Supplementary material for:

Transcriptome profiling of the Pacific oyster Crassostrea gigas visceral ganglia over a reproduction cycle identifies novel regulatory peptides.

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Supplementary figure 1:

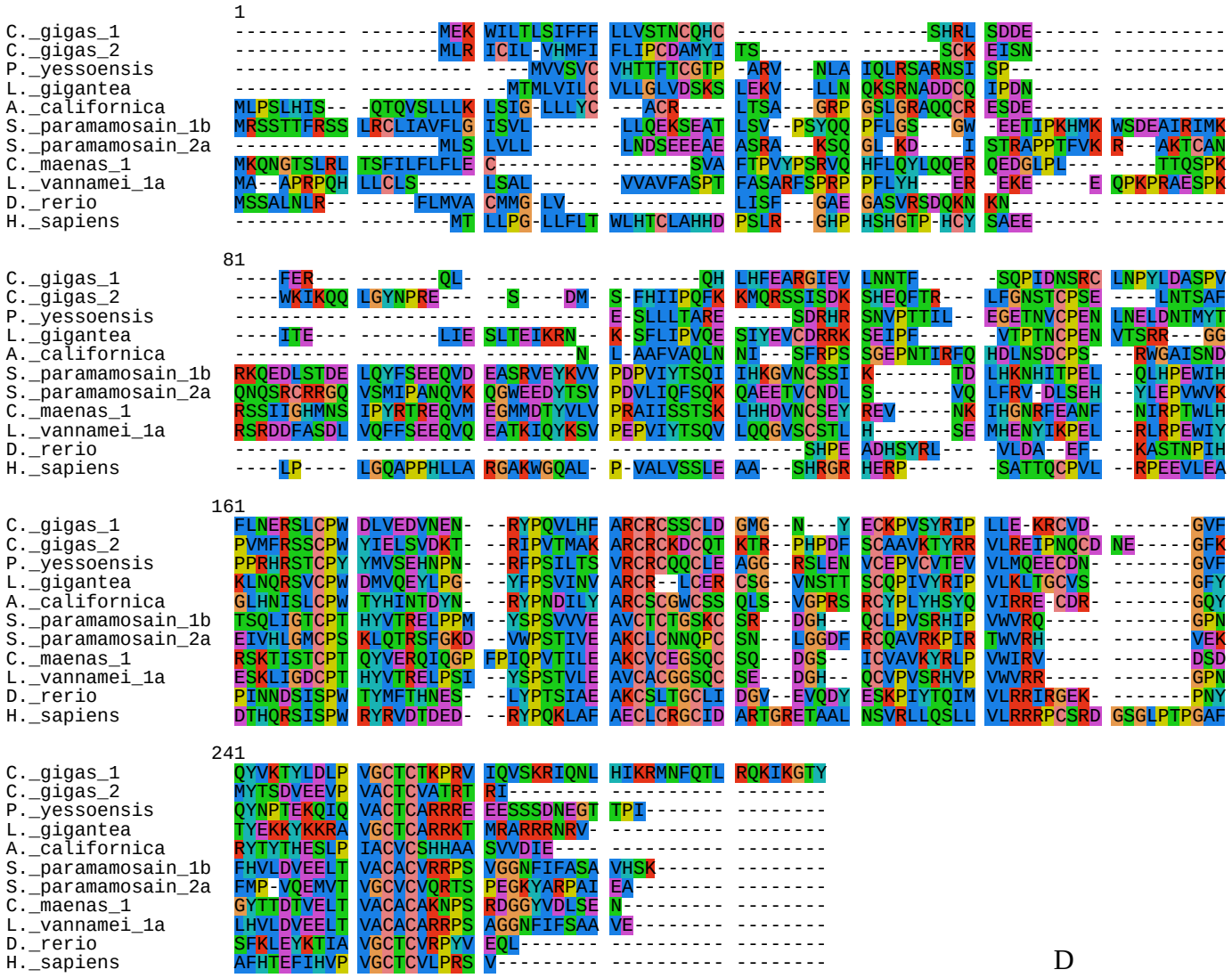
Novel (neuro)peptide precursors characterized in *C. gigas*: Expression during development, in adult tissues and in the visceral ganglia over a cycle of reproduction.

A: Alignment of *C. gigas* NPP sequences with the sequence of related precursors from other species. Amino acids with similar physicochemical properties are in the same color. Signature sequence features are indicated in red above the sequences.
B Expression pattern of NPP transcripts during development (data retrieved from GigaTON, Rivière et al. 2015); Oo: Oocytes; Mor: Morula; Bla: Blastula; Gas: Gastrula; Tro: Trochophore larvae; D-sha: D-shaped larvae; Umb: Umbo larvae; Ped: Pediveliger larvae; Juv: Juvenile.
C: Expression pattern of NPP transcripts in adult tissues (data retrieved from GigaTON, Rivière et al. 2015). MU: Adductor muscle; FGO: Female gonad (mix stages); MGO: Male gonad (mix stages); Gills; Hem: Hemolymph; LPA: Labial palps; Man: mantle; Dgl: Digestive gland.
D Expression pattern of NPP transcripts in the visceral ganglia during the cycle of reproduction..

Bilaterian family

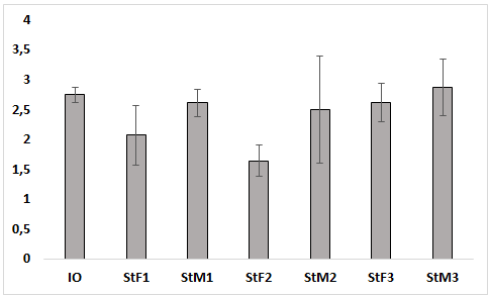
Cragi-IL17/CFSH (Interleukin 17 /Crustacean Female Sex Hormone)

A

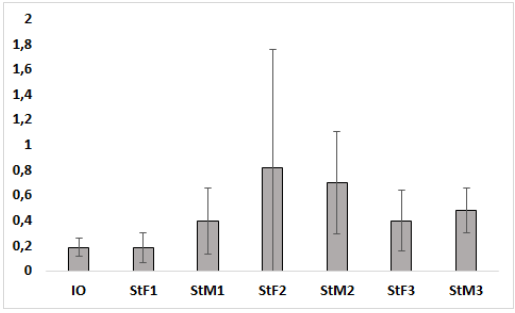


D

Cragi-IL17/CFSH1



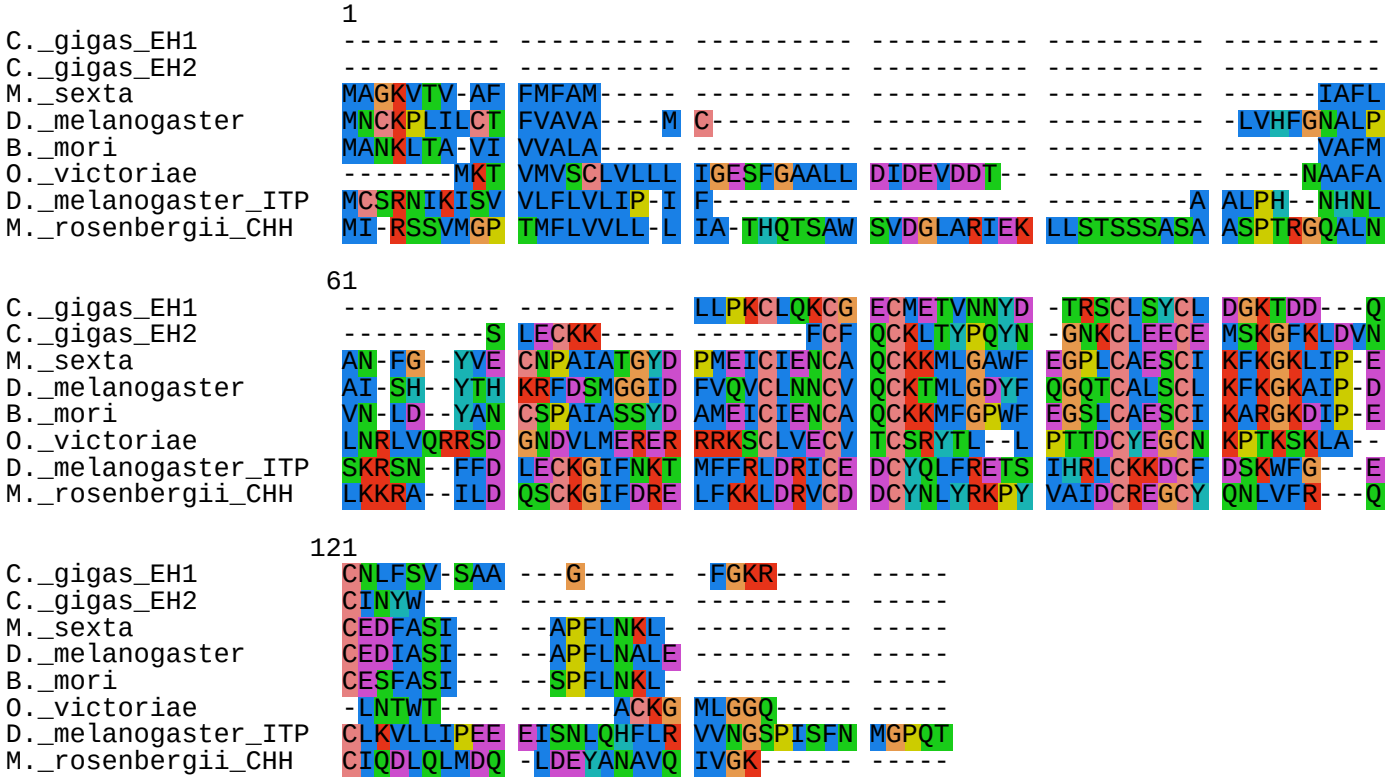
Cragi-IL17/CFSH2



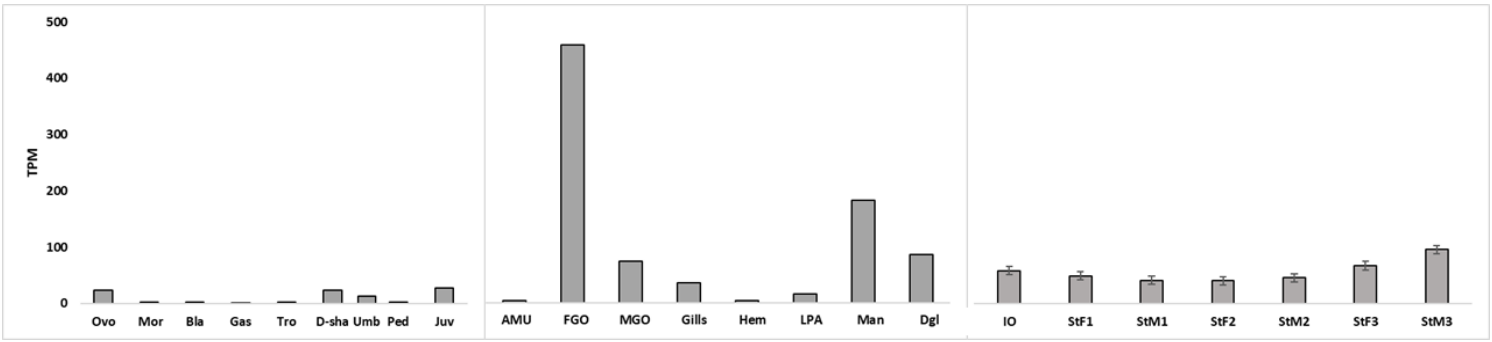
A: Alignment of *Cragi-IL17/CFSH1*(CGG_contig_09983 genome scaffold 678 232727 to 233272 (+)), *Cragi-IL17/CFSH2* (CGG_contig_07061 genome scaffold160 103046 to 103573 (+), *P. yessoensis* (XP_021370734.1), *L. gigantea* (XP_009051410.1), *A. californica*(XP_005097238.1), *S. paramamosain_1b* (Veenstra, 2016), *S. paramamosain_2a* (Veenstra, 2016) , *C. maenas_1* (Veenstra, 2016) , *L. vannamei_1a* (Veenstra, 2016) *CFSH, D. rerio* (NP_001018623.1), *H. sapiens* (AAH69152.1) IL17 sequences.
D: Expression pattern of *Cragi-IL17/CFSH1*(CGG_contig_09983) and *Cragi-IL17/CFSH2* (CGG_contig_07061) encoding genes

Cragi-EH (Eclosion Hormone)

