Analysing the structure of pathways and its influence on the interpretation of biomedical proteomics datasets

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1 Supplementary methods

Integration and Radiality were first decsribed in Valente and Foreman (1998). The distance from node j to node k is the shortest path between these two, which is given by $d(j,k)$. If there is no path from node j to node k, this is defined as infinite. Notice that, as we have a directed network, $d(j,k)$ is not necessarily the same as $d(k,j)$ and that there might be a path from j to k even if there is not a path the other way. If we calculate the shortest path for each pair of nodes, the diameter of the network $D(G)$ is the longest of these shortest paths ignoring the ones of infinite length. While the shortest path from node j to node k is given by $d(j,k)$, the inverse of this is defined as $RD(j,k) = D(G)+1-d(j,k)$: the diameter of the network plus one, minus the distance from node j to node k. If there is no path from j to k $RD(j,k)$ is defined as 0. The total number of nodes in the network is N.
The Integration of node k is then calculated as

$$I(k) = \frac{\sum_{j \neq k} RD(j,k)}{D(G)(N-1)}$$

Similarly, the Radiality of node k is then calculated as

$$R(k) = \frac{\sum_{j \neq k} RD(k,j)}{D(G)(N-1)}$$

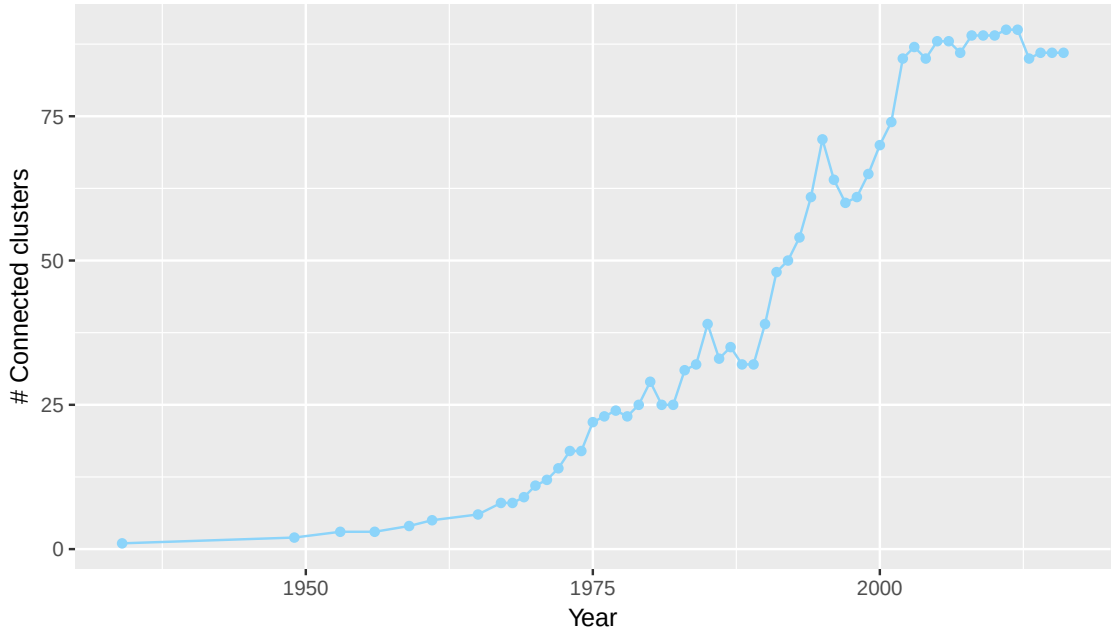

Figure S-1: Number of connected components per year.

