910+K02910+K02867+K02964+K02964+K02964+K02964+K02881+K02881+K02918+K02918+K02918+K02906+K02906+K02924+K02924+K02924+K02924+K02992+K02992+K02920+K02920+K02983+K02989+K02989+K02989+K02865+K02865+K02881+K02881+K02881+K02881+K02881+K02913+K02913+K02913+K02915+K02915+K02915+K02915+K02883+K02888+K02965+K02965+K02965+K02909+K02872+K02864+K02864+K02922+K02922+K02922+K02922+K02922+K02988+K02988+K02900+K02991+K02991+K02873+K02873+K02995+K02937+K02937+K02937+K02926+K02926+K02945+K02945+K02996+K02997+K02997+K02894+K02992+K02950+K02992+K02877+K02966+K02966+K02868+K02981+K02867+K02889+K02987+K02987+K02987+K02981+K02889+K02987+K02987+K02987+K02889+K02889+K02889+K02889+K02896+K02896+K02896+K02896+K02896+K02896+K02896+K02981+K02889+K02889+K02867+K02871+K02982+K02894+K02894+K02894+K02925+K02925+K02925+K02925+K02925+K02998+K02998+K02998+K02998+K02998+K02998+K02998+K02998+K02998+K02998+K02998+K02998+K02998+K02998+K02895+K02895+K02895+K02971+K02971+K02971+K02971+K02971+K02914+K02914+K02914+K02914+K02914+K02914+K02914+K02914+K02966+K02966+K02966+K02984+K02865+K02906+K02906+K02906+K02906+K02934+K02934+K02934+K02934+K02934+K02934+K02934+K02945+K02945+K02945+K02945+K02879+K02941+K02941+K02941+K02941+K02941+K02941+K02941+K02941+K02941+K02889+K02889+K02889+K02889+K02889+K02889+K02988+K02988+K02988+K02988+K02988+K02879+K02879+K02879+K02879+K02879+K02899+K02899+K02899+K02899+K02899+K02899+K02957+K02957+K02957+K02957+K02957+K02946+K02945+K02987+K02992+K02930+K02987+K02979+K02930+K02950+K02979+K02945+K02993+K02971+K02987+K02993+K02950+K02938+K02938+K02982+K02938+K02911+K02956+K02878+K02963+K02963+K02896+K02896+K02896+K02896+K02896+K02896+K02950+K02963+K02954+K02963+

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Protein export	ko03060	212	<p>K03036+K03032+K02735+K03062+K03062+K03062+K03062+K03028+K03028+K03028+K03028+K03028+K03028+K03028+K03065+K03065+K03028+K03028+K03028+K03028+K03065+K03028+K03028+K02731+K02737+K03065+K03065+K02737+K03028+K03033+K03033+K03033+K03033+K03033+K03033+K03061+K03061+K03061+K03061+K03061+K03061+K03035+K03035+K03035+K03035</p> <p>K03217+K03217+K03217+K09648+K07342+K07342+K07342+K07342+K07342+K03100+K09647+K09647+K09647+K09647+K09647+K03116+K03116+K07342+K07342+K07342+K13280+K13280+K13280+K13280+K03104+K03104+K03104+K03104+K12946+K12946+K12946+K03110+K03110+K03110+K03110+K03100+K03100+K12947+K12947+K12947+K09647+K12948+K12948+K12948+K12948+K12272+K12272+K12272+K09540+K03105+K03105+K09481+K09481+K09481+K09481+K09481+K03106+K12947+K03118+K03118+K03118+K03109+K03109+K03109+K03109+K03109+K03109+K03109+K03109+K03109+K03109+K03109+K03109+K03109+K09490+K09490+K09490+K03108+K03070+K03070+K03070+K03070+K03070+K03070+K03070+K03070+K03070+K03070+K03070+K03070+K03070+K10956+K10956+K10956+K10956+K10956+K10956+K10956+K10956+K10956+K10956+K03070+K03070+K03070+K03070+K03070+K03070+K03070+K03070+K03070+K03070+K03070+K03217+K03217+K03217+K03217+K03217+K03217+K03217+K03217+K03217+K03106+K03106+K03106+K03106+K03106+K03106+K03106+K03106+K03217+K03217+K03217+K03217+K12275+K12275+K12275+K12275+K12275+K09490+K13431+K13431+K13431+K13431+K13431+K13431+K13431+K13431+K09540+K09540+K09540+K09540+K09540+K09540+K09540+K09540+K09540+K09540+K12946+K12946+K12946+K12946+K03106+K03106+K03106+K03106+K03109+K03108+K03217+K03217+K03217+K03217+K09490+K09490+K09490+K09490+K09490+K09490+K03217+K09490+K09490+K09490+K09490+K03109+K09490+K09490+K09490+K09490+K03108+K09490+K09490+K09490+K09490+K03108+K03108+K03108+K03108+K03108+K03108+K03217+K09490+K10956+K03107+K03107+K03107+K03107+K03107+K03107+K12947+K12947+K12947+K12947+K12947+K10956</p>
Base excision repair	ko03410	111	<p>K10802+K10802+K10802+K10802+K10802+K10802+K10802+K10802+K10802+K10802+K01246+K01246+K01246+K01246+K03652+K03652+K04799+K04799+K04799+K04799+K01246+K10802+K10802+K10802+K10802+K10802+K10802+K10802+K10802+K10802+K10802+K10802+K10802+K02328+K01247+K01247+K01247+K01247+K03505+K03505+K03505+K10772+K10772+K03506+K01246+K04802+K04802+K02325+K02325+K02326+K02327+K02327+K02327+K02327+K02327+K10798+K10798+K10798+K10798+K10798+K10798+K10747+K10747+K10747+K10747+K10747+K10747+K02335+K02335+K02335+K01142+K01142+K01142+K03504+K03504+K03504+K03504+K10747+K10747+K10747+K10747+K10747+K01246+K01246+K01246+K01246+K01246+K01246+K10801+K02327+K10801+K01246+K10801+K10801+K10801+K01246+K01246+K01246+K10563+K10563+K10563+K10563+K10563+K10563+K02325+K02325+K02325+K02325+K02325+K02325+K04802+K04802+K03512+K03512</p>





