

VWamide_Lymnaea stagnalis
 Helio119288765-198_Helobdella_robusta
 fgenes1_pg_C_scaffold_37000004_Capitella_teleta
 NP_001191611_Aplysia_californica
 AFS33094_Platynereis_dumerilli
 e_gw1.144.57.1_Capitella_teleta
 B4N5C5_DROWI_Drosophila_willistoni
 NP_001137202_Tribolium_castaneum
 EHJ68077_Danaus_plexippus
 XP_001949765_Acyrthosiphon_pisum
 XP_001626456_Nematostella_vectensis
 LWamide_HYDEC_Hydractinia_echinata

10 20 30 40 50 60 70 80 90

A I T D S T E L S Q N T F G N V H S D L A K E P G A Y I H T F R D F D D A T O E T D T S L R G T O N W S E L S K W V K G D
 S I N - D L I - R R R R N V A E V A S L K S L D G G - D D - D D Y S S S V R D D V W G K R
 K W G - G S N - T M - R T W G R A D D N E E D E L A K R K W G S N M R V W G K - R A - D - D N K R W G S N S M R V W G K R A D D M - D E S K R G W K N N N
 R W K - Q M A S W G K R L D D S D R D K K W K M S V W G K R E D N G E P L D K K W K M S W G K - R D - T - L D P R K R W K M A V W G R O G L D R N D K R W K M A T W -
 G W G - K R G A L D P E L E S E A D K R R G - W G K R S - S L E E M E K R R G W G K - R T S V E E E K R R G W
 K R S - D S E M D K R R G - W G K R S - F D E D S E E V A K R R G W G K - R S - E A I N L D E V E E S I A E M D K R R G W
 A W G - S L D - S S - W G K R S - N A G D V V G G F A - G G - D D I Y M T G H F V P - L I V T D G S -
 D W N K D L H I - - W G K R G - W N N L H E W G R - - K R S V P A W -
 G W G - D L N - T A - W G K R A - W R O L S O T P W G K - R G W O D L N S A W G K R G W - Q D M S S A W -
 G W O - N L K - T T - W G K R A - Q D W N L H S W G K - R O - G W - Q K L H G S W -
 L W G - K R Q A G A P G L - W G K R E - A G A P G L W G R - E A - N A P L W G K R R - A G A P G L W -
 L W G - R D A - K P P G L - W G R D A - K P P L W G R - D A - K P P L W G R D A K P P G L W G D - A K P P L W -

110 120 130 140 150 160 170 180 190 200

S Y P E S D N Q S S E N N S Q N K R W N A F S - S W G K R S A - E D E N S S G L D E - O K R W - K Q M A V - W G K R
 H e l i o 1 1 9 2 8 8 7 6 5 - 1 9 8 _ H e l o b d e l l a _ r o b u s t a
 f g e n e s 1 _ p g _ C _ s c a f f o l d _ 3 7 0 0 0 0 0 4 _ C a p i t e l l a _ t e l e t a
 M R V W G K R - A D D E I D E D K R K W S N S - M - N V W G K R S G - D E F S D V N - K R O W G T - R S M A V - W G K R
 N P _ 0 0 1 1 9 1 6 1 1 _ A p l y s i a _ c a l i f o r n i c a
 G K R - N S S E N Y D K R W K M S - V - W G K R D G - D G D L D K R W K M S V W G K R D G D D L - D K R W - K M S V - W G K R
 A F S 3 3 0 9 4 _ P l a t y n e r e i s _ d u m e r i l l i
 G K R - D F E E E E - E M D K R R G W K R S L - E E A E E K - R R W G K - R L T I D A L E D G I D K R G W G K R
 e _ g w 1 . 1 4 4 . 5 7 . 1 _ C a p i t e l l a _ t e l e t a
 - N T I D W K T F E R M - A N O Q O O G D O V A E O P O S D E E P D E I G D V E A A S N L L D - K R A W - K M N N V A - W G K R
 B 4 N 5 C 5 _ D R O W I _ D r o s o p h i l a _ w i l l i s t o n i
 E E Q - Q E K P A W S Q L O - S G W G K R F A - P E D E V A I R O L A A M L D S O Y D D Y N P E I E T N D D E K R N V - G O F H G G - W G K R
 N P _ 0 0 1 1 3 7 2 0 2 _ T r i b o l i u m _ c a s t a n e u m
 G K R - A P E K W S N F H - S S W G K R S G - P E P D Y E D Y E V V Y E H L M P S O L D G D M I E S P E - K K A W - S S L H S A - W G K R
 E H J 6 8 0 7 7 _ D a n a u s _ p l e x i p p u s
 G K R - G W K D M O - S - G W G K R F K - D P A S S Q L S Q F D E V L D K Y E E E N P N E A - K R S W - D N F Q G S - W G K R
 X P _ 0 0 1 9 4 9 7 6 5 _ A c y r t h o s i p h o n _ p i s u m
 G K R - E A N A P L W G K R Q - A G P P L W G K R E A - N A P G L W G K R Q A G P - P G L W G K R E - A N A P G L - W G K R
 X P _ 0 0 1 6 2 6 4 5 6 _ N e m a t o s t e l l a _ v e c t e n s i s
 G R D - A K P P G L W G R D A - K P P L W G R D A K - P P G L W G R D A K P - P G L W G R - D - A N A P G L - W G R
 L W A _ H Y D E C _ H y d r a c t i n i a _ e c h i n a t a