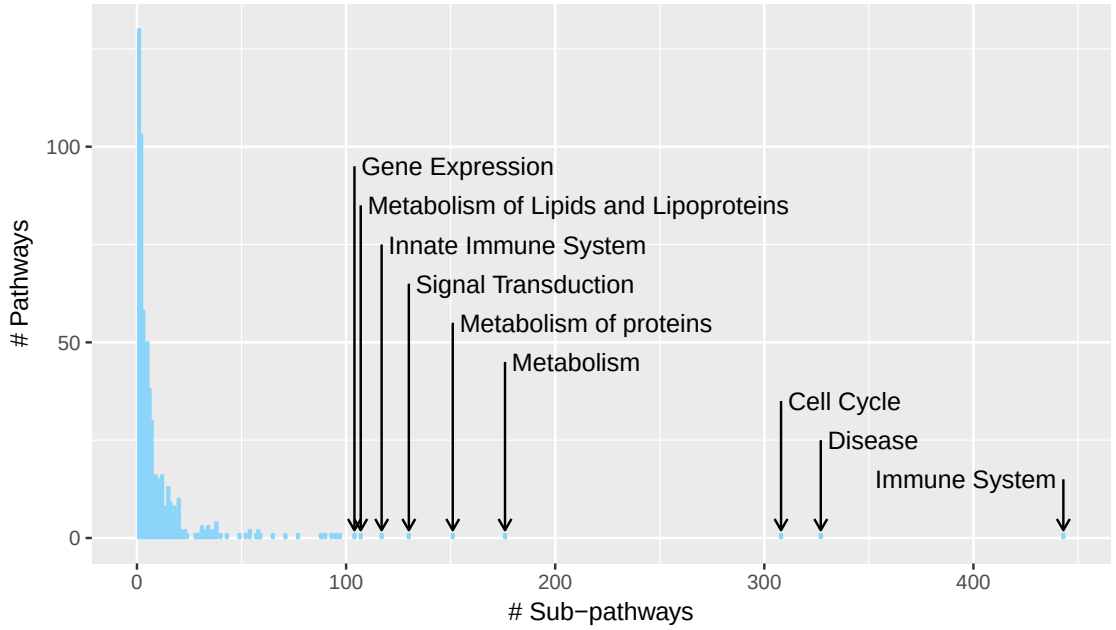

Figure S-2: Distribution of the number of sub-pathways for all pathways. There are 2051 pathways annotated in total. Most pathways (1397) do not contain any sub-pathways. Of the remaining 654, most contain few sub-pathways. The nine pathways with more than 100 sub-pathways are annotated in the plot. Innate Immune System is a sub-pathway of Immune System, Metabolism of Lipids and Lipoproteins is a sub-pathway of Metabolism, the other pathways are all top-level pathways.

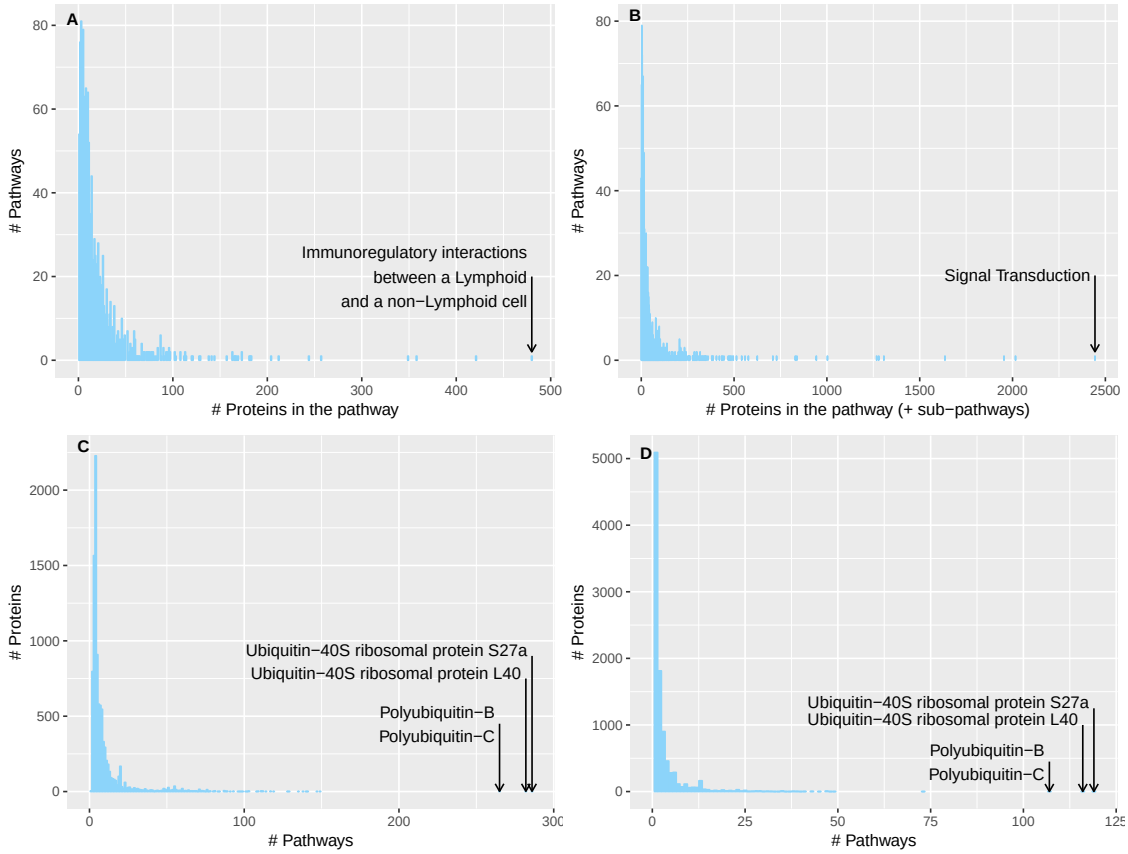

Figure S-3: Number of proteins per pathway and vice versa. A) Number of proteins directly occurring in each pathway. B) Number of proteins occurring in each pathway, including the proteins occurring in sub-pathways. C) Number of pathways a protein occurs in, including the pathways where the protein occurs in a sub-pathway. D) Number of pathways a protein directly occurs in.