A



B C D



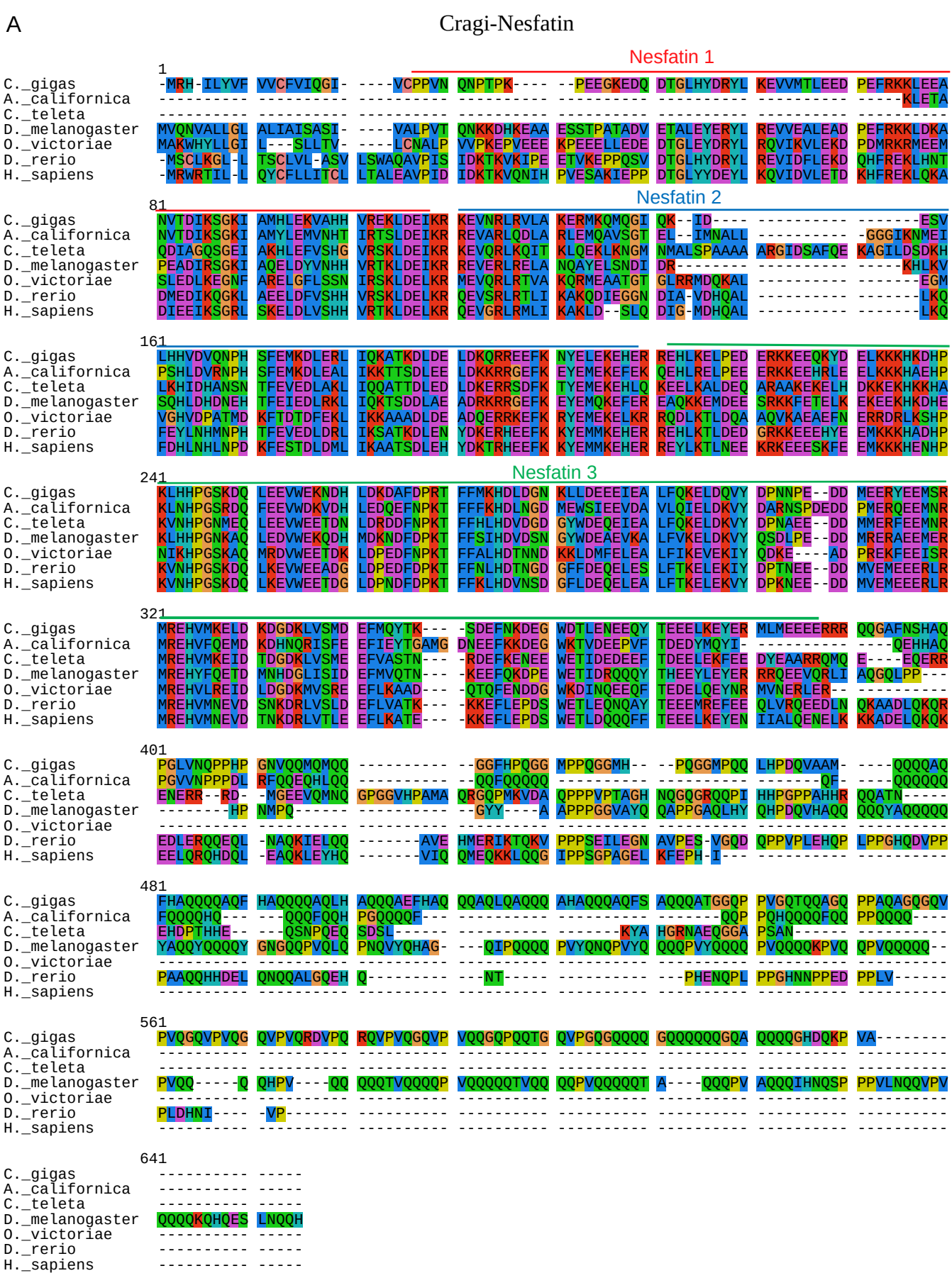
A : Alignment of *C. gigas* (CGG_contig_11351), *M.sexta*(AAA29310.1), *D.melanogaster* (AAF55423.1), *B.mori* (NP_001037307.1), *O.victoriae*(ASK86246.1) EH, *D. melanogaster ITP* (NP_611931.3) and *M. rosenbergii* (AAF29534.1) CHH sequences.

B : Expression pattern of *Cragi-EH* (CHOYP_contig_053689) encoding gene during development

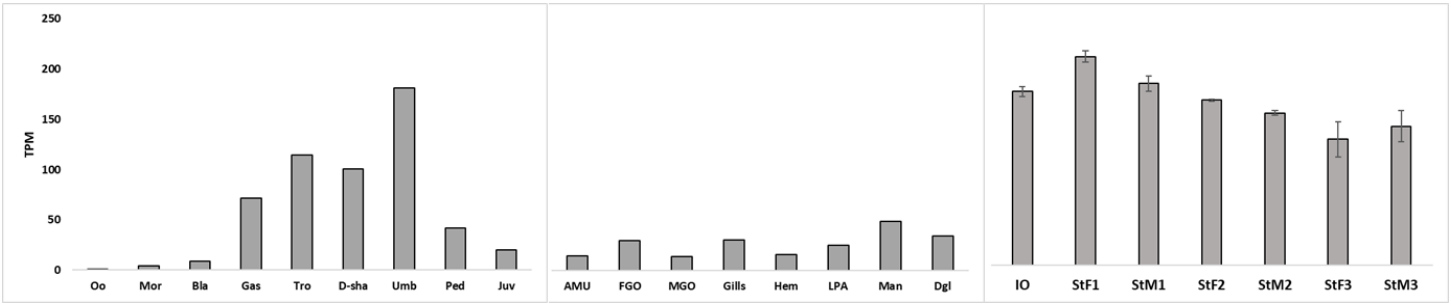
C : Expression pattern in adult tissues.

D: Expression pattern of *Cragi-EH* (CGG_contig_11351) encoding gene in the visceral ganglia during the cycle of

A


Cragi-Nesfatin
Nesfatin 1
Nesfatin 2
Nesfatin 3
C._gigas
A._californica
C._teleta
D._melanogaster
O._victoriae
D._rerio
H._sapiens

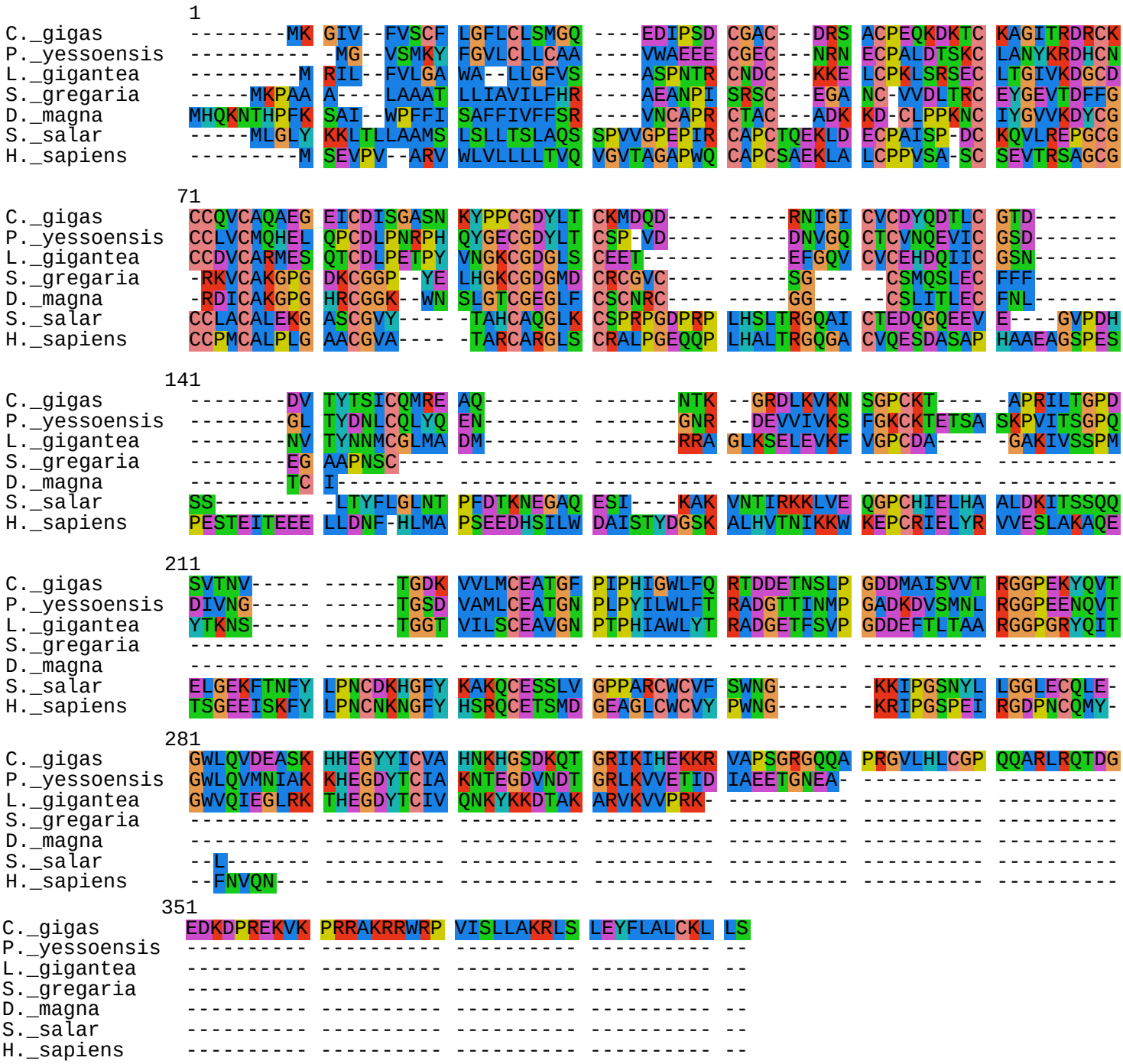
B C D



A : Alignment of *C. gigas* (CGG_contig_14701), *A. californica* (XP_012940282.1), *C. teleta* (ELT97554.1) , *D. melanogaster (*AF044203). ; *O. victoriae* (ASK86275.1); *D. rerio* (NP_958901.1) and *H. sapiens sp* (P80303.3) nesfatin sequences.
B : Expression pattern of Cragi-Nesfatin encoding gene (CHOYP-NUCB1.1.1) during development.
C : Expression pattern in adult tissues.
D : Expression pattern of Cragi-Nesfatin (CGG-contig-14701) encoding gene in the visceral ganglia during the cycle of reproduction.

Cragi-Neuroparsin/IGFBP

A



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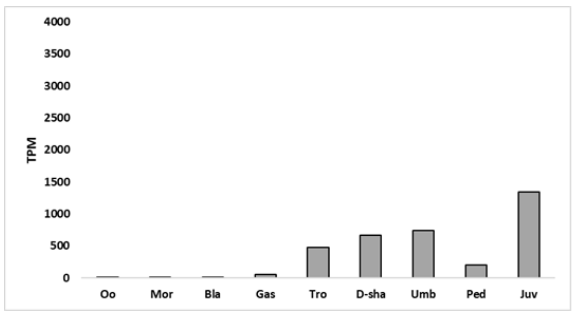

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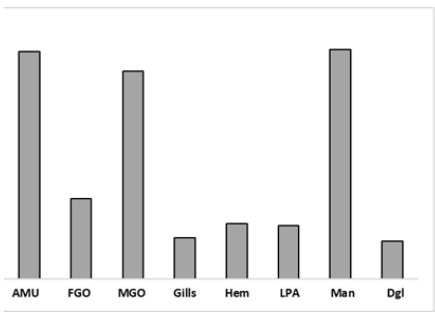

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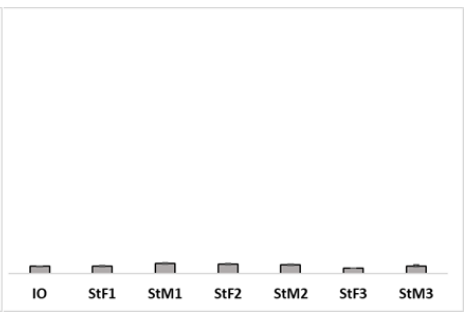


A : Alignment of *C. gigas* (CGG_contig_00821, EKC32441, XM_011444842.3), *P. yessoensis* (XP_021371917.1), *L. gigantea* (XP_009066688.1), *S. gregaria* (CAC38869.1), *D. magna* (XP_032796889.1) neuroparsins, *S. salar* (NP_001117096.1) and *H. sapiens* (AAA52784.1) IGFBP sequences .

B : Expression pattern of Cragi-Neuroparsin encoding gene (CHOTP-LOC769726.1.1) during development.

C : Expression pattern in adult tissues.

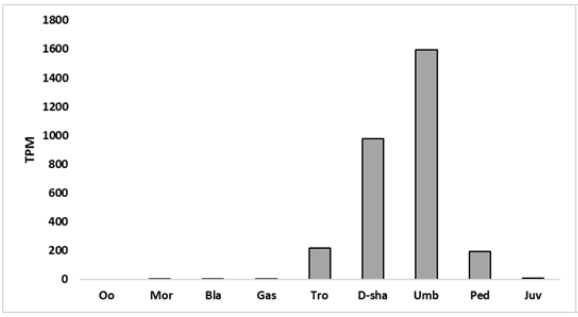
D : Expression pattern of Cragi-Neuroparsin (CGG-contig-00821) encoding gene in the visceral ganglia during the cycle of reproduction.