Trimmed multiple sequence alignment of cnidarian, lophotrochozoan and arthropod LWamide, GWamide and MIP proneuropeptides.

XP_001636257.1_Nematostella_vectensis
 NP_001103719_Strongylocentrotus_purpuratus
 bursicon_B2_Tetranynchus_urticae
 Bursicon-beta_Nasonia_vitripennis
 Bur-beta_Tribolium_castaneum
 Bursicon-beta_Daphnia_pulex
 bursicon_A_Tetranynchus_urticae
 XP_002407512_Ixodes_scapularis
 Bursicon-alpha_Daphnia_pulex
 AD193040_Procambius_clearki
 P_650983_Drosophila_melanogaster
 AB020870_bursicon_alpha_Musca_domestica
 Bursicon-alpha_Nasonia_vitripennis
 Bur-alpha_Tribolium_castaneum

10 20 30 40 50 60 70 80 90

O C K L S G Y T M E V I V H S - C O P R K I S V N T - V G I G V S S A L P A A G - L R I E P A T C C O O E I E S H E V E V G L W C Q A S P N S A W - T O E Y H V
 A D L R K L G - L O Y K L A R P - G C R P V I L D S V G - R R K S Y T R L M P N N L E V R S - D R E E K G V V R K S - P F R D V T
 E N C A I L P G S I H V I K E E L D V A G N V I R S G E G D F L V N K - E G I T V S L O P S V V H S S G F L K K N C O R E S R M K T R S I R L N H O F D P D G K K M T G E K - G S M E I E
 E N D E K L D S E I R I I K E Y S E T G K L F R T C S D E I Q V S K E E G Y D S V O P S I V T T G F T K E S C O R E E F L E R T Y L N N O Y D S N G K Q F S L L D N S N M A I K
 I T C E T L M S D I N L I K E E F D E L G R L Q R C N G E V A V N K E S C K S O V P S V I P T G F L K E Y C O R S F L R E R T I T L H O Y D P D G R L T A E I V N S M D V K
 G T C E T L P S T I H I I K E E Y T D G G I L S R T E G D I G V A K E E - Q V O V I V V H S S G F L K E O M C R S F L R R V V T L T H O Y D A N G N R L T G K S - S S L D V K
 K G C H L R P - V I H V L S H P - G C L S K P I P S F A - H G C S S S Y V O V S G S K F W O V E R S O M C O E M G E R E A T V G I F C P K K T P - K F R K I A
 E S C O L R P - V I H V L K O P - G C O P K P I P S F A - Q O G S S S Y V O V S G S R Y W O V E R S O M C O E M G E R E A T K A V F C P K P G - G P - F R K R I I
 D E C O L T P - V I H V L O Y P - G C I P K P I P S F A - T K C R K S Y V O V S G S K L W O T E R S O M C O E S G E R E A T V S L L C P K A A P G E P - K L R R V V
 D E S L T P - V I H I L S Y Q - G O T S K P I P S F A - V Y O V S G S K L W O T E R S O M C O E S G E R E A S V I L N C P A R K G E P - K O K K I L
 D D C Q V T P - V I H V L O Y P - G C V P K P I P S F A - V G R O A S Y I O V S G S K I W O M E R S O M C O E S G E R E A A V S L F C P K V K P G E R - K F K V L
 D D C Q V T P - V I H V L O Y P - G C V P K P I P S F A - V G R O A S Y I O V S G S K I W O M E R S O M C O E S G E R E A A V S L F C P K V K H G E R - K F K V L
 D E C E V T P - V I H V L O Y T - G C V P K P I P S F A - K R C S S Y I O V S G S K I W O M E R S O M C O E S G E R E A S V S L F C P K T K A G D R - F R K V I
 D E C Q V T P - V I H V L O Y P - G C V P K P I P S F A - I R C A S Y I O V S G S K I W O M E R S O M C O E S G E R E A S V S L F C P K A K P G E R - K F I K V T