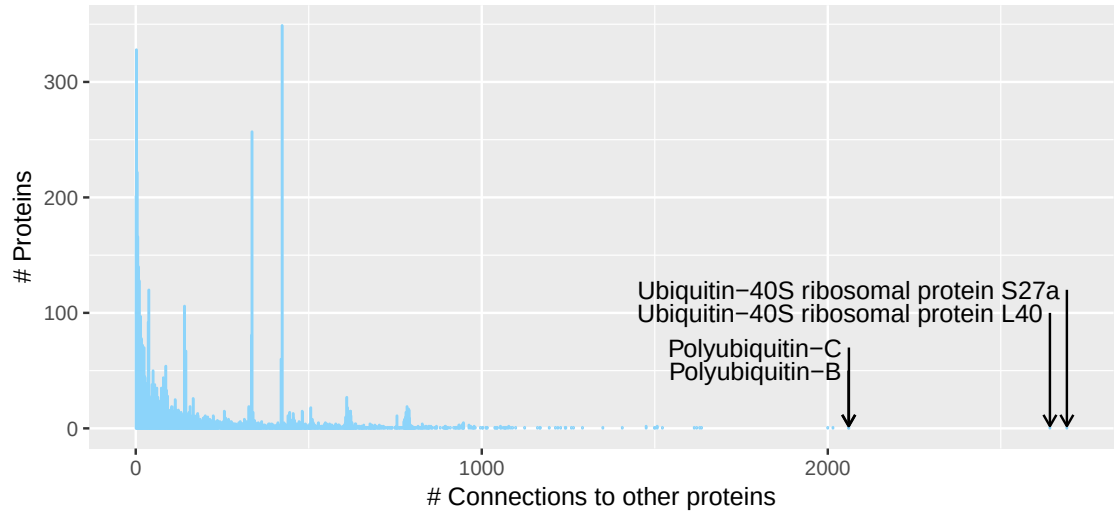

Figure S-4: Distribution of the number of connections for each protein. The two big spikes around 400 connections are mainly olfactory receptors and zinc fingers.