Cragi-Urotensin

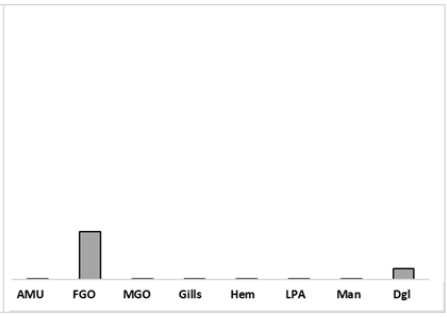
A

```
                1
C._gigas        ---------- MNSLSLLCLV VLSLALLGNY VCSSEPQQFF ADEDEISE-P TEEQR--MM-
A._californica  ----MISKSL MVSMSVYVLV ALLAAMHGST -----PASAM PLEDDNTD-I -DDKR--SM-
C._teleta       MRSTLTNTGL VALATLLLLL ETSAALSSSS LLREEPEKTP QESVER---- --SKR--S--
D._rerio        ----MI---- -CKLFVFC-- --SVLLLSCS LLSAHPVTDT AEMTNIGPDS VEEAGGVSMD

               61
C._gigas        --INNKYQTH LM--KNAFRD ---------- SGNLKR---- --L------- -----LAQKR
A._californica  --LLSKYMAL MNRLQEQRQQ ---------- EGDLSD---- --LVGSPYVQ Q----RSQKR
C._teleta       ---AHDLLKR LNQLDNTFSS YYDYLLSSSE ASDNYD---- --VQESKFLV EESPSSIQKI
D._rerio        DFSVSDLTDV LQRAAAAAHS PLLNRDSIKM SGQISKDALK EFLLEKPYRL VPPSGLL---

              121
C._gigas        FSSD-RQTRG GVALCLWKVC PAGPWLVQK- ----
A._californica  FKSPMQSRSG GMSLCLWKVC PAAPWLISK- ----
C._teleta       APAFKRQASS GAQICIWKVC PPTPWRRARK SRAN
D._rerio        GSRRQFRKRG GGADCFWKYC V--------- ----
```

B



C



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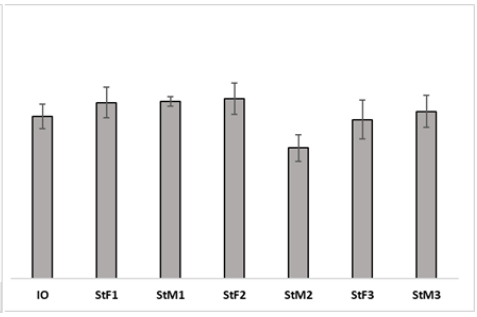


A : Alignment of *C. gigas* (CGG_contig_30764, CGG_contig_09857, CGG_contig_22724, CGG_LOC105343318), *A. californica* (XP_012945633.1), *C. teleta* (ELU12290.1) and *D. rerio* (XP_005157985.1) urotensin II sequences.
B : Expression pattern of Cragi-Urotensin encoding gene (CHOYP-contig-004921) during development.
C : Expression pattern in adult tissues.
D : Expression pattern of Cragi-Urotensin (CGG-contig-30764) encoding gene in the visceral ganglia during the cycle of reproduction.

A

Cragi-Prokineticin

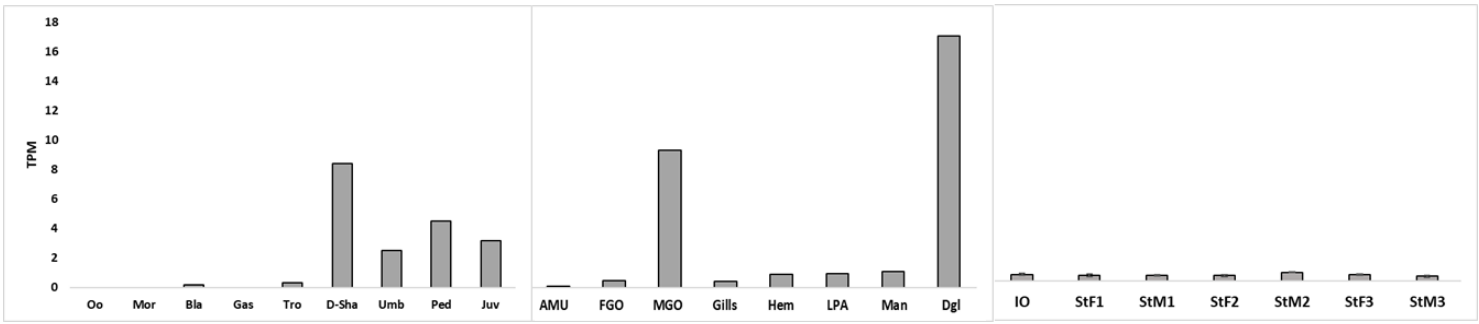
```
                1
C._gigas_1      MTLTRALWIL LVCYHGA-VL ---------- ---------- ---------- ---------- ----YTDAAA
C._gigas_2      -------MKL FLCFAVFACS ---------- ---------- ---------- ---------- -QAFFLDSLF
C._gigas_3      ---------- MHCLTGLAFC ---------- ---------- ---------- ---------- -ITLGIVMGA
C._gigas_4      MA-PINPSIL AICFGLCSTF ---------- ---------- ---------- ---------- ----VIKDTV
C._gigas_5      ---------- ---------- ---------- ---------- ---------- ---------- ------MEN
P._dumerilii    -----MANIF HVCLLLMVFA TIQGIPSKRG RSRPLFVGKR YPPYMPYRRT DYHGKRGRLQ LLFVGKRQPT
A._mellifera    ----MMTSIF EISFLLFVLA Y--------- ---------- ---------- ---------- ----PCHAQN
P._vannamei     ---------M AVSSAVRMLA AAC------- ---------- ---------- ---------- -LVVSAVGMR
D._rerio        -----MTS-- NISFFLCLL- ---------- ---------- ---------- ---------- -LVSRGWTAV

               71
C._gigas_1      TNKGCNSATE CLDNECCVSI YQPLGRRQLH GHYSGHCVPM GMDGDGCLVK TRNATT---- ---------R
C._gigas_2      GSGGCKSDDD CSSGGCCMTD VF-------- GDKSCVH-QY LHYLQECRMD GHDHH----- ----------
C._gigas_3      LRNECSSDPD CPSTHCCVTD YH-------- GKYC--S-AY QNVSQPCHLP GHSLH----- ----------
C._gigas_4      EPRMCNLATD CHDNECCVSN VRPIGKRQT- -SFHGHCIPL GKVGDGCLVR NGNATS---- ---------R
C._gigas_5      KCSMAARDTS CPTGYCCAYD EF-------- FRIIYYCKKL GAINESCSTV ---AS----- ----------
P._dumerilii    YEMSCRTDLD CPSSHCCLAD LE-------- -NSSGTCTPL RHMEQICTTS S----F---- ---------Y
A._mellifera    DYIKCQTSSE CQPNHCCTLG SV-------- RYSIPQCKPM QGKGEVCRPT NSSTTFNVTL GYPDGSSLKI
P._vannamei     RLGDCSSSAD CGPGACCTVG FN-------- RYSVPQCTPL GDLGDWCRIM NPPRE--LNL AYPNGLQIVL
D._rerio        ITGACEKDSQ CGGGMCCAVS LW-------- IRSLRMCIPM GQEGEDCHPM SHKVPF---- ---------F

              141
C._gigas_1      PLDVVLSCPC TPGLYCHGDH LYVVPLG--- ---------- -EQGHCTSP- ---------- ----------
C._gigas_2      ----S--CGC GSGLYCESYA NVHGAAVE-- ----TQHMGS TMYGLCEHKV NA---TSYYN FIVFNK----
C._gigas_3      ----TYHCNC APGYSCQPMH LTADASLAQA LHQVEEILTH TGYGTCQIVV ---------- ----------
C._gigas_4      PTELVFACPC TPGLYCHGDH HYDIPLG--- ---------- -EIGHCANP- ---------- ----------
C._gigas_5      ----DADCPC EPGLTCVPTV QGSS--F--- ---------V TIYGRCKPVG MT---TEEAG TTEAEHTNHG
P._dumerilii    DGISYPMCPC ASGLSCAISP -----EK--- ---------- -RFGICTSSW DEEEGEEQYN Y---------
A._mellifera    EDVYFIFCPC IDGLSCEKGI ---------- ---------- -----CKEKN ---------- ----------
P._vannamei     TDTYHGMCPC RPELVCSRAS -----S---- ---------- ----TCQLPN ESTLDQEDNS LYRD------
D._rerio        GKRLHHTCPC LPNLACITTA -----DG--- ---------- --KSKCLPPF ----PFQDQY L---------

              211
C._gigas_1      -------
C._gigas_2      -------
C._gigas_3      -------
C._gigas_4      -------
C._gigas_5      HHVTKHG
P._dumerilii    -------
A._mellifera    --------
P._vannamei     --------
D._rerio        --------
```

B

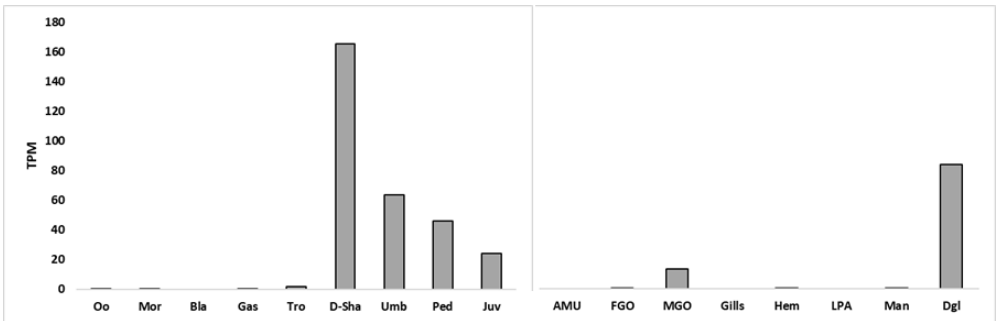
C

D

Cragi-Prokineticin 1

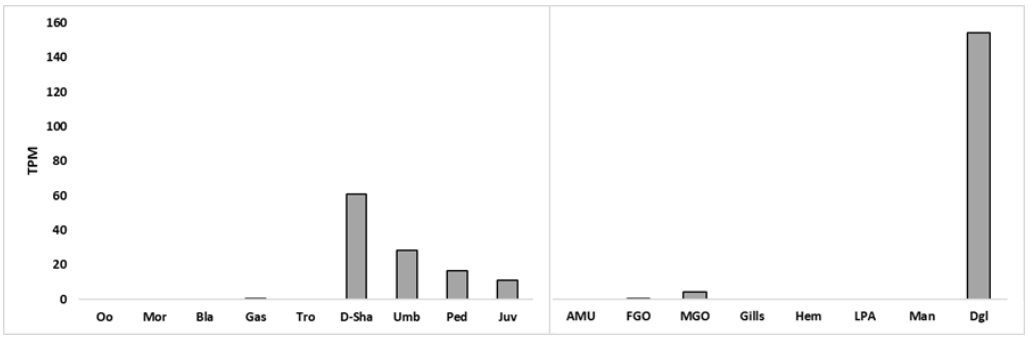


Cragi-Prokineticin 2

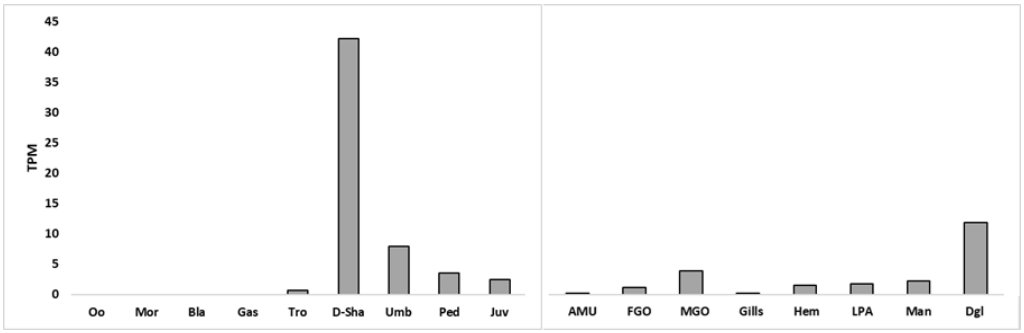


B C D

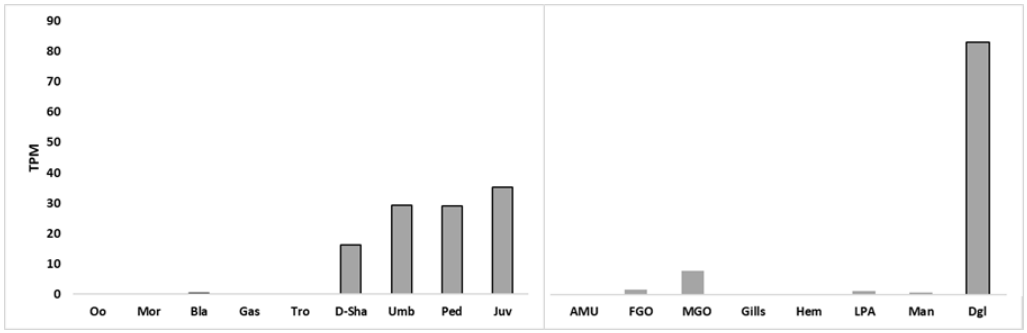
Cragi-Prokineticin 3



Cragi-Prokineticin 4



Cragi-Prokineticin 5



A : Alignment of *C. gigas 1* (CGG_contig_16708), *C. gigas 2* (CHOYP_contig_004850*), *C. gigas 3* (CHOYP_contig_003956*), *C. gigas 4* (CHOYP_contig_004051*), *C. gigas 5* (CHOYP_BM8F.2.2, EKC19072.1 P. yessoensis (XP_021370383.1), *P. dumerilii* (Conzelmann et al. 2013), *A. mellifera* (XP_003250271.1), *P. vannamei* (ADM53424.1) astakine and *D. rerio* (ACV04795.1) Prokinecitin sequences. * Data retrieved from GigaTON (Rivière et al, 2015)