100 110 120 130 140

I K T A T K A S A P P - L E D L R L G -
 Y R I R R S R P R S V A S V S R V O T -
 M E E P E S D H L K S P -
 I R E P T N D K I K G F L -
 L R E P A E K Q Y K G D F S R -
 M R E A P D M R P R G S G A E -
 T K A P V D M O R P S T G I D D L T I K P Q E L I N L T E E L R K T D O D G S S -
 T R A P V E D M O R P S T A P D E A S I L P O E F V G L -
 T R A P V D M O R P S T A L E E S A V M P O E I A R F L D D G S P F K L -
 D E A P L D M O R P S T O V E E G T V L A G E I A N F I A R F M G W N P F L K -
 T K A P L E D M O R P S T S I E E S G I I P O E I A G Y S D E G P L N N H F R R I A L Q -
 T K A P L E D M O R P S T S I E E S G I V P O E I A G Y S D E G P P N N H F R I A L Q -
 T K A P L D M O R P S T S I E E R I V I P O E I A G L S N N G P L S N S A H F R N T F K L T -
 T K A L E D M O R P S T G V E E S A V I P O E I A G Y A D E G P L S N H F L K S H S O -

Trimmed multiple sequence alignment of Nematostella vectensis and Strongylocentrotus purpuratus glycoprotein hormones with arthropod bursicons.

Pyrokinin(GLEAN_04636)_Tribolium_castaneum F W F G P R L R G R K K
 BAE94185_Orgyia_thyellina L W F G P R L G K R S
 XP_307885_Anopheles_gambiae_str._PEST M W F G P R L G K R T
 EG164203_Acromyrmex_echinator S Q F T P R L G R G S
 XP_003439981_Oreochromis_niloticus F L Y R P R N G R R S
 BAL42621_Cyprinus_carpio F L Y R P R N G R R S
 CAD29883_Litoria_caerulea F L F R P R N G R R S
 XP_854097_Canis_lupus_familiaris F L F R P R N G R R S
 XP_003354764_Sus_scrofa F L F R P R N G R N L
 XP_001085777_Macaca_mulatta F L F R P R N G R R S
 AAV74390_Bombina_maxima F L F R P R N G R K V



Shared motif in deuterostome neuromedin-U and protostome PBAN/pyrokinin families.

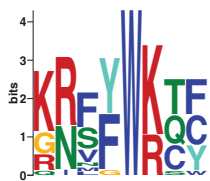
10

XP_002000913_Drosophila_mojavensis	F	D	D	Y	G	H	M	R	F	G	K	R	G	N	D
XP_001846221_Culex_quinquefasciatus	F	D	D	Y	G	H	M	R	F	G	K	R	G	G	E
XP_001378995_Monodelphis_domestica	R	D	Y	M	G	W	M	D	F	G	R	R	S	A	E
EDL09153_Mus_musculus	R	D	Y	M	G	W	M	D	F	G	R	R	S	A	E
XP_002424661_Pediculus_humanus_corporis	F	D	D	Y	G	H	M	R	F	G	K	R	G	E	D
NP_001132994_Salmo_salar	R	D	Y	N	G	W	M	D	F	G	R	R	S	A	E
CAB96790_Squalus_acanthias	R	D	Y	T	G	W	M	D	F	G	R	R	S	I	E
EFN67877_Camponotus_floridanus	L	D	D	Y	G	H	M	R	F	G	K	R	S	N	N
ACS45388_Rhodnius_prolixus	F	N	E	Y	G	H	M	R	F	G	K	R	G	G	S
Sulfakinin_Dappu1:242979	P	D	D	Y	G	H	M	R	Y	G	K	R	D	F	D
NP_990731_Gallus_gallus	H	F	Y	P	D	W	M	D	F	G	R	R	S	T	E
XP_003199491_Danio_rerio	S	D	Y	Q	G	W	V	D	F	G	R	R	S	S	N