			K03505+K10882+K10882+K03553+K03553+K03553+K03553+K04482+K04482+K03553+K03553+K03553+K07466+K07466+K07466+K10875+K10875+K10875+K10875+K02327+K02327+K02327+K02327+K07466+K07466+K07466+K07466+K07466+K07466+K07466+K07466+K07466+K03165+K03165+K03165+K03165+K03165+K03165+K03165+K03165+K10865+K10865+K10865+K10865+K10865+K07466+K07466+K07466+K10875+K10875+K10875+K10875+K10875+K10875+K10875+K03165+K03165+K03165+K03165+K03165+K03165+K03165+K10866+K10866+K10866+K03111+K03111+K03111+K03111+K03111+K10882+K10882+K10882+K10882+K10882+K10882+K10869+K02335+K02335+K02335+K10901+K10901+K10901+K10901+K10879+K10879+K10879+K10879+K10879+K10879+K03504+K03504+K03504+K07466+K07466+K07466+K03553+K03553+K02327+K07466+K07466+K07466+K07466+K10867+K10867+K10867+K10867+K03655+K03655+K07466+K03553+K03553+K03553+K03553+K03553
Non-homologous end-joining	ko03450	34	K04799+K04799+K04799+K04799+K10865+K10865+K10865+K10865+K10865+K10866+K10866+K10866+K10777+K10777+K10777+K10777+K10777+K10777+K10777+K10777+K10777+K10777+K10885+K10885+K10884+K10884+K10884+K10884+K03512+K03512
Phosphatidylinositol signaling system	ko04070	222	K00913+K00913+K00913+K00913+K00913+K00915+K00915+K00915+K00913+K00913+K00921+K00921+K00921+K00921+K00921+K02183+K02183+K02183+K02183+K02183+K02183+K02183+K02183+K02183+K02183+K02183+K02183+K02183+K00921+K00921+K00921+K00921+K00921+K00921+K10572+K10572+K10572+K10572+K10572+K00921+K00921+K00921+K00921+K00921+K00921+K00921+K00921+K00921+K00921+K15422+K15422+K02183+K02183+K02183+K01092+K01092+K00999+K00999+K00999+K00999+K00999+K02183+K00913+K01110+K01110+K01110+K01110+K01110+K01110+K01110+K01110+K01110+K01110+K01110+K01110+K01110+K00901+K01110+K01110+K01110+K00901+K00901+K00889+K00889+K00889+K00889+K00889+K00889+K00888+K00888+K01106+K01106+K00889+K00889+K00889+K00889+K02183+K02183+K02183+K02183+K02183+K02183+K02183+K02183+K00914+K00914+K00914+K00914+K00901+K00901+K00901+K00901+K00901+K00889+K00889+K00889+K00889+K00889+K00889+K00889+K00889+K00889+K00889+K00889+K01110+K01110+K05857+K05857+K05857+K05857+K05857+K05857+K05857+K05857+K00888+K00888+K00888+K00888+K00888+K00888+K00981+K10572+K10572+K10572+K10572+K00915+K00915+K00915+K00901+K01092+K00981+K00981+K00901+K00901+K00901+K05857+K10572+K10572+K10572+K10572+K00901+K00901+K10572+K10572+K00901+K00901+K10572+K00901+K00901+K00901+K10572+K10572+K00901+K10572+K10572+K10572+K10572+K01092+K00901+K00901+K00901+K00901+K00901+K05857+K00901+K00901+K00901+K00901+K00901+K00981+K05857+K05857+K05857+K05857+K01110+K05857+K00901+K00981+K00901+K15422+K01110+K05857+K00901+K00901+K00981+K00901+K00901+K00901+K15422+K00901+K00901+K00901+K01110+K00901+K00901+K00901+K05857+K05857+K00901+K00901+K00901+K00913+K00913+K00981+K00981+K00981