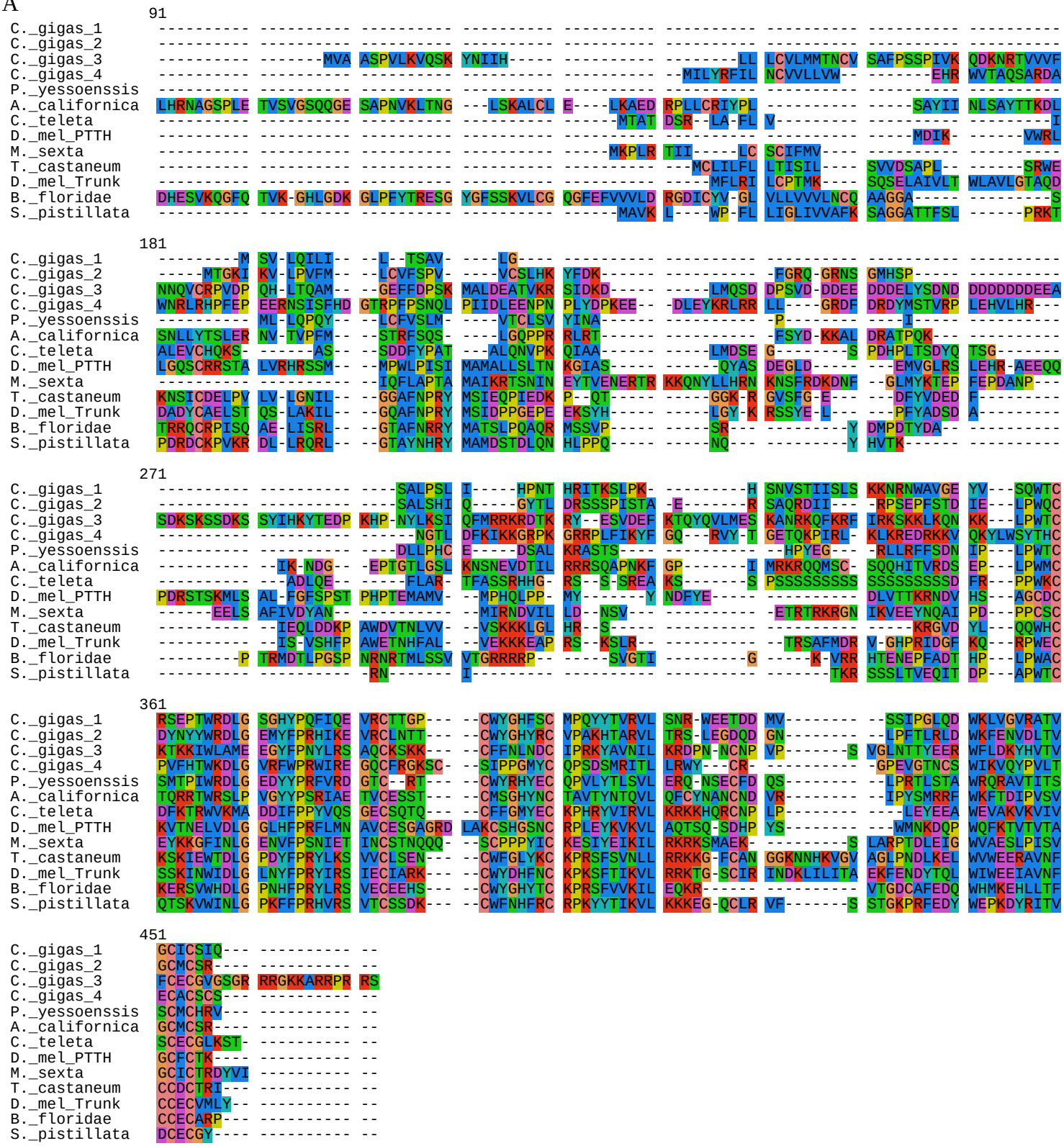
B : Expression pattern of Cragi-Prokineticin 1 (CHOYP_contig_002587); Cragi-Prokineticin 2 (CHOYP_contig_014127); Cragi-Prokineticin 3 (CHOYP_contig_003956); Cragi-Prokineticin 4 (CHOYP_contig_004051) and Cragi-Prokineticin 5 (CHOYP_BM8F.2.2) encoding genes during development.

C : Expression pattern in adult tissues.

D : Expression pattern of Cragi-Prokineticin1 (CGG_contig_16708) encoding gene in the visceral ganglia during the cycle of

Cragi-Trunk/PTTH

A

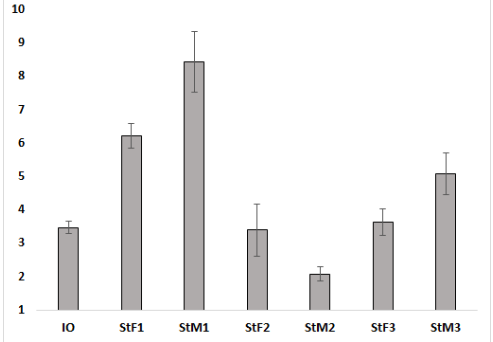


Cragi-PTTH 1

B

C

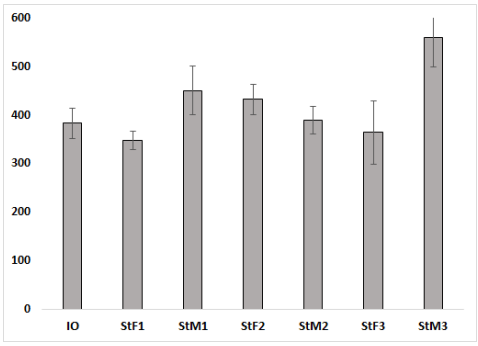
D



B

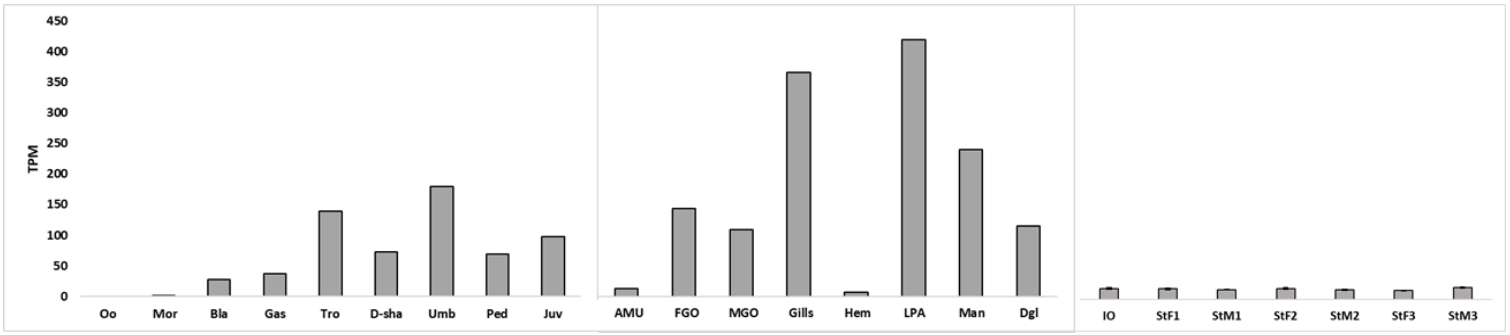
C

D

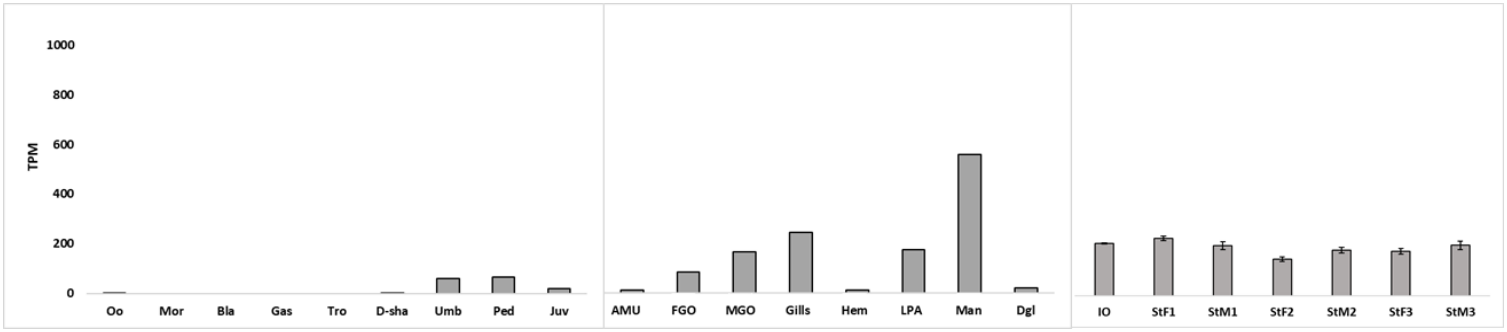


Cragi-PTTH 2

Cragi-PTTH 3

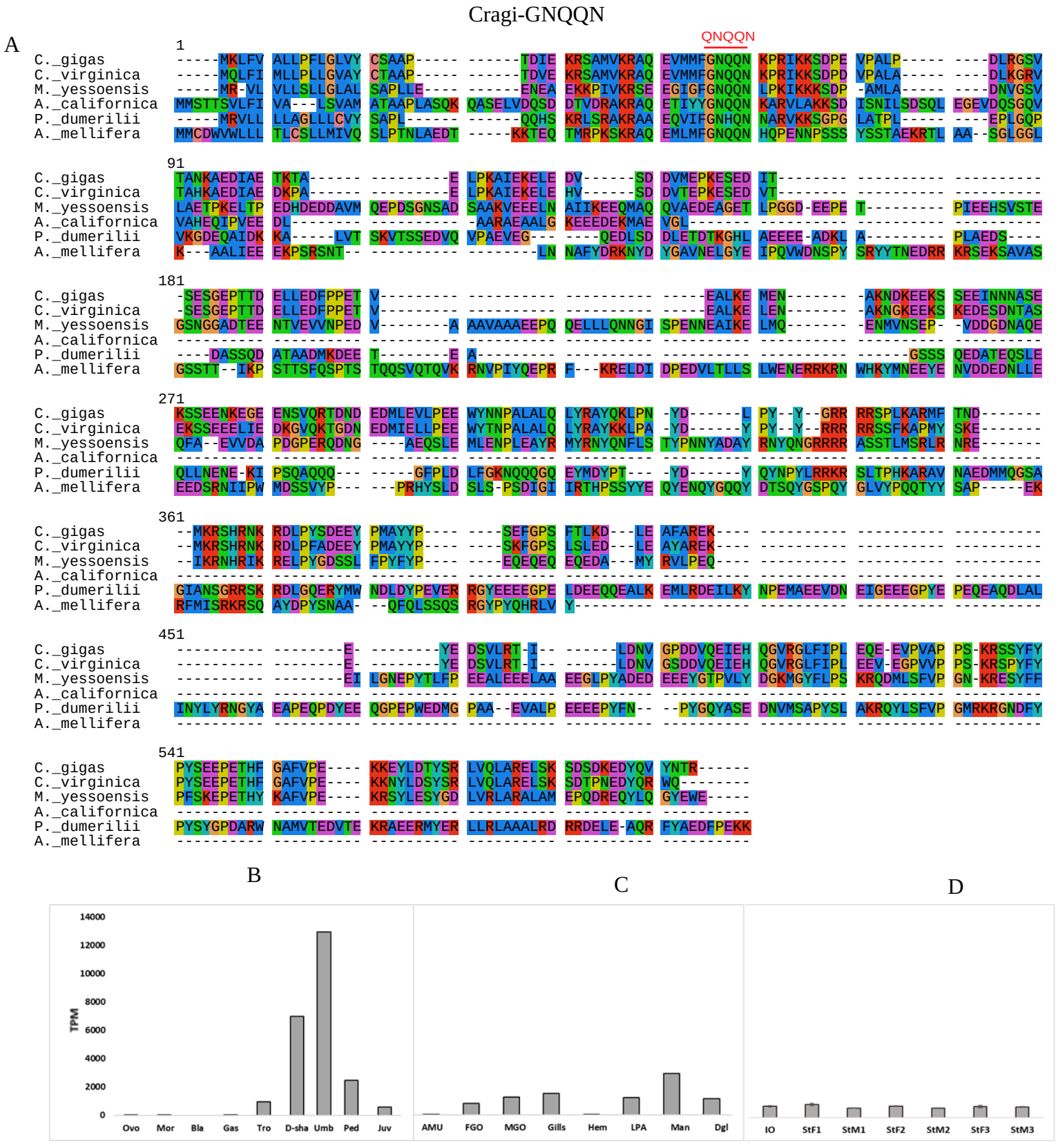


Cragi-PTTH 4



A : Alignment of *C. gigas* PTTH1 (CGG_contig_11546, genome Scaffold257 [810982 to 811595 + 810776 to 810900 + 810895 to 810992 + 814723 to 814836), *C. gigas* PTTH2 (CGG_contig_28778; EKC39796; XP_011450369.1), *C. gigas* PTTH3 (CGG_contig_24835, genome Scaffold43954 [239163 to 239624 + 238782 to 239042]) , *C. gigas* PTTH4 (CGG_contig_10820 EKC21705, XP_011448209.1), *P. yessoensis* (XP_021368706.1), *A. californica* (XP_012942268.1), *C. teleta* (ELU11356.1), *D. mel* (NP_001285550.1), *M. sexta* (AAG14368.1) , *T. castraneum* (XP_971946.1) PTTH sequences, *D. mel* (AAF52896.1) , *B. floridae* (XP_002586716.1) and *S. pistillata* (PFX31008.1) trunk sequences .
B : Expression pattern of Cragi-PTTH 3(CHOYP_TRK.1.1), PTTH 4 (CHOYP_BRAFLDRAFT_113863.1.1) encoding genes during development.
C : Expression pattern in adult tissues.
D : Expression pattern of Cragi-PTTH 1(CGG_contig_11546), PTTH 2 (CGG_contig_28778), PTTH 3 (CGG_contig_24835), PTTH 4 (CGG_contig_10820) encoding genes in the visceral ganglia during the cycle of reproduction.