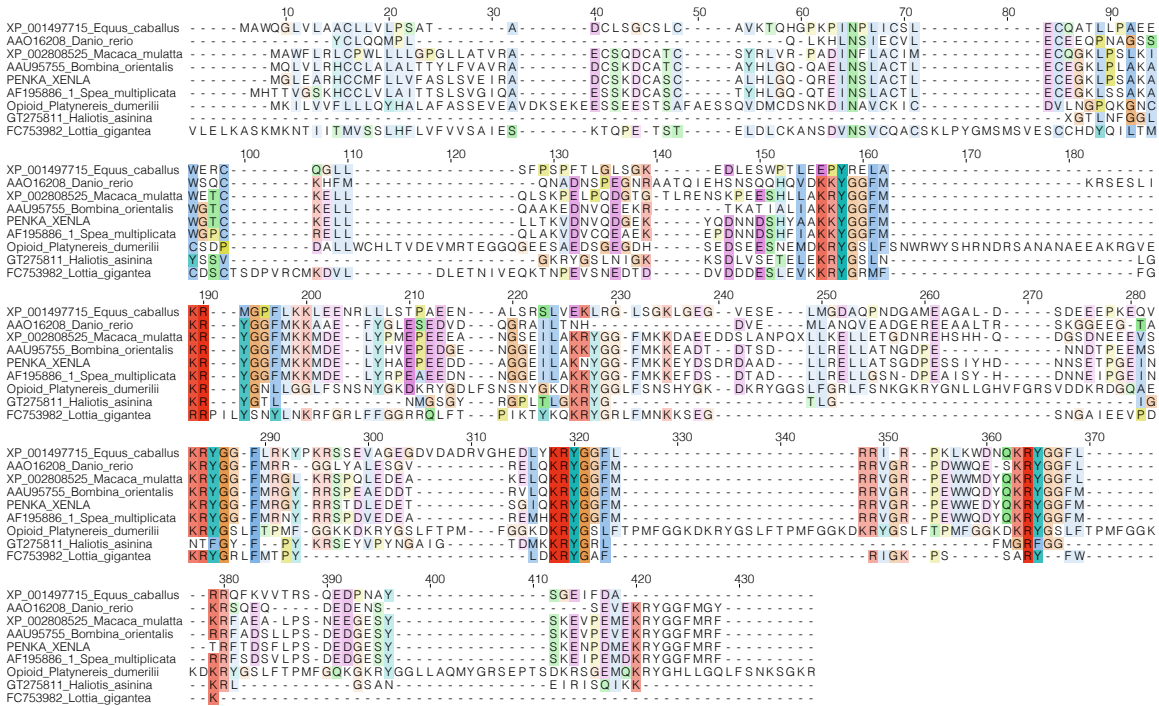


Shared motif in deuterostome cholecystokinin and protostome sulfakinin families.

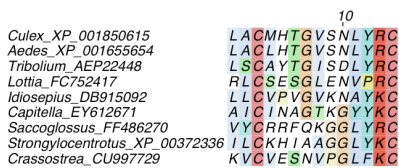
AAU93565_Epinephelus_coioides	K	N	F	F	W	K	T	F	T	S	C
XP_002430075_Pediculus_humanus_corporis	K	R	S	Y	W	K	Q	C	A	F	N
XP_003274336_Nomascus_leucogenys	R	N	F	F	W	K	T	F	S	S	C
XP_001810067_Tribolium_castaneum	G	R	V	Y	W	R	C	Y	F	N	A
XP_002074304_Drosophila_willistoni	G	R	M	Y	W	R	C	Y	F	N	A
EGl60677_Acromyrmex_echinatior	K	R	N	F	W	R	Q	C	S	L	N
XP_003244027_Acyrtosiphon_pisum	G	R	L	Y	W	R	C	Y	F	N	A
Allatostatin_Dappu1:237118	Q	R	V	F	W	R	C	Y	F	N	A
XP_002433459_Ixodes_scapularis	K	R	S	G	W	K	Q	C	S	F	N
CAG07675_Tetraodon_nigroviridis	R	I	F	F	W	K	S	W	T	S	C
XP_001490614_Equus_caballus	K	N	F	F	W	K	T	F	S	S	C
XP_001333082_Danio_rerio	R	N	F	Y	W	K	T	F	T	S	C