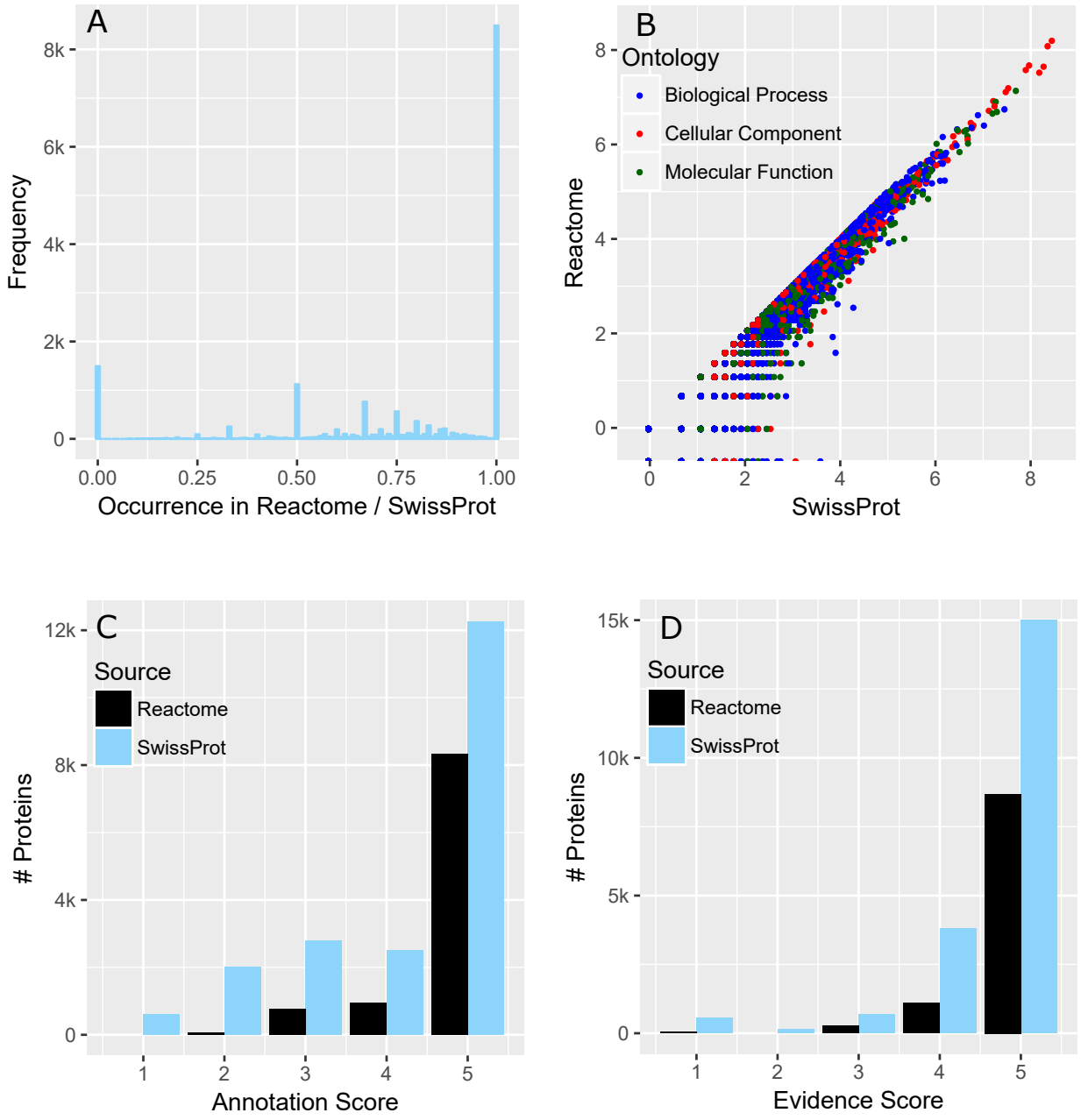

Figure S-5: Potential biases in the curation process. Relative occurrence of GO terms (A and B) or protein annotations (C and D) in Reactome vs. SwissProt. A) The number of GO terms that occur with the relative amount indicated on the x-axis (bins of 0.01). B) Each point indicates one GO term. The axes are log-scale, and terms not included in Reactome are plotted at the bottom of the plot. Red: Cellular Component; green: Molecular Function; blue: Biological Process. C) Distributions of annotation and D) evidence scores of proteins in SwissProt and Reactome. Higher scores indicate more annotation and better evidence. Reactome contains only about half of the proteins in SwissProt, hence the much lower bars in general for Reactome.

Table S-1: The number of pathways a sub-pathway directly participates in. Only those sub-pathways that are directly part of more than two pathways are shown.

Pathway Name	Parents
RAF/MAP kinase cascade	20
PIP3 activates AKT signaling	9
DAG and IP3 signaling	5
TAK1 activates NFkB by phosphorylation and activation of IKKs complex	4
MAP kinase activation in TLR cascade	4
Spry regulation of FGF signaling	4
MyD88:Mal cascade initiated on plasma membrane	3

Table S-2: List of 399 ‘isolated’ proteins. These have scores for Radiality and Integration both below 0.02, and are depicted red in Figure 6.

Uniprot ID	Protein name
Q05823	2-5A-dependent ribonuclease
P82664	28S ribosomal protein S10, mitochondrial
P82912	28S ribosomal protein S11, mitochondrial
O15235	28S ribosomal protein S12, mitochondrial
O60783	28S ribosomal protein S14, mitochondrial
P82914	28S ribosomal protein S15, mitochondrial
Q9Y3D3	28S ribosomal protein S16, mitochondrial
Q9Y2R5	28S ribosomal protein S17, mitochondrial
Q9Y676	28S ribosomal protein S18b, mitochondrial
Q9Y3D5	28S ribosomal protein S18c, mitochondrial
Q9Y399	28S ribosomal protein S2, mitochondrial
P82921	28S ribosomal protein S21, mitochondrial
P82650	28S ribosomal protein S22, mitochondrial
Q9Y3D9	28S ribosomal protein S23, mitochondrial
Q96EL2	28S ribosomal protein S24, mitochondrial
P82663	28S ribosomal protein S25, mitochondrial
Q9BYN8	28S ribosomal protein S26, mitochondrial
Q92552	28S ribosomal protein S27, mitochondrial
Q9Y2Q9	28S ribosomal protein S28, mitochondrial
P51398	28S ribosomal protein S29, mitochondrial
Q92665	28S ribosomal protein S31, mitochondrial
Q9Y291	28S ribosomal protein S33, mitochondrial
P82930	28S ribosomal protein S34, mitochondrial
P82673	28S ribosomal protein S35, mitochondrial
P82909	28S ribosomal protein S36, mitochondrial
P82675	28S ribosomal protein S5, mitochondrial
P82932	28S ribosomal protein S6, mitochondrial
Q9Y2R9	28S ribosomal protein S7, mitochondrial
P82933	28S ribosomal protein S9, mitochondrial
Q9BYD6	39S ribosomal protein L1, mitochondrial
Q7Z7H8	39S ribosomal protein L10, mitochondrial
Q9Y3B7	39S ribosomal protein L11, mitochondrial
P52815	39S ribosomal protein L12, mitochondrial
Q9BYD1	39S ribosomal protein L13, mitochondrial
Q6P1L8	39S ribosomal protein L14, mitochondrial
Q9P015	39S ribosomal protein L15, mitochondrial
Q9NX20	39S ribosomal protein L16, mitochondrial
Q9NRX2	39S ribosomal protein L17, mitochondrial
Q9H0U6	39S ribosomal protein L18, mitochondrial
P49406	39S ribosomal protein L19, mitochondrial
Q5T653	39S ribosomal protein L2, mitochondrial
Q9BYC9	39S ribosomal protein L20, mitochondrial
Q7Z2W9	39S ribosomal protein L21, mitochondrial
Q9NWU5	39S ribosomal protein L22, mitochondrial
Q16540	39S ribosomal protein L23, mitochondrial
Q96A35	39S ribosomal protein L24, mitochondrial
Q9P0M9	39S ribosomal protein L27, mitochondrial
Q13084	39S ribosomal protein L28, mitochondrial
P09001	39S ribosomal protein L3, mitochondrial

