

Additional file 9. Four novel malacostracan gene families.

Additional file 9A. Chitin binding Peritrophin-A domain pfam01607

Arthropoda

Class (subphylum)	Species	Tissue type	Total gene counts	References
Insecta	Drosophila melanogaster	whole organism	0	proteome
Insecta	Anopheles gambiae	whole organism	0	proteome
Insecta	Aedes aegypti	whole organism	0	proteome
Chilopoda (Myriapoda)	Strigamia maritima	whole organism	0	proteome
Arachnida (Chelicerata)	Mesobuthus martensii	whole organism	0	proteome
Arachnida (Chelicerata)	Ixodes scapularis	whole organism	0	proteome
Branchiopoda (Crustacea)	Daphnia pulex	whole organism	0	proteome

Malacostraca

Order	Species/Datasets	Tissue type	Total gene counts	Total number of non-redundant genes per species
Amphipoda	Echinogammarus veneris	NA	0	0
Amphipoda	Gammarus chevreuxi	NA	0	0
Amphipoda	Gammarus pulex	NA	0	0
Amphipoda	Hyalella azteca_1	NA	0	
Amphipoda	Hyalella azteca_2	NA	0	
Amphipoda	Hyalella azteca_3	whole organism	1	1
Amphipoda	Melita plumulosa	whole organism	0	0
Amphipoda	Parhyale hawaiiensis	whole organism	2	2
Amphipoda	Talitrus saltator	brain	0	0
		hepatopancreas, ovaries, green		
Decapoda	Astacus astacus	glands, abdominal musculature	0	0
Decapoda	Astacus leptodactylus_1	hypodermis; Y organ	1	
Decapoda	Astacus leptodactylus_2	hepatopancreas	0	
		hypodermis, Y organ,		
		hepatopancreas, gills, hemocytes,		
Decapoda	Astacus leptodactylus_3	muscle	1	1
Decapoda	Callinectes sapidus	gill 7	0	0
Decapoda	Cancer borealis	nervous system	0	0
Decapoda	Carcinus maenas	NA	1	1
Decapoda	Cherax quadricarinatus_1	hypodermis and gastrolith disc	2	
Decapoda	Cherax quadricarinatus_2	heart, kidney, liver, nerve, testis	0	
Decapoda	Cherax quadricarinatus_3	heart, kidney, liver, nerve, testis	0	2
Decapoda	Eriocheir sinensis_1	NA	1	
		eyestalk, Y-organ, and		
Decapoda	Eriocheir sinensis_2	hepatopancreas	0	
Decapoda	Eriocheir sinensis_3	hepatopancreas	0	1
Decapoda	Farfantepenaeus aztecus	hepatopancreas	1	1
Decapoda	Homarus americanus	nervous system	0	0
Decapoda	Hyas araneus_1	adult	0	
Decapoda	Hyas araneus_2	gill	0	0
Decapoda	Litopenaeus vannamei_1	Ghaffari et al., 2014	10	
Decapoda	Litopenaeus vannamei_2	hepatopancreas	1	
Decapoda	Litopenaeus vannamei_3	hepatopancreas	1	
Decapoda	Litopenaeus vannamei_4	hemocytes	1	10
Decapoda	Macrobrachium nipponense	NA	2	2
		Brain, HPT, Hemocyte,		
Decapoda	Pacifastacus leniusculus	Hepatopancreas	0	0
Decapoda	Palaemon argentinus	whole organism	0	0
Decapoda	Penaeus monodon_1	hepatopancreas	0	
Decapoda	Penaeus monodon_2	hepatopancreas	0	0
Decapoda	Procambarus clarkii_1	Eyestalk	0	
		Eyestalk, brain, hemocytes, gills,		
		testis, ovary, hepatopancreas, heart,		
		green gland, ventralganglia, Y-organ,		
Decapoda	Procambarus clarkii_2	hypodermis, muscle	0	0
Decapoda	Scylla olivacea	Na	2	2
Decapoda	Scylla paramamosain	gill	0	0
Euphausiacea	Euphausia superba	NA	2	2
Euphausiacea	Meganyctiphanes norvegica	adult	1	1
Isopoda	Asellus aquaticus	NA	0	0
Isopoda	Bragasellus molinai	whole organism	0	0
Isopoda	Bragasellus peltatus	whole organism	2	2
Isopoda	Proasellus aragonensis	whole organism	3	3
Isopoda	Proasellus arthroditus	whole organism	2	2
Isopoda	Proasellus assaforensis	whole organism	1	1
Isopoda	Proasellus beticus	whole organism	2	2
Isopoda	Proasellus cantabricus	whole organism	2	2
Isopoda	Proasellus cavaticus	whole organism	3	3
Isopoda	Proasellus coiffaiti	whole organism	3	3