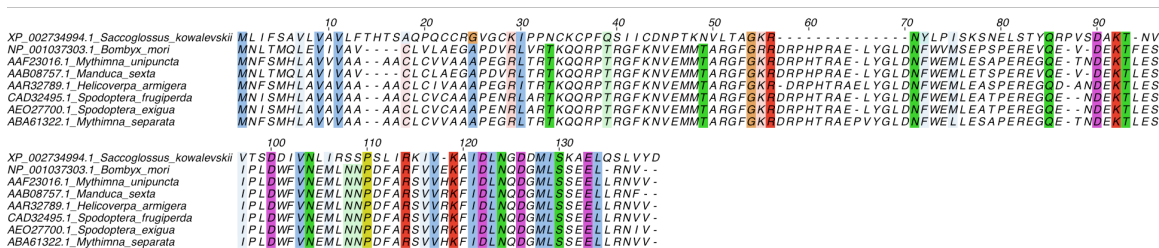
Shared motif in deuterostome somatostatin and protostome allatostatin-C families.



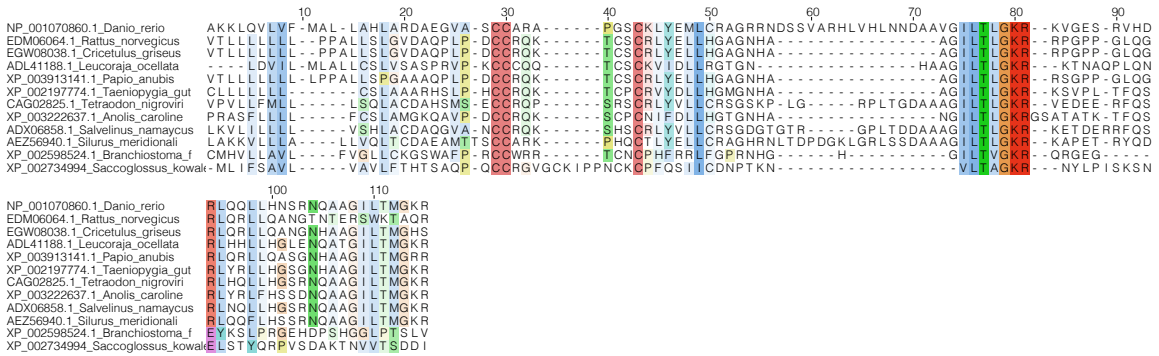
Multiple sequence alignment of proctostome and deuterostome opioid proneuropeptides.



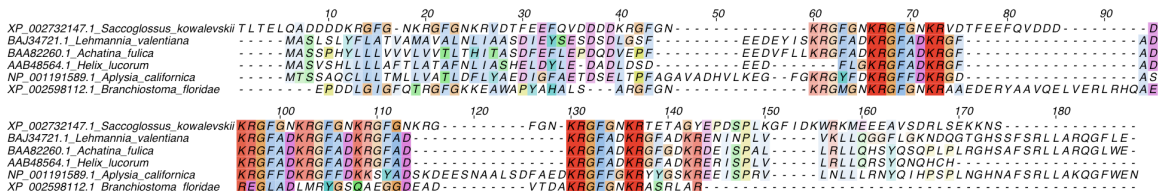
Trimmed multiple sequence alignment of the C-terminal Cys-containing peptide in luqin precursors of protostomes and deuterostomes.



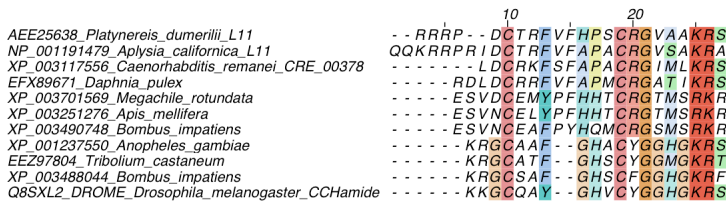
Multiple sequence alignment of insect and *Saccoglossus kowalevskii* allatotropin precursors.