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Uniprot ID	Protein name
Q8TCC3	39S ribosomal protein L30, mitochondrial
Q9BYC8	39S ribosomal protein L32, mitochondrial
O75394	39S ribosomal protein L33, mitochondrial
Q9BQ48	39S ribosomal protein L34, mitochondrial
Q9NZE8	39S ribosomal protein L35, mitochondrial
Q9P0J6	39S ribosomal protein L36, mitochondrial
Q9BZE1	39S ribosomal protein L37, mitochondrial
Q96DV4	39S ribosomal protein L38, mitochondrial
Q9NYK5	39S ribosomal protein L39, mitochondrial
Q9BYD3	39S ribosomal protein L4, mitochondrial
Q9NQ50	39S ribosomal protein L40, mitochondrial
Q8IXM3	39S ribosomal protein L41, mitochondrial
Q9Y6G3	39S ribosomal protein L42, mitochondrial
Q8N983	39S ribosomal protein L43, mitochondrial
Q9H9J2	39S ribosomal protein L44, mitochondrial
Q9BRJ2	39S ribosomal protein L45, mitochondrial
Q9H2W6	39S ribosomal protein L46, mitochondrial
Q9HD33	39S ribosomal protein L47, mitochondrial
Q96GC5	39S ribosomal protein L48, mitochondrial
Q13405	39S ribosomal protein L49, mitochondrial
Q8N5N7	39S ribosomal protein L50, mitochondrial
Q4U2R6	39S ribosomal protein L51, mitochondrial
Q86TS9	39S ribosomal protein L52, mitochondrial
Q96EL3	39S ribosomal protein L53, mitochondrial
Q6P161	39S ribosomal protein L54, mitochondrial
Q7Z7F7	39S ribosomal protein L55, mitochondrial
Q9BYD2	39S ribosomal protein L9, mitochondrial
Q9NVS2	39S ribosomal protein S18a, mitochondrial
Q9NP92	39S ribosomal protein S30, mitochondrial
Q03393	6-pyruvoyl tetrahydrobiopterin synthase
Q9NRR6	72 kDa inositol polyphosphate 5-phosphatase
Q13085	Acetyl-CoA carboxylase 1
Q8N9N2	Activating signal cointegrator 1 complex subunit 1
Q9H1I8	Activating signal cointegrator 1 complex subunit 2
Q8N3C0	Activating signal cointegrator 1 complex subunit 3
Q8NC06	Acyl-CoA-binding domain-containing protein 4
Q5T8D3	Acyl-CoA-binding domain-containing protein 5
Q8N6N7	Acyl-CoA-binding domain-containing protein 7
P07108	Acyl-CoA-binding protein
O95372	Acyl-protein thioesterase 2
Q15848	Adiponectin
Q96A54	Adiponectin receptor protein 1
Q86V24	Adiponectin receptor protein 2
Q3SXY8	ADP-ribosylation factor-like protein 13B
P36405	ADP-ribosylation factor-like protein 3
P10109	Adrenodoxin, mitochondrial
P55196	Afadin
O60218	Aldo-keto reductase family 1 member B10
Q04828	Aldo-keto reductase family 1 member C1
P42330	Aldo-keto reductase family 1 member C3

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Uniprot ID	Protein name
P17516	Aldo-keto reductase family 1 member C4
Q96Q83	Alpha-ketoglutarate-dependent dioxygenase alkB homolog 3
P47710	Alpha-S1-casein [Cleaved into: Casoxin-D]
Q6FI81	Anamorsin
Q9H6X2	Anthrax toxin receptor 1
P58335	Anthrax toxin receptor 2
O14977	Antizyme inhibitor 1
Q9NQ94	APOBEC1 complementation factor
P05090	Apolipoprotein D
P07306	Asialoglycoprotein receptor 1
P07307	Asialoglycoprotein receptor 2
P33897	ATP-binding cassette sub-family D member 1
Q9UBJ2	ATP-binding cassette sub-family D member 2
P28288	ATP-binding cassette sub-family D member 3
P61221	ATP-binding cassette sub-family E member 1
P20594	Atrial natriuretic peptide receptor 2
Q9NWT8	Aurora kinase A-interacting protein
O60238	BCL2/adenovirus E1B 19 kDa protein-interacting protein 3-like
Q8NHY0	Beta-1,4 N-acetylgalactosaminyltransferase 2
P50747	Biotin–protein ligase
Q9NP55	BPI fold-containing family A member 1
Q96DR5	BPI fold-containing family A member 2
Q8TDL5	BPI fold-containing family B member 1
Q8N4F0	BPI fold-containing family B member 2
P59827	BPI fold-containing family B member 4
Q8NFQ5	BPI fold-containing family B member 6
O95258	Brain mitochondrial carrier protein 1
P41238	C->U-editing enzyme APOBEC-1
Q9Y235	C->U-editing enzyme APOBEC-2
Q96D31	Calcium release-activated calcium channel protein 1
P54750	Calcium/calmodulin-dependent 3’,5’-cyclic nucleotide phosphodiesterase 1A
Q01064	Calcium/calmodulin-dependent 3’,5’-cyclic nucleotide phosphodiesterase 1B
Q14123	Calcium/calmodulin-dependent 3’,5’-cyclic nucleotide phosphodiesterase 1C
A8K7I4	Calcium-activated chloride channel regulator 1
Q9UQC9	Calcium-activated chloride channel regulator 2
Q14CN2	Calcium-activated chloride channel regulator 4
Q9Y6N3	Calcium-activated chloride channel regulator family member 3
Q8NEC5	Cation channel sperm-associated protein 1
Q96P56	Cation channel sperm-associated protein 2
Q86XQ3	Cation channel sperm-associated protein 3
Q7RTX7	Cation channel sperm-associated protein 4
Q9H7T0	Cation channel sperm-associated protein subunit beta
Q86XM0	Cation channel sperm-associated protein subunit delta
Q6ZRH7	Cation channel sperm-associated protein subunit gamma
Q15762	CD226 antigen
P26842	CD27 antigen
Q9NPF0	CD320 antigen
P09326	CD48 antigen
P32970	CD70 antigen
Q9BY67	Cell adhesion molecule 1