Isopoda	Proasellus coxalis	whole organism	3	3
Isopoda	Proasellus ebreensis	whole organism	0	0
Isopoda	Proasellus escolai	whole organism	1	1
Isopoda	Proasellus grafi	whole organism	3	3
Isopoda	Proasellus granadensis	whole organism	1	1
Isopoda	Proasellus hercegovinensis	whole organism	3	3
Isopoda	Proasellus ibericus	whole organism	1	1
Isopoda	Proasellus jaloniacus	whole organism	2	2
Isopoda	Proasellus karamani	whole organism	3	3
Isopoda	Proasellus margalefi	whole organism	1	1
Isopoda	Proasellus meridianus	whole organism	3	3
Isopoda	Proasellus ortizi	whole organism	2	2
Isopoda	Proasellus parvulus	whole organism	1	1
Isopoda	Proasellus racovitzai	whole organism	3	3
Isopoda	Proasellus rectus	whole organism	1	1
Isopoda	Proasellus solanasi	whole organism	3	3
Isopoda	Proasellus spelaeus	whole organism	3	3
Mysida	Neomysis awatschensis	whole organism	2	2
Total gene counts				80

Additional file 9B. Death domain pfam00531.

Arthropoda

Class (subphylum)	Species	Tissue type	Total gene counts	References
Insecta	Drosophila melanogaster	whole organism	0	proteome
Insecta	Anopheles gambiae	whole organism	0	proteome
Insecta	Aedes aegypti	whole organism	0	proteome
Chilopoda (Myriapoda)	Strigamia maritima	whole organism	0	proteome
Arachnida (Chelicerata)	Mesobuthus martensii	whole organism	0	proteome
Arachnida (Chelicerata)	Ixodes scapularis	whole organism	0	proteome
Branchiopoda (Crustacea)	Daphnia pulex	whole organism	0	proteome