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K10609+K10609+K10609+K10609+K10609+K10609+K10609+K10609+K10609+K10609+K10609+K10590+K10590+K10590+K10590+K10144+K10144+K10144+K03350+K03350+K03350+K03350+K03350+K03350+K03350+K03350+K03350+K03350+K03350+K03350+K10592+K10592+K10592+K03353+K03353+K03353+K03354+K03354+K03354+K03354+K03354+K10610+K10610+K10610+K10610+K10610+K10610+K10610+K10610+K10610+K10610+K10610+K10610+K04649+K04649+K04649+K04649+K04649+K04649+K04649+K04649+K06689+K06689+K06689+K06689+K06689+K06689+K06689+K06689+K06689+K10591+K10591+K10591+K10591+K10591+K10591+K10591+K10591+K10591+K10685+K10685+K03349+K03349+K03349+K03349+K03349+K03349+K09561+K09561+K09561+K09561+K09561+K09561+K04506+K10570+K10570+K10570+K10570+K06689+K06689+K10581+K10581+K10581+K10581+K10581+K10581+K10581+K10581+K10581+K10581+K10581+K10581+K10581+K10581+K10576+K03351+K03351+K03351+K03869+K03869+K03869+K03869+K03869+K03869+K03869+K03869+K03869+K03869+K03869+K03869+K03869+K03869+K03868+K03868+K03868+K03868+K03868+K03868+K03868+K03868+K03353+K03353+K03353+K03094+K03094+K03094+K03094+K10599+K10599+K10599+K10599+K10588+K10588+K10588+K10588+K10588+K10588+K10588+K10588+K10588+K03347+K03347+K03178+K03178+K10573+K03347+K03178+K03178+K10143+K10573+K03875+K10579+K03347+K10580+K10573+K03178+K03347+K03347+K03347+K03178+K03178+K03178+K03178+K03178+K03178+K03347+K03347+K03352+K03347+K03347+K03347+K03347+K03347+K03178+K03347+K10589+K10589+K10589+K10589+K10589+K10589+K10589+K10589+K10589+K10589+K10589+K10589+K10589+K03347+K03178+K03178+K10573+K03347+K03347+K03347+K03347+K03178+K03178+K03178+K03178+K03347+K03348+K10573+K03178+K10573+K03178+K03347+K03347+K03347+K03347+K03178+K10688+K03178+K03178+K03178+K03347+K10577+K03348+K10143+K10143+K03094+K03178+K03347+K03352+K03347+K03347+K03347+K03347+K03352+K03347+K03347+K03347+K03347+K03347+K03875+K10589+K03352+K03875+K03347+K03347+K03347+K03347+K03347+K03347+K03352+K03347+K10143+K03352+K03347+K10143+K03347+K03347+K03347+K03347+K03347+K03347+K03347+K03347+K03352+K03347+K03352+K03347+K03178+K03352+K03347+K03347+K03178+K10597+K10597+K10597+K10597+K03094+K03094+K03094+K03094+K03364+K04706+K04706+K04706+K04706+K04706+K04706+K04706+K04706+K04706+K04706+K04706+K04706+K04706+K04706+K04706+K04706+K10140+K10140+K10140+K10140