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Uniprot ID	Protein name
Q8N3J6	Cell adhesion molecule 2
Q8N126	Cell adhesion molecule 3
Q96AQ7	Cell death activator CIDE-3
O60543	Cell death activator CIDE-A
Q8TD46	Cell surface glycoprotein CD200 receptor 1
P29762	Cellular retinoic acid-binding protein 1
P05108	Cholesterol side-chain cleavage enzyme, mitochondrial
Q96BP2	Coiled-coil-helix-coiled-coil-helix domain-containing protein 1
O00244	Copper transport protein ATOX1
Q04656	Copper-transporting ATPase 1
P78310	Coxsackievirus and adenovirus receptor
O95476	CTD nuclear envelope phosphatase 1
Q92478	C-type lectin domain family 2 member B
Q9UHP7	C-type lectin domain family 2 member D
P23582	C-type natriuretic peptide [Cleaved into: CNP-22; CNP-29; CNP-53]
P49238	CX3C chemokine receptor 1
Q717R9	Cystin-1
O43174	Cytochrome P450 26A1
Q9NR63	Cytochrome P450 26B1
Q6V0L0	Cytochrome P450 26C1
Q7Z7A3	Cytoplasmic tRNA 2-thiolation protein 1
Q2VPK5	Cytoplasmic tRNA 2-thiolation protein 2
O95727	Cytotoxic and regulatory T-cell molecule
Q9BU89	Deoxyhypusine hydroxylase
P49366	Deoxyhypusine synthase
Q9H5Q4	Dimethyladenosine transferase 2, mitochondrial
P31941	DNA dC->dU-editing enzyme APOBEC-3A
Q9UH17	DNA dC->dU-editing enzyme APOBEC-3B
Q9NRW3	DNA dC->dU-editing enzyme APOBEC-3C
Q6NTF7	DNA dC->dU-editing enzyme APOBEC-3H
Q01826	DNA-binding protein SATB1
O00411	DNA-directed RNA polymerase, mitochondrial
O60313	Dynamin-like 120 kDa protein, mitochondrial
Q92838	Ectodysplasin-A
Q8WWZ3	Ectodysplasin-A receptor-associated adapter protein
Q96RP9	Elongation factor G, mitochondrial
P49411	Elongation factor Tu, mitochondrial
Q6JVE5	Epididymal-specific lipocalin-12
Q8WX39	Epididymal-specific lipocalin-9
P63241	Eukaryotic translation initiation factor 5A-1
Q9GZV4	Eukaryotic translation initiation factor 5A-2
A5D6W6	Fat storage-inducing transmembrane protein 1
Q8N6M3	Fat storage-inducing transmembrane protein 2
P49327	Fatty acid synthase
Q6P4F2	Ferredoxin-2, mitochondrial
P49771	Fms-related tyrosine kinase 3 ligand
P78423	Fractalkine
O00182	Galectin-9
P08034	Gap junction beta-1 protein
P29033	Gap junction beta-2 protein

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Uniprot ID	Protein name
P35754	Glutaredoxin-1
P09919	Granulocyte colony-stimulating factor
Q99062	Granulocyte colony-stimulating factor receptor
Q8TAE8	Growth arrest and DNA damage-inducible proteins-interacting protein 1
P30793	GTP cyclohydrolase 1
P30047	GTP cyclohydrolase 1 feedback regulatory protein
O75616	GTPase Era, mitochondrial
P43080	Guanylyl cyclase-activating protein 1
Q9UMX6	Guanylyl cyclase-activating protein 2
O95843	Guanylyl cyclase-activating protein 3
Q12931	Heat shock protein 75 kDa, mitochondrial
Q8TDQ0	Hepatitis A virus cellular receptor 2
P26927	Hepatocyte growth factor-like protein
P15515	Histatin-1
P15516	Histatin-3
Q8NI35	InaD-like protein
Q14643	Inositol 1,4,5-trisphosphate receptor type 1
Q14571	Inositol 1,4,5-trisphosphate receptor type 2
Q14573	Inositol 1,4,5-trisphosphate receptor type 3
Q8IU57	Interferon lambda receptor 1
Q8IU54	Interferon lambda-1
Q8IZJ0	Interferon lambda-2
Q8IZI9	Interferon lambda-3
Q08334	Interleukin-10 receptor subunit beta
P35225	Interleukin-13
Q14627	Interleukin-13 receptor subunit alpha-2
Q96F46	Interleukin-17 receptor A
Q9NRM6	Interleukin-17 receptor B
Q8NAC3	Interleukin-17 receptor C
Q8NFR9	Interleukin-17 receptor E
Q16552	Interleukin-17A
Q9P0M4	Interleukin-17C
Q96PD4	Interleukin-17F
Q9GZX6	Interleukin-22
Q8N6P7	Interleukin-22 receptor subunit alpha-1
Q969J5	Interleukin-22 receptor subunit alpha-2
Q9H293	Interleukin-25
Q6ZMJ4	Interleukin-34
Q86YT9	Junctional adhesion molecule-like
O60259	Kallikrein-8
P07498	Kappa-casein
Q12918	Killer cell lectin-like receptor subfamily B member 1
Q9NZS2	Killer cell lectin-like receptor subfamily F member 1
Q9NRN7	L-aminoadipate-semialdehyde dehydrogenase-phosphopantetheinyl transferase
O95237	Lecithin retinol acyltransferase
P31025	Lipocalin-1
Q6UWW0	Lipocalin-15
P07333	Macrophage colony-stimulating factor 1 receptor
Q9UEW3	Macrophage receptor MARCO
Q04912	Macrophage-stimulating protein receptor