Malacostraca

Order	Species/Datasets	Tissue type	Total gene counts	Total number of non-redundant genes per species
Amphipoda	Echinogammarus veneris	NA	0	0
Amphipoda	Gammarus chevreuxi	NA	0	0
Amphipoda	Gammarus pulex	NA	0	0
Amphipoda	Hyalella azteca_1	NA	0	
Amphipoda	Hyalella azteca_2	NA	0	
Amphipoda	Hyalella azteca_3	whole organism	1	1
Amphipoda	Melita plumulosa	whole organism	0	0
Amphipoda	Parhyale hawaiiensis	whole organism	1	1
Amphipoda	Talitrus saltator	brain	1	1
		hepatopancreas, ovaries, green		
Decapoda	Astacus astacus	glands, abdominal musculature	0	0
Decapoda	Astacus leptodactylus_1	hypodermis; Y organ	1	
Decapoda	Astacus leptodactylus_2	hepatopancreas	1	
		hypodermis, Y organ,		
		hepatopancreas, gills,		
Decapoda	Astacus leptodactylus_3	hematocytes, muscle	1	1
Decapoda	Callinectes sapidus	gill 7	0	0
Decapoda	Cancer borealis	nervous system	0	0
Decapoda	Carcinus maenas	NA	1	1
Decapoda	Cherax quadricarinatus_1	hypodermis and gastrolith disc	0	
Decapoda	Cherax quadricarinatus_2	heart, kidney, liver, nerve, testis	1	
Decapoda	Cherax quadricarinatus_3	heart, kidney, liver, nerve, testis	1	1
Decapoda	Eriocheir sinensis_1	NA	0	
		eyestalk, Y-organ, and		
Decapoda	Eriocheir sinensis_2	hepatopancreas	0	
Decapoda	Eriocheir sinensis_3	hepatopancreas	0	0
Decapoda	Farfantepenaeus aztecus	hepatopancreas	0	0
Decapoda	Homarus americanus	nervous system	1	1
Decapoda	Hyas araneus_1	adult	0	
Decapoda	Hyas araneus_2	gill	0	0
Decapoda	Litopenaeus vannamei_1	Ghaffari et al., 2014	0	
Decapoda	Litopenaeus vannamei_2	hepatopancreas	0	
Decapoda	Litopenaeus vannamei_3	hepatopancreas	0	
Decapoda	Litopenaeus vannamei_4	hemocytes	1	1
Decapoda	Macrobrachium nipponense	NA	1	1
		Brain, HPT, Hemocyte,		
Decapoda	Pacifastacus leniusculus	Hepatopancreas	0	0
Decapoda	Palaemon argentinus	whole organism	0	0
Decapoda	Penaeus monodon_1	hepatopancreas	0	
Decapoda	Penaeus monodon_2	hepatopancreas	0	0
Decapoda	Procambarus clarkii_1	Eyestalk	1	
		Eyestalk, brain, hemocytes, gills,		
		testis, ovary, hepatopancreas,		
		heart, green gland, ventralganglia,		
Decapoda	Procambarus clarkii_2	Y-organ, hypodermis, muscle	1	1
Decapoda	Scylla olivacea	Na	1	1
Decapoda	Scylla paramamosain	gill	0	0
Euphausiacea	Euphausia superba	NA	0	0
Euphausiacea	Meganyctiphanes norvegica	adult	1	1
Isopoda	Asellus aquaticus	NA	0	0
Isopoda	Bragasellus molinae	whole organism	0	0
Isopoda	Bragasellus peltatus	whole organism	1	1
Isopoda	Proasellus aragonensis	whole organism	1	1
Isopoda	Proasellus arthrodilus	whole organism	1	1
Isopoda	Proasellus assaforensis	whole organism	1	1
Isopoda	Proasellus beticus	whole organism	1	1
Isopoda	Proasellus cantabricus	whole organism	1	1
Isopoda	Proasellus cavaticus	whole organism	1	1
Isopoda	Proasellus coiffaiti	whole organism	1	1
Isopoda	Proasellus coxalis	whole organism	1	1

Isopoda	Proasellus ebreus	whole organism	1	1
Isopoda	Proasellus escolai	whole organism	1	1
Isopoda	Proasellus grafi	whole organism	1	1
Isopoda	Proasellus granadensis	whole organism	1	1
Isopoda	Proasellus hercegovinensis	whole organism	1	1
Isopoda	Proasellus ibericus	whole organism	1	1
Isopoda	Proasellus jaloniacus	whole organism	1	1
Isopoda	Proasellus karamani	whole organism	0	0
Isopoda	Proasellus margalefi	whole organism	1	1
Isopoda	Proasellus meridianus	whole organism	1	1
Isopoda	Proasellus ortizi	whole organism	1	1
Isopoda	Proasellus parvulus	whole organism	1	1
Isopoda	Proasellus racovitza	whole organism	1	1
Isopoda	Proasellus rectus	whole organism	1	1
Isopoda	Proasellus solanasi	whole organism	1	1
Isopoda	Proasellus spelaeus	whole organism	1	1
Mysida	Neomysis awatschensis	whole organism	1	1
Total gene counts				37