Protostome families



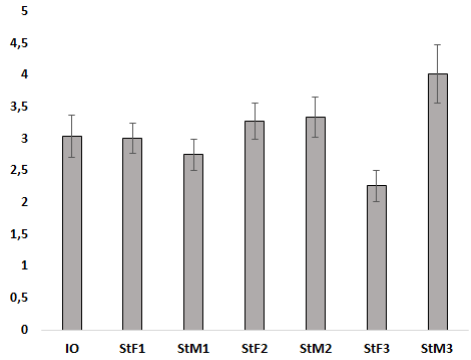
A : Alignment of *C. gigas* (CGG_contig_21126), *C. virginica* (XP_022294073.1), *P. yessoensis* (AXN93526.1 GNQQNxP), *A. californica* (XP_012937567.1), *P. dumerilii* (AHB62367.1) and *A. mellifera* (NP_001161308) GNQQN sequences.
B : Expression pattern of Cragi-GNQQN encoding genes (CHOYP-contig-035767) during development.
C : Expression pattern in adult tissues.
D : Expression pattern of Cragi-GNQQN encoding gene (CGG_contig_21126) in the visceral ganglia during the cycle of reproduction.

Cragi-Pleurin

A

```
                1
C._gigas        --MQSLFWAL IVLVSCDCAL CLFYTSSKEN DYPRFGKRNS RIHSDAWM-- ---DKDSIED
P._yessoensis   MSPHSILTLL TTFAIIQLAK AIFYTNKEGN DFPRIGKRRH LYQSEAWS-- ---RDSVPSD
A._californica  MQSHVSSSLL ALCILTGSAC AMFYTKGSDS DYPRIGRRSF YTTGNGNHYP RIGRRDSPGA

               61
C._gigas        --YN------ --------EI IDSSEIKPTQ YL-SQSRL-- ---------- ----------
P._yessoensis   --GL------ --------PG ETDRQMEPMY NQ-DEGEIPI TS-------- ----------
A._californica  AAGTDILYPS AASGFSDFPA SASAAKRGIF TQSAYGSYPR VGRRSQAGDD GSQEGLQTAR

              121
C._gigas        ---------- ---------- -------RMF KRGTNLLFQF LDRNGDQLIT KNEFTANSFT
P._yessoensis   ---------- ---------- -RREHQNPMS SYSKAMYYRA LGLNGYRAFS KNKVQASPNN
A._californica  SKIFQKITGL DGPVEEELGD GSAERLEADN QIGLELMFLA FDLDGDQALS KSEFKSGMEK

              181
C._gigas        EILDALTKDH HGK
P._yessoensis   GIRGTRTYY- ---
A._californica  FRRHNPLC-- ---
```

D

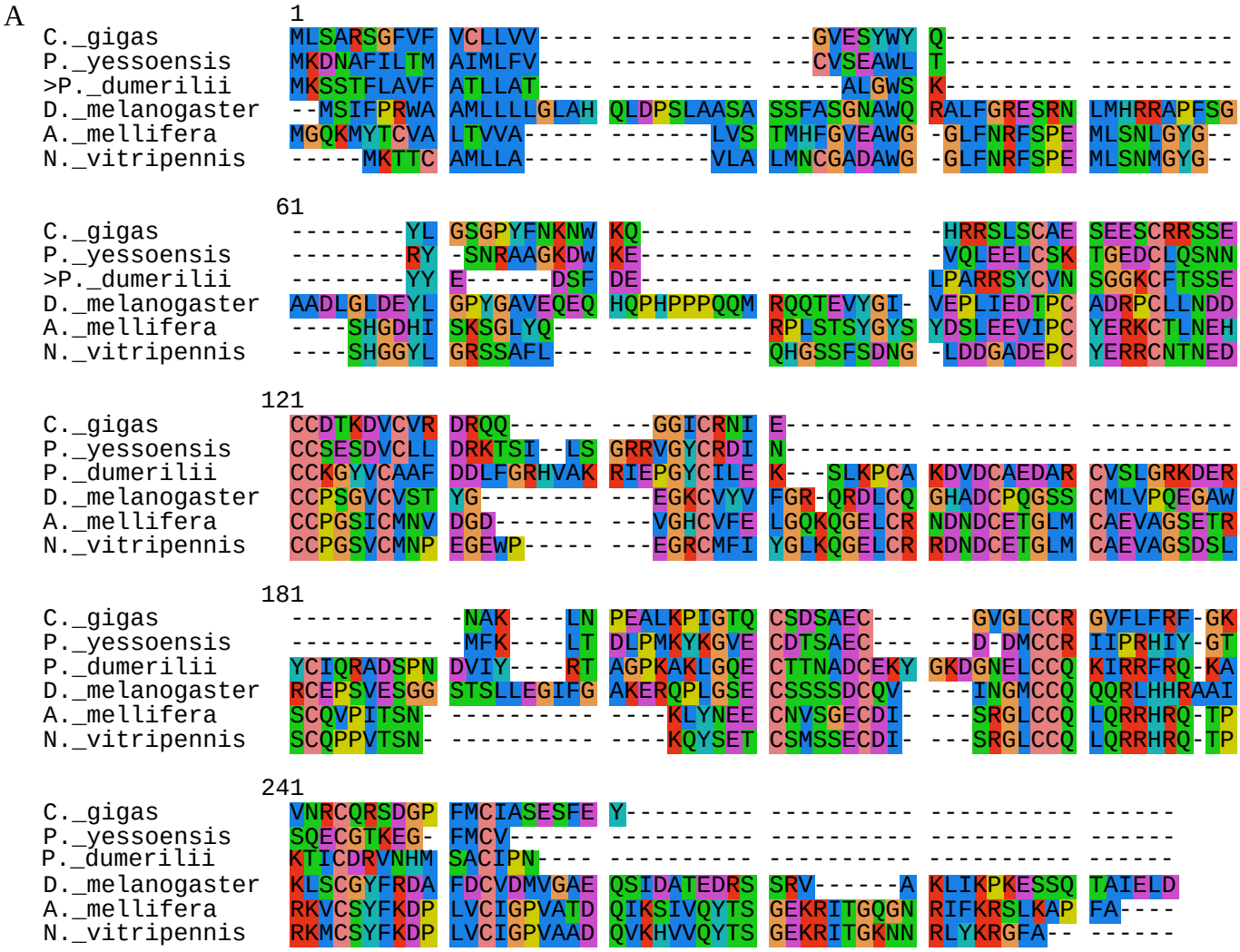


A : Alignment of *C. gigas* (CGG_contig_22966), P. *yessoensis* (AXN93514.1) and *A. californica* (NP_001191504.1) pleurin sequences.

D: Expression pattern of Cragi-Pleurin encoding gene (CGG_contig_22966) encoding gene in the visceral ganglia during the cycle of reproduction.

Cragi-Prohormone 3

A



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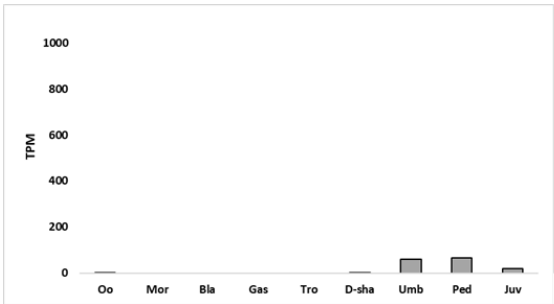

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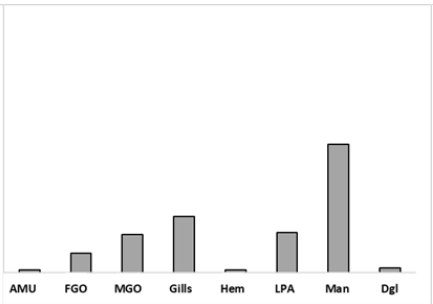
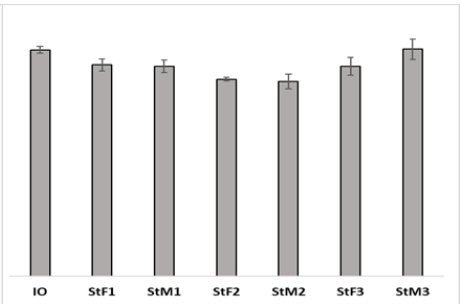


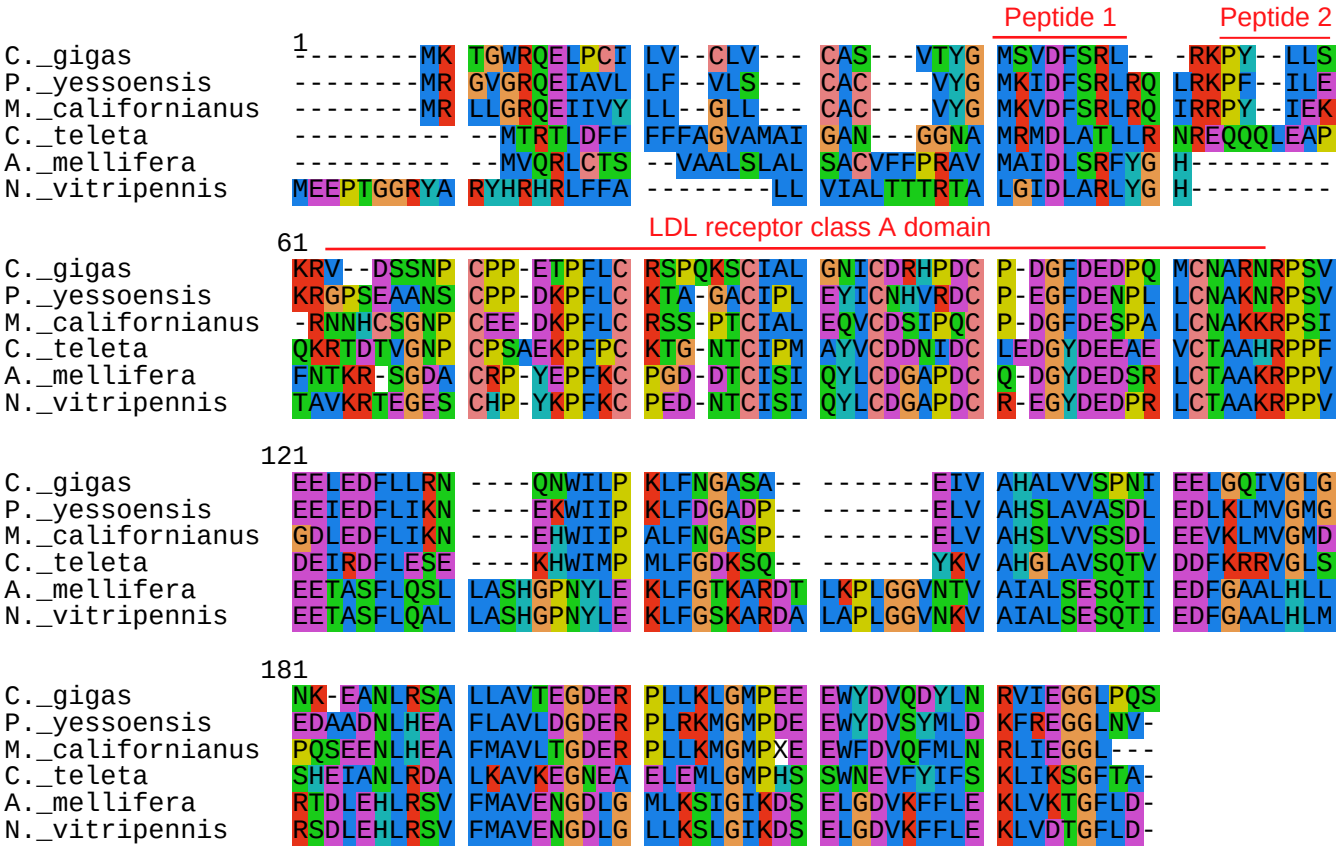
D



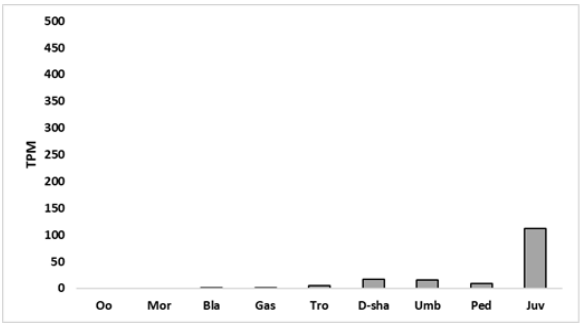
A : Alignment of *C. gigas* (CGG_contig_31012, XP_011427435.1) and *P. yessoensis* (XP_021368853.1), *P. dumerili*i (AHB62385.1) , *D. melanogaster* (ABO52824.1), *A. mellifera* (XP_001122204.2) and *N. vitripennis* (XP_001604833.1) prohormone 3 sequences.
B : Expression pattern of Cragi-Prohormone 3 encoding gene (CHOYP-contig-038859) during development.
C : Expression pattern in adult tissues.
D : Expression pattern of Cragi-Prohormone 3 encoding gene (CGG_contig_31012) in the visceral ganglia during the cycle of reproduction.