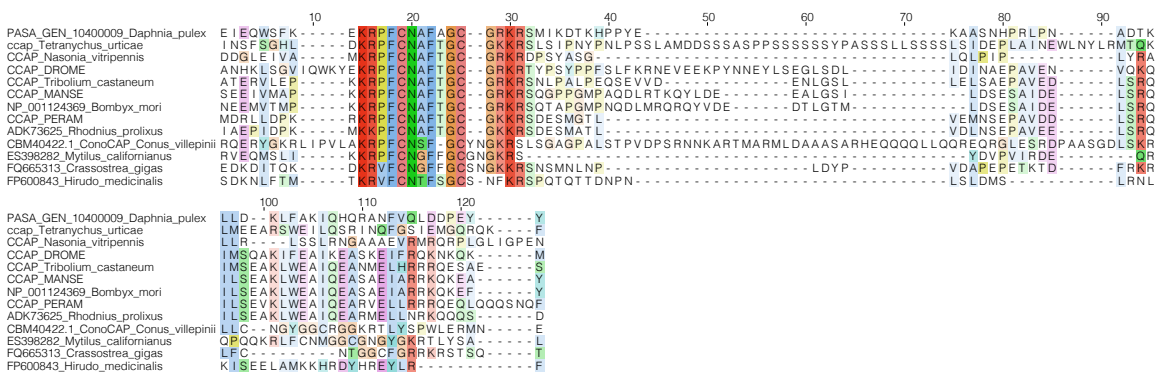
Multiple sequence alignment of *Saccoglossus kowalevskii* allatotropin and chordate orexin proneuropeptides.



Trimmed multiple sequence alignment of protostome and deuterostome achatin proneuropeptides.



Trimmed multiple sequence alignment of protostome L11 and CCHamide/polychaete excitatory peptide neuropeptides.



Trimmed multiple sequence alignment of CCAP/ConoCAP proneuropeptides from arthropods, mollusks and annelids.

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XP_003125675_Sus_scrofa
 XP_003479659_Cavia_porcellus
 XP_003419729_Loxodonta_africana
 XP_002929798_Ailurogaster_melanoleuca
 XP_002756762_Callithrix_jacchus
 XP_003208285_Meleagris_gallopavo
 CBM40422.1_Conus_villepinii
 NP_001124369_Bombyx_mori
 FP600843.1_Hirudo_medicinalis

KRSFRNGVGTGMKKT
 KRSFRNGVGTGMKKT
 KRSFRNGVGTGMKKT
 KRSFRNGVGTGMKKT
 KRSFRNGVGTGMKKT
 KRSFRNGVGTGMKKT
 KRVCNGFTGCGRRH
 KRPFCAFTGCGRKR
 KRVCNTFSGCSNFK



Shared motif in deuterostome neuropeptide-S and protostome CCAP families.

XP_001654286_Aedes_aegypti
 XP_003244660_Acyrthosiphon_pisum
 NP_001124363_Bombyx_mori
 EHJ7323_Danaus_plexippus
 EV289917_Tritonia_diomedea
 FR764292_Malacoceros_fulginosus
 FO180226_Sepia_officinalis
 FC738949_Lottia_gigantea
 EB316616_Aplysia_californica
 NP_741126.1_Caenorhabditis_elegans
 estExt_Iggenes1_pg_C_360058_Capitella_teteta

SAKDFFICLSNQLGDPDTLNÁ-----MLLDNLEVAÇDPRFSPVSAIQKRNSKYVSKOKFYISWGGKRN-----SDKHGRP-----K
 ROKTVFSSWGGKR-----RSSDFPWGGKRFITGDAK-----QSTYFYGGKRAFSSWGGKRA-----GOMVYKPGSKSSKLIFSATVPELT
 YDKNFSWGGKRDKPSFEH-----OMWTWK-----RSSVREPSMPKRVRFSPWGGKRS-----GOMIYKPKGSKSVIFSASVPELT
 LEKRFSWGGKRNRPNTIE-----KSAGIREPSMPKRVRFSPWGGKRS-----GOMIYKPKGSKSVIFSASVPELT
 EKRSFAAWAGKRSADYDHP-----VYGSVMVKRPSFAWAGKRS-----LSPDWD
 AFRKRVQFWGGKRSVGFDEIDDSSEVALDKRNWFERSEPRDYAALMKKGFQWGGKRASSWGGKRS-----SLSALSNDTLDTDSYISDELDNK
 EEKRKFSWGGKRGGPVLPSS-----YIIRTRTNSKPDVITHKSRFSWGGKRS-----AAGISDPELSDN-----LLE
 GKRAAFTSWGGKRSNDEYDLDKKAFRYWNGKPSDL-----NDGGDGNVMDKKAAFTSWGGKRSDFGDEM-----DKK
 GEGTNIIPENERDEVFDP-----DSGTEDLDRAGFAFWAGKRD-----GDGVV-----DKR
 -----EYSDAKR-----AASSEGMR-----NKR
 IDKRAFSAWGGKRG-----FHWGGKRSEDNE-----MDKRAFSAWGGKRA-FNPWGGKRS-FEDEAERGNFE-----EOK