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Uniprot ID	Protein name
Q8N3R9	MAGUK p55 subfamily member 5
Q96E52	Metalloendopeptidase OMA1, mitochondrial
Q658P3	Metalloreductase STEAP3
Q99707	Methionine synthase
Q9UBK8	Methionine synthase reductase
Q9HCC0	Methylcrotonoyl-CoA carboxylase beta chain, mitochondrial
Q96RQ3	Methylcrotonoyl-CoA carboxylase subunit alpha, mitochondrial
Q9Y4U1	Methylmalonic aciduria and homocystinuria type C protein
Q9H3L0	Methylmalonic aciduria and homocystinuria type D protein, mitochondrial
Q8IVH4	Methylmalonic aciduria type A protein, mitochondrial
P22033	Methylmalonyl-CoA mutase, mitochondrial
Q9NPA3	Mid1-interacting protein 1
P25874	Mitochondrial brown fat uncoupling protein 1
P55851	Mitochondrial uncoupling protein 2
P55916	Mitochondrial uncoupling protein 3
O95847	Mitochondrial uncoupling protein 4
Q09013	Myotonin-protein kinase
P15559	NAD(P)H dehydrogenase [quinone] 1
P22570	NADPH:adrenodoxin oxidoreductase, mitochondrial
Q9UHB4	NADPH-dependent diflavin oxidoreductase 1
Q9BZW8	Natural killer cell receptor 2B4
Q15223	Nectin-1
Q92692	Nectin-2
Q9NQS3	Nectin-3
Q96NY8	Nectin-4
Q7Z494	Nephrocystin-3
P17677	Neuromodulin
Q8N9A8	Nuclear envelope phosphatase-regulatory subunit 1
P11926	Ornithine decarboxylase
P54368	Ornithine decarboxylase antizyme 1
O95190	Ornithine decarboxylase antizyme 2
Q9UMX2	Ornithine decarboxylase antizyme 3
P02818	Osteocalcin
P41217	OX-2 membrane glycoprotein
Q5EBL8	PDZ domain-containing protein 11
Q96EY7	Pentatricopeptide repeat domain-containing protein 3, mitochondrial
Q9UGC7	Peptide chain release factor 1-like, mitochondrial
Q96LB9	Peptidoglycan recognition protein 3
Q96LB8	Peptidoglycan recognition protein 4
Q14197	Peptidyl-tRNA hydrolase ICT1, mitochondrial
P40855	Peroxisomal biogenesis factor 19
P56589	Peroxisomal biogenesis factor 3
O95571	Persulfide dioxygenase ETHE1, mitochondrial
Q96J94	Piwi-like protein 1
Q9HB21	Pleckstrin homology domain-containing family A member 1
Q9HB19	Pleckstrin homology domain-containing family A member 2
Q9H4M7	Pleckstrin homology domain-containing family A member 4
Q9HAU0	Pleckstrin homology domain-containing family A member 5
Q9Y2H5	Pleckstrin homology domain-containing family A member 6
O60486	Plexin-C1