Cragi-Prohormone 4

A



B



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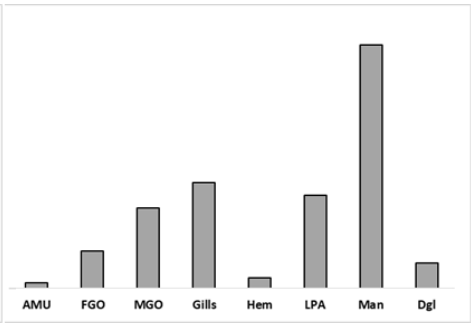

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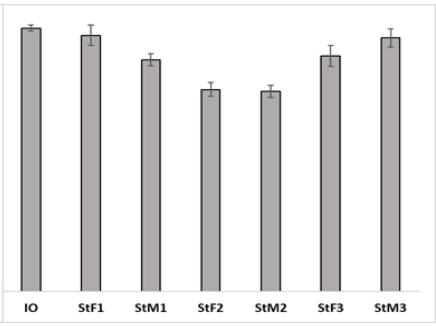
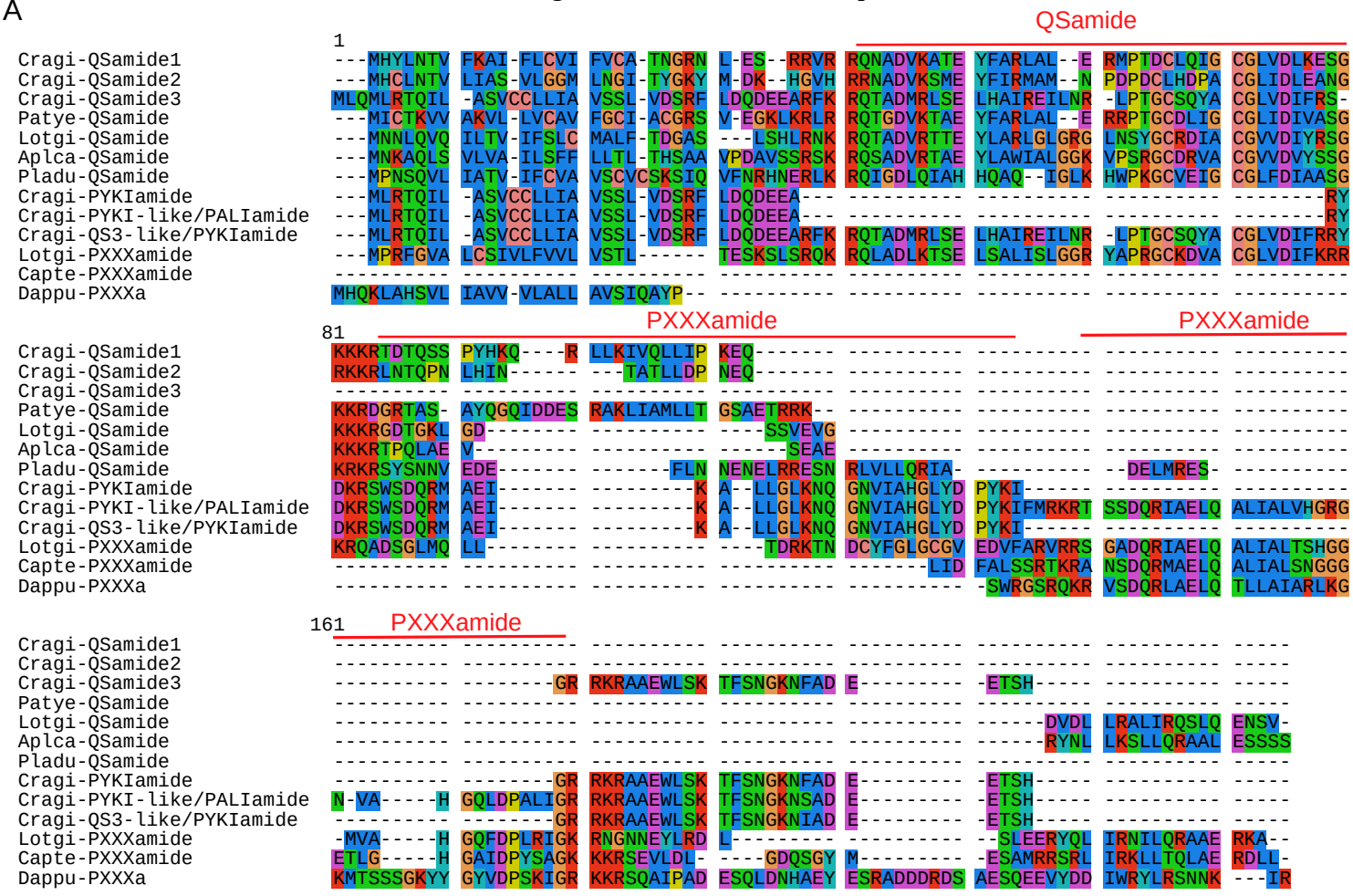


A : Alignment of *C. gigas* (CGG_contig_28466, CGG_contig_14367, CU997943.1), *P. yessoensis* (XP_021370383.1), *M. californianus* (GE760547) , *C. teleta* (EY614440), *A. mellifera* (XP_392764.1) and *N. vitripennis* (XP_001603909) prohormone 4 sequences.
B : Expression pattern of Cragi-Prohormone 4 encoding gene (CHOYP-LOC658640.1.2) during development.
C : Expression pattern in adult tissues.
D : Expression pattern of Cragi-Prohormone 4 encoding gene (CGG_contig_28466, CGG_contig_14367) in the visceral ganglia during the cycle of reproduction.