Sulfur relay ko04122 41  
system

K04487+K04487+K04487+K14168+K14168+K14168+K14168+K14168+K14168+K14168+K12161+K12161+K12161+K03635+K03635+K03635+K03635+K03635+K03635+K11996+K11996+K11996+K11996+K11996+K11996+K00566+K00566+K00566+K00566+K00566+K00566+K00566+K00566+K01011+K01011+K01011+K01011+K01011+K01011+K01011+K01011+K01011+K14169

SNARE ko04130 105  
interactions in  
vesicular transport

K08515+K08516+K08516+K08516+K08503+K08503+K08503+K08503+K08490+K08490+K08490+K08490+K08506+K08506+K08506+K08506+K08506+K08496+K08496+K08496+K08496+K08496+K08495+K08495+K08495+K08495+K08495+K08488+K08488+K08488+K08497+K08497+K08497+K08490+K08486+K08486+K08486+K08486+K08515+K08515+K08486+K08486+K08515+K08515+K08515+K08495+K08495+K08495+



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K13993+K13993+K13993+K13993+K13993+K13993+K13993+K13993+K13993+K11863+K03094+K03094+K09562+K09562+K09562+K12666+K12666+K12666+K12666+K12666+K13993+K13993+K13993+K13993+K13993+K13993+K03094+K03094+K03094+K03094+K03094+K03094+K03094+K03094+K13993+K13993+K13993+K13993+K13993+K13993+K06689+K06689+K13525+K14016+K14016+K14016+K09580+K09580+K09580+K09580+K09580+K09580+K09580+K04079+K04079+K04079+K04079+K09503+K09503+K09503+K10839+K10839+K10839+K10839+K10839+K07342+K07342+K07342+K13993+K13993+K13993+K13993+K03283+K14009+K14009+K14009+K13250+K13250+K09518+K09518+K09518+K09518+K09518+K09518+K09518+K09518+K07953+K07953+K14006+K14006+K10666+K10666+K10575+K10575+K10575+K05546+K08057+K08057+K08057+K08057+K08057+K08057+K08057+K13249+K13249+K13249+K13249+K14016+K14016+K13993+K13993+K13993+K13989+K13989+K07953+K07953+K07953+K07953+K07953+K07953+K07953+K07953+K07953+K06689+K06689+K06689+K06689+K06689+K06689+K06689+K06689+K06689+K06689+K06689+K06689+K03347+K10666+K10666+K09486+K04554+K04554+K04554+K04554+K04554+K04554+K04554+K04554+K04554+K13993+K13993+K13993+K13993+K13993+K13993+K13993+K13993+K13250+K13250+K13250+K09540+K03347+K09481+K09481+K09481+K09481+K09481+K13993+K10839+K14009+K14009+K14009+K14009+K14009+K14009+K14009+K14009+K14009+K09518+K09518+K09518+K09518+K09518+K14003+K14003+K03868+K03868+K13989+K13989+K13989+K13989+K09517+K09517+K09517+K08054+K14003+K14003+K14003+K14003+K08288+K03283+K13993+K13993+K13993+K13993+K13993+K08288+K12668+K10666+K10666+K03094+K03094+K03094+K09487+K03094+K03094+K09490+K09490+K09490+K04079+K04079+K04079+K04079+K09561+K09561+K03347+K03347+K03347+K03347+K14005+K14005+K09503+K14009+K12669+K03283+K03283+K03283+K03283+K03283+K08288+K12669+K03347+K03347+K13993+K08653+K08653+K08653+K08653+K08653+K08653+K08653+K03347+K14007+K14007+K14007+K14007+K14007+K14007+K14007+K14007+K14007+K14007+K14007+K14007+K14007+K14007+K14007+K14007+K14007+K16196+K16196+K16196+K12666+K12666+K12666+K12666+K11718+K11718+K11718+K11718+K10601+K10601+K10601+K10601+K10601+K10601+K10601+K10601+K10601+K10601+K10601+K10601+K10601+K10601+K10601+K10601+K10601+K10601+K10601+K14009+K14009+K14009+K14009+K14009+K14009+K14001+K14001+K14001+K14001+K14001+K10956+K10956+K10956+K10956+K10956+K10956+K10956+K10956+K09580+K10666+K10666+K10666+K10666+K10666+K07151+K07151+K07151+K07151+K07151+K07151+K07151+K07151+K07151+K03237+K03237+K03237+K03237+K03237+K03237+K03237+K09584+K09584+K09584+K09584+K09584+K09584+K10084+K10084+K10084+K10084+K10084+K10084+K10084+K10666+K10666+K10666+K10666+K10666+K10666+K06689+K06689+K06689+K06689+K06689+K06689+K06689+K06689+K06689+K06689+K06689+K06689+K06689+K06689+K10950+K10950+K10950+K10950+K10950+K10950+K10950+K10950+K10085+K10085+K10085+K10085+K10085+K10085+K09518+