Additional file 9C. Von Willebrand factor type A domain pfam05762

Arthropoda

Class (subphylum)	Species	Tissue type	Total gene counts	References
Insecta	Drosophila melanogaster	whole organism	0	proteome
Insecta	Anopheles gambiae	whole organism	0	proteome
Insecta	Aedes aegypti	whole organism	0	proteome
Chilopoda (Myriapoda)	Strigamia maritima	whole organism	0	proteome
Arachnida (Chelicerata)	Mesobuthus martensii	whole organism	0	proteome
Arachnida (Chelicerata)	Ixodes scapularis	whole organism	0	proteome
Branchiopoda (Crustacea)	Daphnia pulex	whole organism	0	proteome

Malacostraca

Order	Species/Datasets	Tissue type	Total gene counts	Total number of non-redundant genes per species
Amphipoda	Echinogammarus veneris	NA	0	0
Amphipoda	Gammarus chevreuxi	NA	2	2
Amphipoda	Gammarus pulex	NA	0	0
Amphipoda	Hyalella azteca_1	NA	1	
Amphipoda	Hyalella azteca_2	NA	4	
Amphipoda	Hyalella azteca_3	whole organism	2	4
Amphipoda	Melita plumulosa	whole organism	2	2
Amphipoda	Parhyale hawaiiensis	whole organism	6	6
Amphipoda	Talitrus saltator	brain	1	1
		hepatopancreas, ovaries, green		
Decapoda	Astacus astacus	glands, abdominal musculature	2	2
Decapoda	Astacus leptodactylus_1	hypodermis; Y organ	5	
Decapoda	Astacus leptodactylus_2	hepatopancreas	4	
		hypodermis, Y organ,		
		hepatopancreas, gills, hemocytes,		
Decapoda	Astacus leptodactylus_3	muscle	5	6
Decapoda	Callinectes sapidus	gill 7	0	0
Decapoda	Cancer borealis	nervous system	1	1
Decapoda	Carcinus maenas	NA	2	2
Decapoda	Cherax quadricarinatus_1	hypodermis and gastrolith disc	0	
Decapoda	Cherax quadricarinatus_2	heart, kidney, liver, nerve, testis	3	
Decapoda	Cherax quadricarinatus_3	heart, kidney, liver, nerve, testis	4	5
Decapoda	Eriocheir sinensis_1	NA	0	
		eyestalk, Y-organ, and		
Decapoda	Eriocheir sinensis_2	hepatopancreas	1	
Decapoda	Eriocheir sinensis_3	hepatopancreas	1	1
Decapoda	Farfantepenaeus aztecus	hepatopancreas	2	2
Decapoda	Homarus americanus	nervous system	3	3
Decapoda	Hyas araneus_1	adult	1	
Decapoda	Hyas araneus_2	gill	1	1
Decapoda	Litopenaeus vannamei_1	Ghaffari et al., 2014	2	
Decapoda	Litopenaeus vannamei_2	hepatopancreas	2	
Decapoda	Litopenaeus vannamei_3	hepatopancreas	2	
Decapoda	Litopenaeus vannamei_4	hemocytes	2	3
Decapoda	Macrobrachium nipponense	NA	5	5
		Brain, HPT, Hemocyte,		
Decapoda	Pacifastacus leniusculus	Hepatopancreas	5	5
Decapoda	Palaemon argentinus	whole organism	0	0
Decapoda	Penaeus monodon_1	hepatopancreas	2	
Decapoda	Penaeus monodon_2	hepatopancreas	2	2
Decapoda	Procambarus clarkii_1	Eyestalk	6	
		Eyestalk, brain, hemocytes, gills,		
		testis, ovary, hepatopancreas,		
		heart, green gland, ventralganglia, Y-		
Decapoda	Procambarus clarkii_2	organ, hypodermis, muscle	4	5
Decapoda	Scylla olivacea	Na	1	1
Decapoda	Scylla paramamosain	gill	1	1
Euphausiacea	Euphausia superba	NA	1	1
Euphausiacea	Meganctiphanes norvegica	adult	4	4
Isopoda	Asellus aquaticus	NA	0	0
Isopoda	Bragasellus molinai	whole organism	1	1
Isopoda	Bragasellus peltatus	whole organism	1	1
Isopoda	Proasellus aragonensis	whole organism	1	1
Isopoda	Proasellus arthrodilus	whole organism	1	1
Isopoda	Proasellus assaforensis	whole organism	1	1
Isopoda	Proasellus beticus	whole organism	0	0
Isopoda	Proasellus cantabricus	whole organism	1	1
Isopoda	Proasellus cavaticus	whole organism	1	1
Isopoda	Proasellus coiffaiti	whole organism	1	1
Isopoda	Proasellus coxalis	whole organism	1	1
Isopoda	Proasellus ebreensis	whole organism	1	1