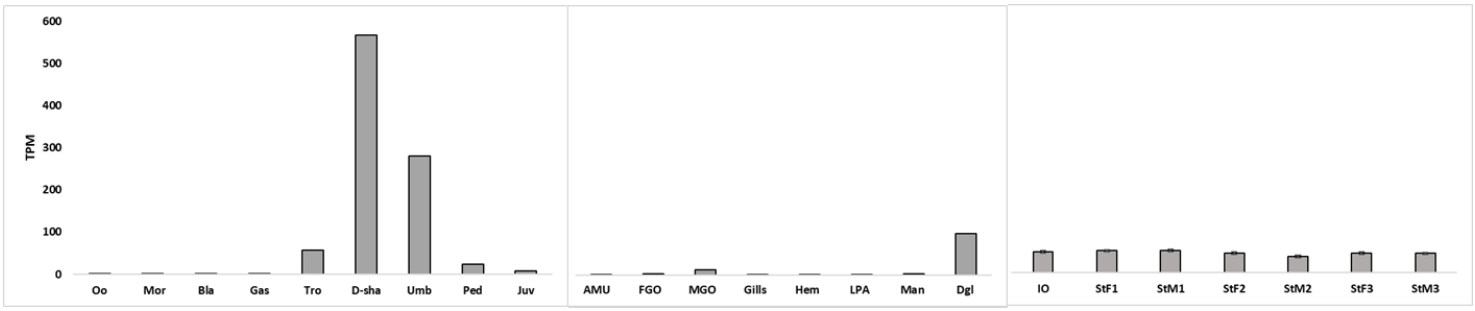
Cragi-QSamide/PXXXamide precursors

A



B

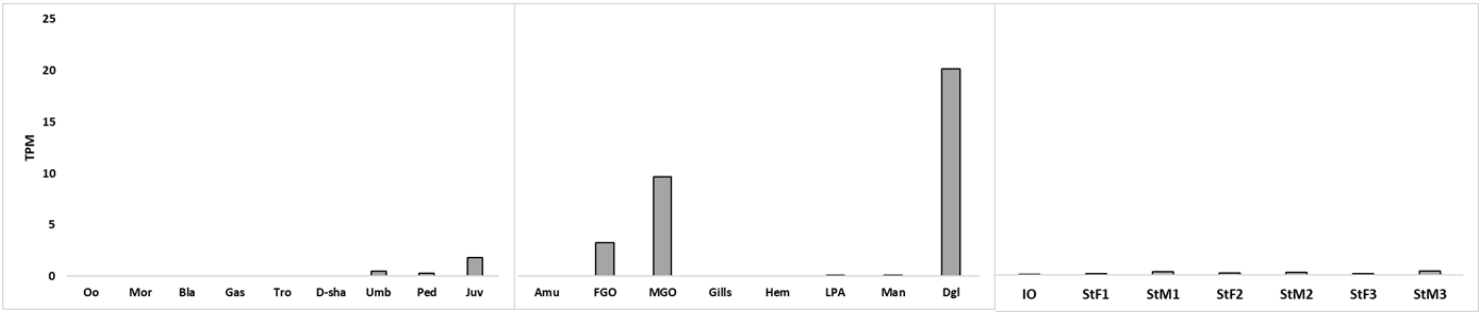
Cragi-QS1



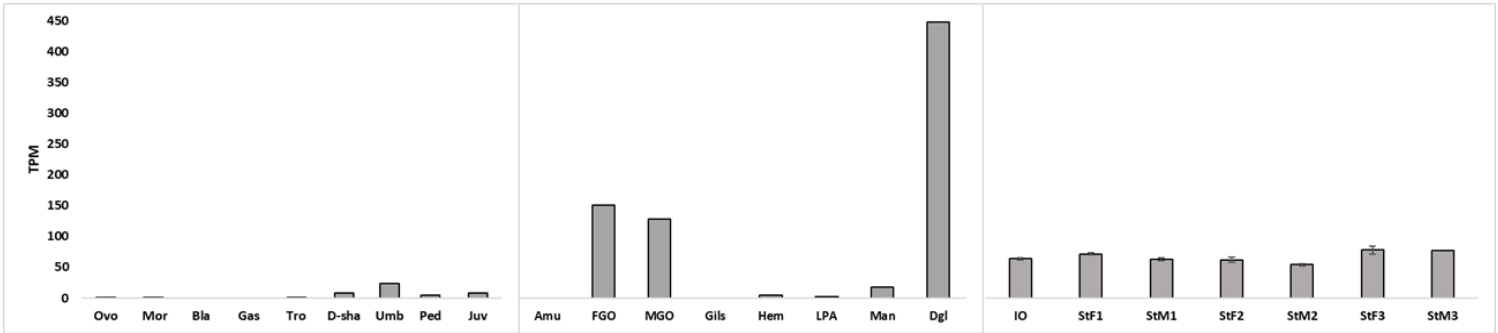
C

D

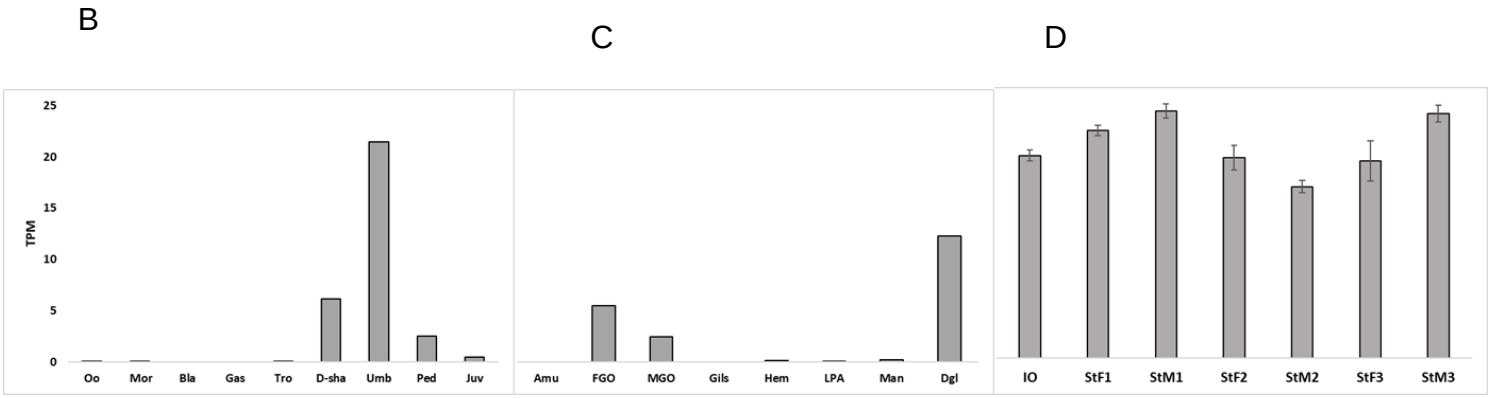
Cragi-QS2



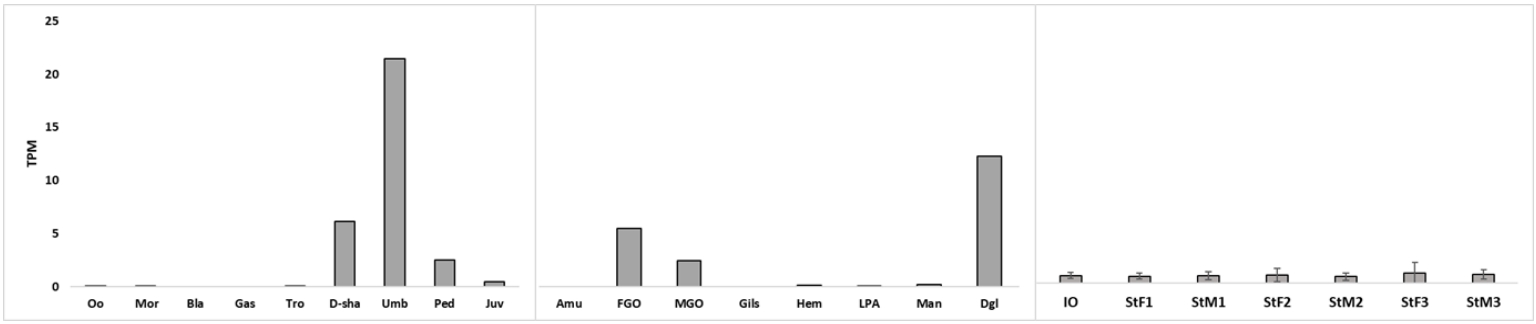
Cragi-QS3



Cragi-PYKI amide



Cragi- QS3-like/PYKIamide



A : Alignment of *C. gigas* Cragi-QSamide1 (CGG_contig_22528, CHOYP_contig_003053, ERK20562, CGI_10005831), Cragi-QSamide2 (CGG_contig_22774, CHOYP_contig_042522) , Cragi-QS3 (CGG_contig_22898, CHOYP_contig_043914), *P. yessoensis* (XP_021353029.1), *L. gigantea* (XP_009051664.1), *A. californica* (XP_012937765.1) and *P. dumerilii* (AHB62379.1) QSamide sequences and Cragi-PYKI amide (CGG_contig_15711, CHOYP-contig-025841) Cragi-PIKI-like/PALIamide (XR-01142063.4), Cragi-QS3-like/PYKIamide (CGG_contig_23609, CHOYP_contig_004027), *L. gigantea* (ESO97822.1), *C. teleta* (ELT91968.1) and *D. pulex* (EFX77601.1) PXXXamide sequences.
B : Expression pattern of Cragi-QSamide1 (CHOYP_contig_003053), Cragi-QSamide2 (CHOYP_contig_042522), Cragi-QSamide3 (CHOYP_contig_043914), Cragi-PYKIamide (CHOYP-contig-025841) and Cragi-QS3-like/PYKIamide (CHOYP-contig-004207) encoding genes during development.
C : Expression pattern in adult tissues.
D : Expression pattern of Cragi-QSamide1(CGG_contig_22528), Cragi-QSamide2 (CGG_contig_22774), Cragi-QSamide3 (CGG_contig_22898), Cragi-PYKIamide (CGG_contig_15711) and Cragi-QS3-like/PYKIamide (CGG_contig_23609) encoding transcripts in the visceral ganglia during the cycle of reproduction.

Lophotrochozoan-specific neuropeptides

Cragi-CCWamide

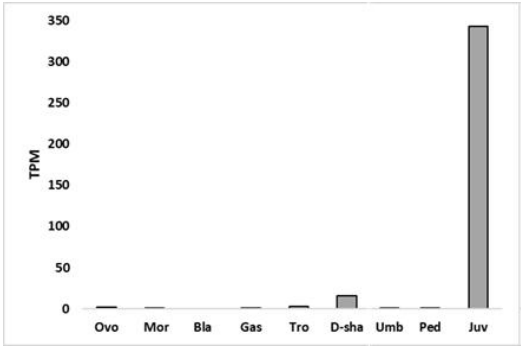
A

```
                1
C._gigas        ---------- ---------- MTYFIAGIWI LLISLN---- -FGSCMYYAD YDDD------
L._gigantea     MNVDHSVVRY TDTRFCGNEC RSWCNTES-- ---------- P----FHCHR YSMRNY----
A._californica  ---------- ---------- MSWTCERLWL LLVLLV---- PLCLSLRYTD YMTSPE----
P._dumerilii    ---------- ---------- ------MRWI IFCFLIVLFS HTVLCWRIQD FANTDNEADD

               61
C._gigas        ------YYNQ NKALDLFKSM DRRNY----- ----YLRQPI CNSWNRHCLP WSNEIQHSCC
L._gigantea     --------ND FDALDKLKTI KRR----VSF RRNQQVEPRT CRGWRAPCIP WTSEPGEACC
A._californica  --------YR HDALKTLRNI KKRLQPSMSV SRRSGYSEQK CRLWNDPCEP WTSDPSRACC
P._dumerilii    DDTSARYRQE RRLLDYLRDV KRRHVKDRQV QK--PPYFLT CSAWQEPCDP WTNNVHTQCC

              121
C._gigas        G--GLACKCN LWGQNCRCTT QLWGR
L._gigantea     TSANLVCRCN LWMQNCRCVG RTWG-
A._californica  NPRRHVCQCN LWLQNCRCGT RLWG-
P._dumerilii    DEDGLVCKCN FWAQNCKCVS RLWGR
```

B



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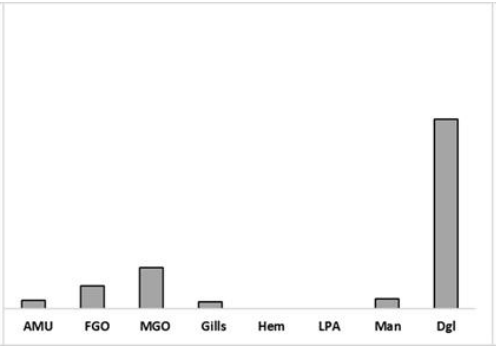
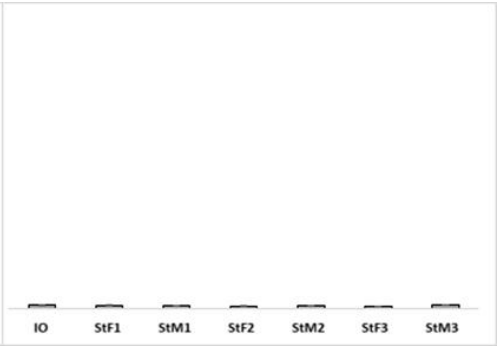


D



A : Alignment of *C. gigas* (CGG_contig_20696), *L. gigantea* (XP_009055999.1), *A. californica* (XP_005090647.1) and *P. dumerilii* (FP002705) CCW sequences.
B : Expression pattern of Cragi-CCWamide encoding gene (CHOYP-contig-025497) during development.
C : Expression pattern in adult tissues.
D : Expression pattern of Cragi-CCWamide (CGG-contig-20696) encoding gene in the visceral ganglia during the cycle of reproduction.

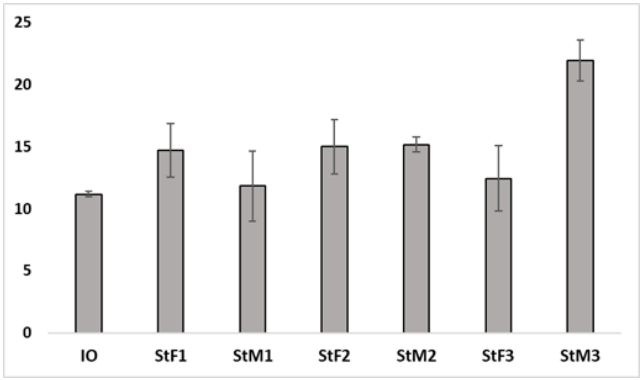
Cragi-CLCCY

A

```
                1
C._gigas        ---------- ---------- -MELKTL--- LLFSC--FLA LASGFAL--I --SGRSSSGL P----YYLKL
P._yessoensis   ---------- ---------- -MGVTTNLLL CLISCSLYIS LAHGQRIPFI RYLRTGGGGY PVMERVYLKS
P._dumerilii    ---------- --------MS SIYKMALLVL CALLL---IA LASSRPSATN Q--------- ---EEEVDQ-
C._teleta       MECRCRPGSI EGLGNTHRRN PMMTLNLLIV VLVSC---IS VADQKRHVDT R--------- ---DASWTWA

               71
C._gigas        PDRDIRETVQ FPKCSRYMET CVPDRDECCG ELTCRNILRD FCLYPLEQCR CNKLRIYQDV RR------
P._yessoensis   SGR-DREPEP EAKCGKPMDS CIPDVTECCN NMQCLNKAHS YCLYPLEMCL CISPTSHNVD ML------
P._dumerilii    --ANVARLKR RTKCGFQLEA CDPYENSCCP GMKCANLFGG YCLSGIEKCM CLPTSYGV-- --------
C._teleta       MSKRPRIAKS KHVCLSQAAE CHPFLDKCCP GMSCMNLIRG FCIYGRETCI CQSRRLHDSF YRVGRPYF
```

D

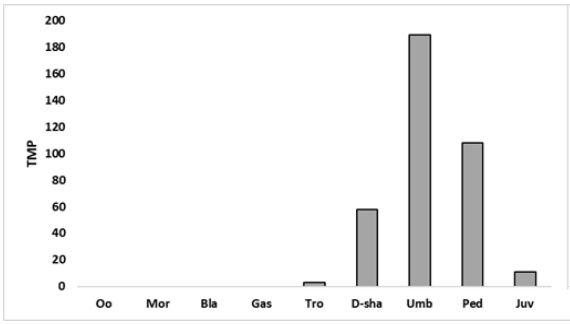


A : Alignment of *C.gigas* (CGG_contig_18747),P. *yessoensis* (XP_021368903.1), *P. dumerilii* (AHB62377.1) and *C. teleta* (ELU16055.1) CLCCY sequences.
D : Expression pattern of Cragi-CLCCY encoding gene (CGG_contig_18747) in the visceral ganglia during the cycle of reproduction.

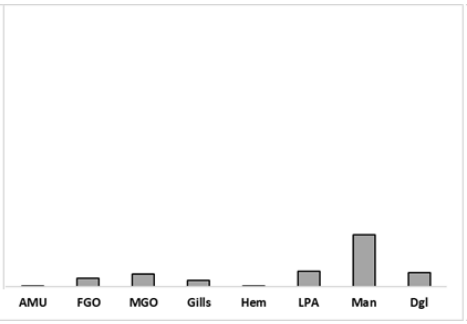
Cragi-HFAamide

A

B



C



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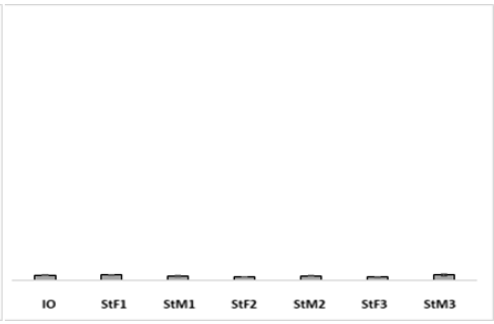
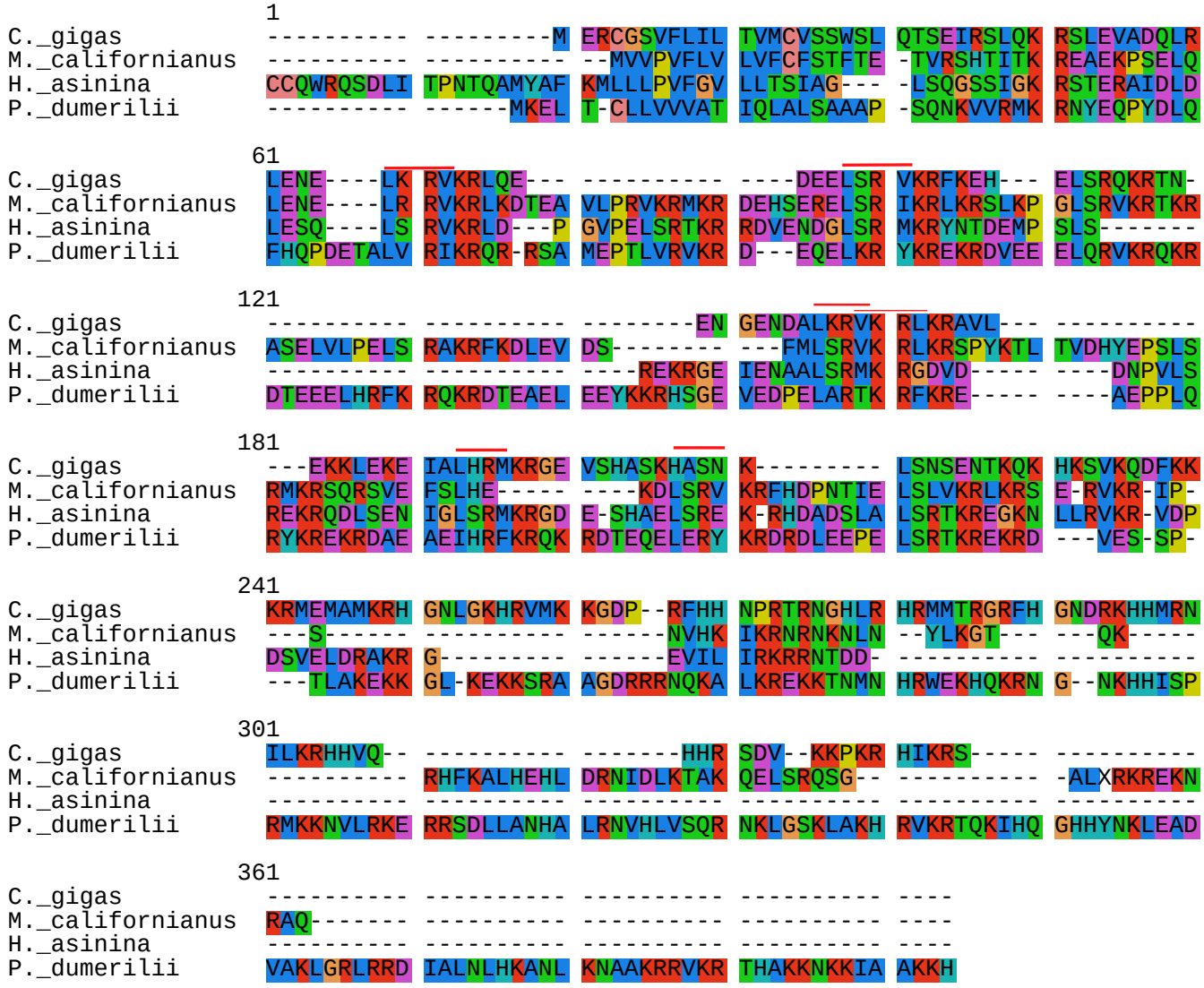