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Uniprot ID	Protein name
Q9Y4D7	Plexin-D1
P15151	Poliovirus receptor
O60741	Potassium/sodium hyperpolarization-activated cyclic nucleotide-gated channel 1
Q9UL51	Potassium/sodium hyperpolarization-activated cyclic nucleotide-gated channel 2
Q9P1Z3	Potassium/sodium hyperpolarization-activated cyclic nucleotide-gated channel 3
Q9Y3Q4	Potassium/sodium hyperpolarization-activated cyclic nucleotide-gated channel 4
Q96N28	PRELI domain containing protein 3A
Q9Y255	PRELI domain-containing protein 1, mitochondrial
P12273	Prolactin-inducible protein
P81277	Prolactin-releasing peptide
P49683	Prolactin-releasing peptide receptor
P05165	Propionyl-CoA carboxylase alpha chain, mitochondrial
P05166	Propionyl-CoA carboxylase beta chain, mitochondrial
Q9BUF7	Protein crumbs homolog 3
Q9Y6F6	Protein MRVI1
Q96SN7	Protein orai-2
A6NIH7	Protein unc-119 homolog B
O75695	Protein XRP2
Q8WW27	Putative C->U-editing enzyme APOBEC-4
P11498	Pyruvate carboxylase, mitochondrial
Q2PPJ7	Ral GTPase-activating protein subunit alpha-2
Q86X10	Ral GTPase-activating protein subunit beta
P11233	Ras-related protein Ral-A
P36888	Receptor-type tyrosine-protein kinase FLT3
Q06141	Regenerating islet-derived protein 3-alpha
Q6UW15	Regenerating islet-derived protein 3-gamma
O43924	Retinal rod rhodopsin-sensitive cGMP 3’,5’-cyclic phosphodiesterase subunit delta
P09455	Retinol-binding protein 1
P50120	Retinol-binding protein 2
Q9BQC6	Ribosomal protein 63, mitochondrial
Q96E11	Ribosome-recycling factor, mitochondrial
Q969S9	Ribosome-releasing factor 2, mitochondrial
Q9NV23	S-acyl fatty acid synthase thioesterase, medium chain
O43865	S-adenosylhomocysteine hydrolase-like protein 1
Q96PL1	Secretoglobin family 3A member 2
O15041	Semaphorin-3E
Q9H3S1	Semaphorin-4A
O75326	Semaphorin-7A
P35270	Sepiapterin reductase
Q9HBY8	Serine/threonine-protein kinase Sgk2
Q96BR1	Serine/threonine-protein kinase Sgk3
Q9H4A3	Serine/threonine-protein kinase WNK1
Q9Y3S1	Serine/threonine-protein kinase WNK2
Q9BYP7	Serine/threonine-protein kinase WNK3
Q96J92	Serine/threonine-protein kinase WNK4
O60880	SH2 domain-containing protein 1A
O14796	SH2 domain-containing protein 1B
P48995	Short transient receptor potential channel 1
Q13507	Short transient receptor potential channel 3
Q9Y210	Short transient receptor potential channel 6

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Uniprot ID	Protein name
Q9HCX4	Short transient receptor potential channel 7
Q96DU3	SLAM family member 6
O95772	STARD3 N-terminal-like protein
Q14849	StAR-related lipid transfer protein 3
Q96DR4	StAR-related lipid transfer protein 4
P59095	StAR-related lipid transfer protein 6
P49675	Steroidogenic acute regulatory protein, mitochondrial
Q13586	Stromal interaction molecule 1
O14521	Succinate dehydrogenase [ubiquinone] cytochrome b small subunit, mitochondrial
P31040	Succinate dehydrogenase [ubiquinone] flavoprotein subunit, mitochondrial
P21912	Succinate dehydrogenase [ubiquinone] iron-sulfur subunit, mitochondrial
Q99643	Succinate dehydrogenase cytochrome b560 subunit, mitochondrial
Q9Y6N5	Sulfide:quinone oxidoreductase, mitochondrial
Q7L0J3	Synaptic vesicle glycoprotein 2A
Q7L1I2	Synaptic vesicle glycoprotein 2B
Q496J9	Synaptic vesicle glycoprotein 2C
Q7RTX1	Taste receptor type 1 member 1
Q8TE23	Taste receptor type 1 member 2
Q7RTX0	Taste receptor type 1 member 3
P40200	T-cell surface protein tactile
Q9NNW7	Thioredoxin reductase 2, mitochondrial
Q99757	Thioredoxin, mitochondrial
P30048	Thioredoxin-dependent peroxide reductase, mitochondrial
Q16762	Thiosulfate sulfurtransferase
Q92748	Thyroid hormone-inducible hepatic protein
O43715	TP53-regulated inhibitor of apoptosis 1
P20062	Transcobalamin-2
Q00059	Transcription factor A, mitochondrial
Q9ULX9	Transcription factor MafF
O15525	Transcription factor MafG
O60675	Transcription factor MafK
Q16621	Transcription factor NF-E2 45 kDa subunit
Q99576	TSC22 domain family protein 3
Q9Y2W6	Tudor and KH domain-containing protein
O60522	Tudor domain-containing protein 6
Q9UNG2	Tumor necrosis factor ligand superfamily member 18
P23510	Tumor necrosis factor ligand superfamily member 4
P32971	Tumor necrosis factor ligand superfamily member 8
P41273	Tumor necrosis factor ligand superfamily member 9
Q9Y5U5	Tumor necrosis factor receptor superfamily member 18
Q9HAV5	Tumor necrosis factor receptor superfamily member 27
P43489	Tumor necrosis factor receptor superfamily member 4
P28908	Tumor necrosis factor receptor superfamily member 8
Q07011	Tumor necrosis factor receptor superfamily member 9
Q9UNE0	Tumor necrosis factor receptor superfamily member EDAR
Q12923	Tyrosine-protein phosphatase non-receptor type 13
Q9BTM9	Ubiquitin-related modifier 1
P07911	Uromodulin
P22891	Vitamin K-dependent protein Z
P25311	Zinc-alpha-2-glycoprotein