Isopoda	Proasellus escolai	whole organism	0	0
Isopoda	Proasellus grafi	whole organism	1	1
Isopoda	Proasellus granadensis	whole organism	0	0
Isopoda	Proasellus hercegovinensis	whole organism	1	1
Isopoda	Proasellus ibericus	whole organism	0	0
Isopoda	Proasellus jaloniacus	whole organism	1	1
Isopoda	Proasellus karamani	whole organism	1	1
Isopoda	Proasellus margalefi	whole organism	0	0
Isopoda	Proasellus meridianus	whole organism	1	1
Isopoda	Proasellus ortizi	whole organism	1	1
Isopoda	Proasellus parvulus	whole organism	1	1
Isopoda	Proasellus racovitzai	whole organism	1	1
Isopoda	Proasellus rectus	whole organism	1	1
Isopoda	Proasellus solanasi	whole organism	1	1
Isopoda	Proasellus spelaeus	whole organism	1	1
Mysida	Neomysis awatschensis	whole organism	1	1
Total gene counts				

Additional file 9D. ML domain pfam02221

Arthropoda

Class (subphylum)	Species	Tissue type	Total gene counts	References
Insecta	Drosophila melanogaster	whole organism	0	proteome
Insecta	Anopheles gambiae	whole organism	0	proteome
Insecta	Aedes aegypti	whole organism	0	proteome
Chilopoda (Myriapoda)	Strigamia maritima	whole organism	0	proteome
Arachnida (Chelicerata)	Mesobuthus martensii	whole organism	0	proteome
Arachnida (Chelicerata)	Ixodes scapularis	whole organism	0	proteome
Branchiopoda (Crustacea)	Daphnia pulex	whole organism	0	proteome