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K09518+K09518+K09518+K09518+K05546+K10666+K10666+K10666+K12275+K12275+K12275+K12275+K12275+K13525+K12667+K12667+K12667+K12667+K12667+K12667+K12667+K12667+K12667+K12667+K12667+K12667+K12667+K12667+K12667+K12667+K12667+K12667+K14026+K14026+K14026+K14026+K14026+K14026+K14026+K14026+K14026+K14026+K09490+K01230+K01230+K01230+K01230+K01230+K01230+K08852+K08852+K08852+K08852+K08852+K08852+K08852+K08852+K08852+K09561+K09561+K09561+K09561+K09561+K09561+K13525+K13993+K09487+K09487+K09487+K09487+K09487+K09487+K09487+K09487+K09487+K09487+K09487+K09487+K09487+K09487+K09487+K10950+K10950+K10950+K10950+K10950+K10950+K10950+K10950+K10950+K10950+K06689+K06689+K07151+K07151+K07151+K07151+K07151+K07151+K07151+K08852+K08852+K10636+K10636+K10636+K10636+K10636+K10636+K10636+K10636+K10636+K10636+K09580+K09580+K09580+K09580+K09580+K09580+K09580+K09580+K09580+K09580+K09580+K09580+K09580+K09580+K10666+K10666+K10666+K10666+K09580+K07765+K07765+K01230+K01230+K01230+K01230+K01230+K14016+K14016+K14016+K14016+K10666+K10666+K10666+K10666+K10666+K03868+K03868+K03868+K03868+K03868+K03868+K09580+K09580+K09580+K09580+K09580+K13989+K13989+K13989+K13989+K13989+K13989+K13989+K09540+K09540+K09540+K09540+K09540+K09540+K09540+K09540+K09540+K09540+K09540+K09540+K09540+K09540+K09540+K09540+K03283+K03283+K03283+K03283+K03094+K03094+K03094+K03094+K14011+K14011+K14011+K04523+K04523+K04523+K04523+K04523+K04523+K04523+K04523+K04523+K04523+K08057+K08057+K08057+K08057+K08057+K08057+K08057+K08057+K08057+K08057+K08057+K08057+K08057+K08057+K08057+K08057+K08057+K03347+K04079+K01456+K03347+K04079+K09487+K13525+K03347+K13525+K04079+K10661+K09487+K14005+K14005+K05546+K12666+K03283+K08054+K04079+K14012+K03283+K08288+K10661+K14006+K03283+K14003+K04079+K08288+K04079+K08054+K03283+K03283+K08288+K03283+K14018+K04079+K04079+K09487+K04079+K01456+K13525+K09580+K14012+K14003+K09580+K12666+K09580+K03347+K08054+K03283+K03283+K08288+K03283+K03283+K03283+K09487+K04079+K01456+K08288+K03283+K12666+K08288+K12666+K04079+K13993+K04079+K04079+K03283+K03283+K14005+K12666+K08054+K12666+K03283+K10661+K12666+K04079+K04079+K09580+K08288+K03283+K12666+K04079+K04079+K14012+K03347+K03283+K09490+K09490+K09580+K03283+K12666+K09490+K09580+K09580+K08054+K09487+K12666+K04079+K08288+K03283+K03283+K14003+K04079+K03283+K09490+K09490+K01456+K09487+K09487+K03283+K03347+K04079+K03347+K01456+K09580+K03283+K04079+K03283+K01228+K10661+K03283+K03347+K10661+K09487+K03347+K01456+K04079+K10661+K14007+K03347+K03283+K09487+K09490+K09490+K08288+K03283+K04079+K03283+K14006+K09490+K14005+K10661+K03347+K09486+K09490+K13525+K04079+K09487+K14005+K10661+K14005+K03347+K03347+K09487+K04079+K03347+K09487+K10661+K14005+K09580+K08288+K10661+K09487+K01456+K03347+K04079+K09487+K04079+K03283+K04079+K10661+K03283+K04079+K10661+K04079+K01456+K09487+K04079+K04079+K04079+K04079+K04079+K10661+K08054+K03347+K04079+K04079+K04079+K03283+K09487+

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