XP_001654286_Aedes_aegypti
 XP_003244660_Acyrthosiphon_pisum
 NP_001124363_Bombyx_mori
 EHJ7323_Danaus_plexippus
 EV289917_Tritonia_diomedea
 FR764292_Malacoceros_fulginosus
 FO180226_Sepia_officinalis
 FC738949_Lottia_gigantea
 EB316616_Aplysia_californica
 NP_741126.1_Caenorhabditis_elegans
 estExt_Iggenes1_pg_C_360058_Capitella_teteta

NVFPW-----GGKRN-----TGRVHROPKVV-----
 OTFSSW-----GGKRS-----DYDGYDNGEMDEHOMDKRELNGIKODKNYRNKMTKG IHALFTIFSDWSRDPPEEKKGIRYAGIKSM-----
 KIVSNY-----LPSGERL-----NLAGLHYIPSVDKRFP LKMMALSAKFPDRSFKAMPFTFVESLPKVPKPGQPYD-----
 RIVSNL-----SPNGNRL-----NMAGLQFIPSPDKRHP I K I LALNTKLDERTLRDALPNTFMETIPKMYKPGHAYLD-----
 RVLNLF-----GGKRA-----P-----FNPWGGKR-----AFSOWG-----GKRFSFPWGGKR-----AFSP
 RLLLOWTDSDI GR LQK-----
 SAFTSW-----GGKRSYDGDVOKKAAFTSWGGKR-----SLYDLGLYDLNKRPAFSSWGGKRS LFPFHLSDNIPDPFNEFNFLLLTKRKPWFNFAKN
 PAFHAW-----SGKRT-----
 KOFYAW-----AGKRS-----SAPVHYFEDSIAQEAAGPSM-----
 ROFGPW-----GGKRA-----SPEIYKKAFFNPWGGKRSSSTSSLEDF-----

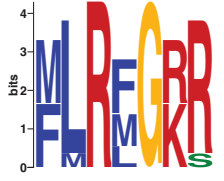
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 XP_003244660_Acyrthosiphon_pisum
 NP_001124363_Bombyx_mori
 EHJ7323_Danaus_plexippus
 EV289917_Tritonia_diomedea
 FR764292_Malacoceros_fulginosus
 FO180226_Sepia_officinalis
 FC738949_Lottia_gigantea
 EB316616_Aplysia_californica
 NP_741126.1_Caenorhabditis_elegans
 estExt_Iggenes1_pg_C_360058_Capitella_teteta

-----IRNPFHAWGGKRNQKDDN
 -----RSSDFPWGGKRFITGDAK
 -----VNIKKDKRREVKS AWGGKRSPP IIG
 -----VHLKKDKGRKVKFS AWGGKRSPP IIG
 -----INE LRKVRHVMG
 -----W-----GGKRAFSPWGGKRAFQFWG
 -----LLEKRGFNFWA
 YLRAFVTRLLNERAPKRSFS AWKGRNGELVY
 -----PHSAVDAOKRPAFAWAGKRSSTYPYK
 -----EKIKDQYAWAGK
 -----LSKRSFNPWGGKRS S DMGK

Trimmed multiple sequence alignment of leucokinin from arthropods, nematodes, annelids and mollusks.

ACI90289_Apis_mellifera
 NP_001156174_Acyrthosiphon_pisum
 NP_001166882_Bombyx_mori
 ACT98134_Rhodnius_prolixus
 BAG68789_Procambarus_clarkii
 Helro1|167674_Helobdella_robusta
 ABA70768_Aplysia_californica
 jgil|Capca|226517_Capitella_teteta

KRQDVDHVF LRFGR
 KRQDLHVF LRFGR
 KRQDVHVSFLRFGR
 KRQDIDHVFMRFGRR
 KRQDLHVF LRFGRS
 LNDKKA VNNMLRMGKR
 LRLGRGLQMLRLGKR
 EQQKRAMSMLRMGKR



Shared motif in arthropod myosuppressin and lophotrochozoan myomodulin families.