Malacostraca

Order	Species/Datasets	Tissue type	Total gene counts	Total number of non-redundant genes per species
Amphipoda	Echinogammarus veneris	NA	0	0
Amphipoda	Gammarus chevreuxi	NA	1	1
Amphipoda	Gammarus pulex	NA	0	0
Amphipoda	Hyalella azteca_1	NA	1	
Amphipoda	Hyalella azteca_2	NA	1	
Amphipoda	Hyalella azteca_3	whole organism	1	1
Amphipoda	Melita plumulosa	whole organism	0	0
Amphipoda	Parhyale hawaiiensis	whole organism	1	1
Amphipoda	Talitrus saltator	brain	1	1
		hepatopancreas, ovaries, green glands,		
Decapoda	Astacus astacus	abdominal musculature	0	0
Decapoda	Astacus leptodactylus_1	hypodermis; Y organ	1	
Decapoda	Astacus leptodactylus_2	hepatopancreas	0	
		hypodermis, Y organ, hepatopancreas,		
Decapoda	Astacus leptodactylus_3	gills, hemocytes, muscle	1	1
Decapoda	Callinectes sapidus	gill 7	0	0
Decapoda	Cancer borealis	nervous system	0	0
Decapoda	Carcinus maenas	NA	1	1
Decapoda	Cherax quadricarinatus_1	hypodermis and gastrolith disc	0	
Decapoda	Cherax quadricarinatus_2	heart, kidney, liver, nerve, testis	1	
Decapoda	Cherax quadricarinatus_3	heart, kidney, liver, nerve, testis	1	1
Decapoda	Eriocheir sinensis_1	NA	1	
Decapoda	Eriocheir sinensis_2	eyestalk, Y-organ, and hepatopancreas	0	
Decapoda	Eriocheir sinensis_3	hepatopancreas	0	1
Decapoda	Farfantepenaeus aztecus	hepatopancreas	0	0
Decapoda	Homarus americanus	nervous system	1	1
Decapoda	Hyas araneus_1	adult	0	
Decapoda	Hyas araneus_2	gill	0	0
Decapoda	Litopenaeus vannamei_1	Ghaffari et al., 2014	1	
Decapoda	Litopenaeus vannamei_2	hepatopancreas	0	
Decapoda	Litopenaeus vannamei_3	hepatopancreas	0	
Decapoda	Litopenaeus vannamei_4	hemocytes	0	1
Decapoda	Macrobrachium nipponense	NA	0	0
Decapoda	Pacifastacus leniusculus	Brain, HPT, Hemocyte, Hepatopancreas	0	0
Decapoda	Palaemon argentinus	whole organism	0	0
Decapoda	Penaeus monodon_1	hepatopancreas	0	
Decapoda	Penaeus monodon_2	hepatopancreas	0	0
Decapoda	Procambarus clarkii_1	Eyestalk	0	
		Eyestalk, brain, hemocytes, gills, testis,		
		ovary, hepatopancreas, heart, green		
		gland, ventralganglia, Y-organ,		
Decapoda	Procambarus clarkii_2	hypodermis, muscle	1	1
Decapoda	Scylla olivacea	Na	0	0
Decapoda	Scylla paramamosain	gill	0	0
Euphausiacea	Euphausia superba	NA	2	2
Euphausiacea	Meganyctiphanes norvegica	adult	0	0
Isopoda	Asellus aquaticus	NA	0	0
Isopoda	Bragasellus molinai	whole organism	1	1
Isopoda	Bragasellus peltatus	whole organism	1	1
Isopoda	Proasellus aragonensis	whole organism	1	1
Isopoda	Proasellus arthrotilus	whole organism	2	2
Isopoda	Proasellus assaforensis	whole organism	1	1
Isopoda	Proasellus beticus	whole organism	0	0
Isopoda	Proasellus cantabricus	whole organism	0	0
Isopoda	Proasellus cavaticus	whole organism	0	0
Isopoda	Proasellus coiffaiti	whole organism	1	1
Isopoda	Proasellus coxalis	whole organism	1	1
Isopoda	Proasellus ebrensis	whole organism	1	1
Isopoda	Proasellus escolai	whole organism	1	1
Isopoda	Proasellus grafi	whole organism	1	1

Isopoda	Proasellus granadensis	whole organism	1	1
Isopoda	Proasellus hercegovinensis	whole organism	1	1
Isopoda	Proasellus ibericus	whole organism	1	1
Isopoda	Proasellus jaloniacus	whole organism	1	1
Isopoda	Proasellus karamani	whole organism	1	1
Isopoda	Proasellus margalefi	whole organism	1	1
Isopoda	Proasellus meridianus	whole organism	1	1
Isopoda	Proasellus ortizi	whole organism	1	1
Isopoda	Proasellus parvulus	whole organism	1	1
Isopoda	Proasellus racovitzai	whole organism	1	1
Isopoda	Proasellus rectus	whole organism	2	2
Isopoda	Proasellus solanasi	whole organism	1	1
Isopoda	Proasellus spelaeus	whole organism	1	1
Mysida	Neomysis awatschensis	whole organism	1	1

Total gene counts