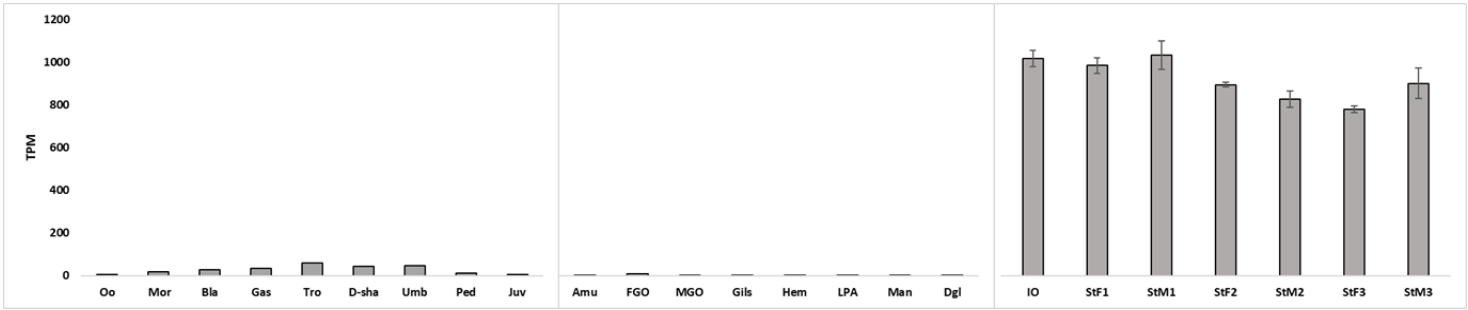
A : Alignment of *C. gigas* (CGG_contig_26304), *A. californica* (EB352987.1), *P. dumerilii* (PMID:24359412) and *C. teleta* (ELU01627.1) sequences.
B : Expression pattern of Cragi-HFAamide encoding gene (CHOYP-contig-035470) during development.
C : Expression pattern in adult tissues.
D : Expression pattern of Cragi-HFAamide encoding gene (CGG_contig_26304) in the visceral ganglia during the cycle of reproduction.

Cragi-LXRX

A



B C D



A : Alignment of *C. gigas* (CGG_contig_08893), *M. californianus* (ES394341.1), *H. asinina* (GT276618) and *P. dumerilii* (Conzelmann et al. 2013) LXRX sequences.
B : Expression pattern of Cragi-LXRX encoding gene (CHOYP-SS1G-08041.1.1) during development.
C : Expression pattern in adult tissues.
D : Expression pattern of Cragi-HFAamide encoding gene (CGG_contig_08893) in the visceral ganglia during the cycle of reproduction.

Mollusk-specific neuropeptides

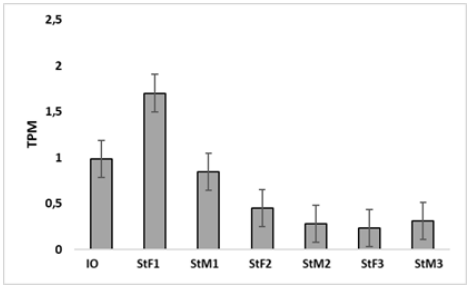
A

Cragi-CCCGS

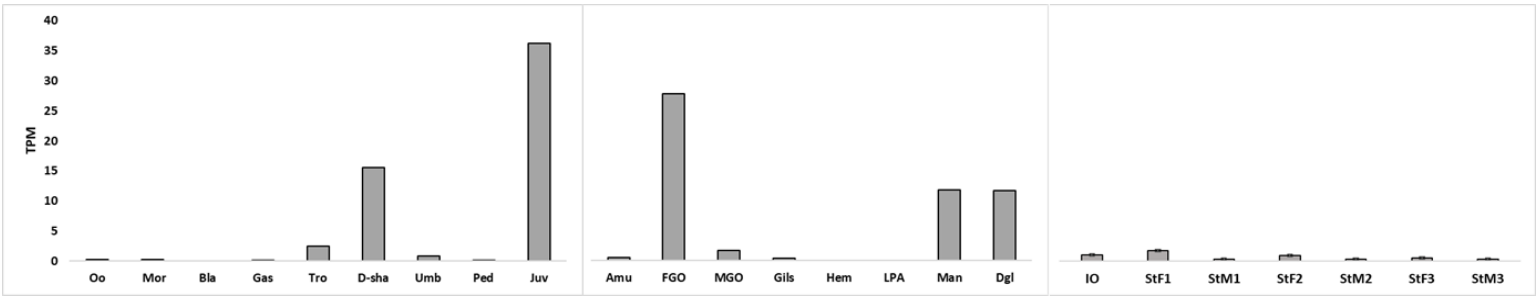
```
                1
Cragi-CCCCGS1   MHSGTSVRLV FLVLVLAVIG EAYNTRRGHS IQKRSAICTD ENGHMWFENE CFCVDSEHEC CCGSGKIHCI
Cragi-CCCGS2    MHSGTSVRLV FLVLILAVIG EAYNTRRGHS IQKRSPVCTD ENGYLWFENE CYCVDFEHKC CCGSGEIHCI

               71
Cragi-CCCCGS1  ESRSCI
Cragi-CCCGS2   ESRSCD
```

D

Cragi-CCCGS 1



Cragi-CCCGS 2



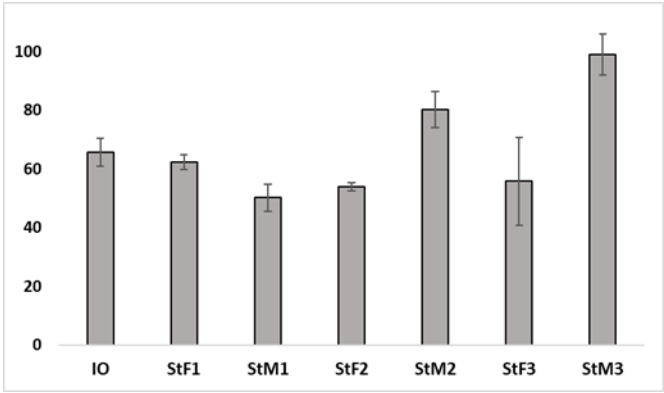
A : Alignment of *C. gigas Cragi-CCCGS1* (CGG_contig_25260, CGG_contig_16024), and *Cragi-CCCGS2* (CGG_contig_26223, CHOYP_contig_014739).
B : Expression pattern of Cragi-CCCGS2 encoding gene (CHOYP-contig-014739) during development.
C : Expression pattern in adult tissues.
D : Expression pattern of Cragi-CCCGS 1 (CGG_contig_25260) and Cragi-CCCGS 2 (CGG_contig_26223) encoding genes in the visceral ganglia during the cycle of reproduction.

Cragi-Clionin

A

```
                1
C._gigas        --MNTCIIAV I---LALTIS TSMVKSSPIF ----PVVELS SMHPRDACLF ICSICFHS--
A._californica  -MTSSMILAV L-AI-SLSCL LTAVTSSPLG P-VQPAISLS KMEPDHACLF MCNICFPDLE
S._officinalis  MVKPTAFFTV -----VLVIA AVFMKPANLY --PTPSVPLE EMDPRDACLF QCSNCFGD--
T._diomedea     -MSPFVCFAS LATIAMFAIL LPLTSATPLE PVIDPVIALE EMEAYHACLF ICHNCFVE--

               61
C._gigas        EENSMLKCAN NFCLSDYGFN --GLGYLWIG KEC---AHWP SLEKFVAADN VLKN------
A._californica  DTGLLLDCSN KVCGPIMAGM CAMEKLVWLG HNCRQ---YD MVQKMWAPHG AL--------
S._officinalis  QYQPLLDCAN DVCPKVKSFS -------EVG YECSTILRHP NLGRRSLFKF ----------
T._diomedea     DKEKMMKCTN QVCGTLYEDK CALDQFIWLG HHCRH---YN MIESMWSSKK RTHDVKDQFN

              121
C._gigas        --
A._californica  --
S._officinalis  --
T._diomedea     LE
```

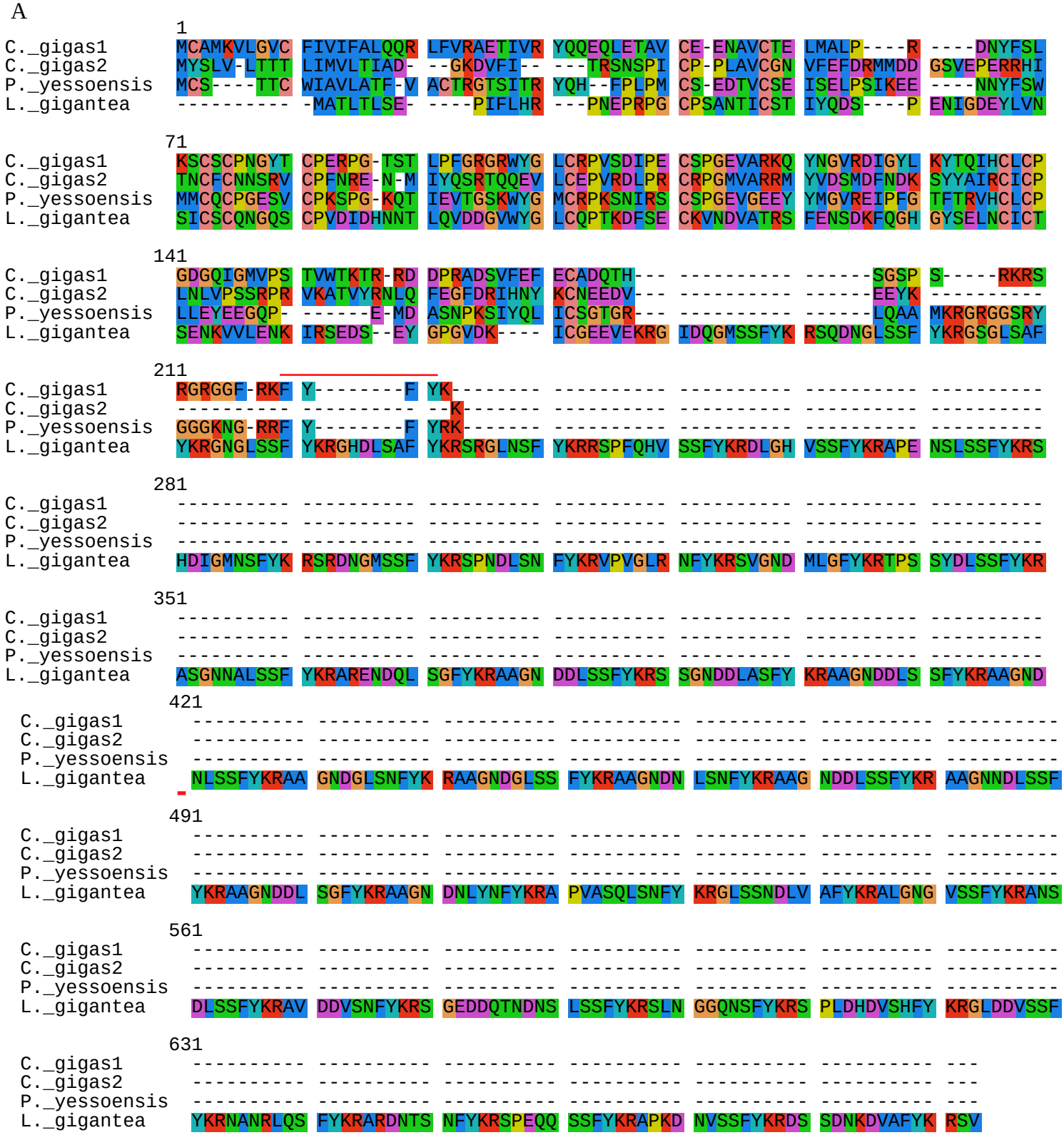
D



A : Alignment of *C. gigas* (CGG_contig_22908, XP_011412322.1), *A. californica* (XP_005099829.1), *S. officinalis* (Zatylny-Gaudin et al., 2016) and T. *diomedea* (I1SKI5) Clionin sequences.
D: Expression pattern of Cragi-Clionin encoding gene (CGG_contig_22908) in the visceral ganglia during the cycle of reproduction.

Cragi-FYFY

A

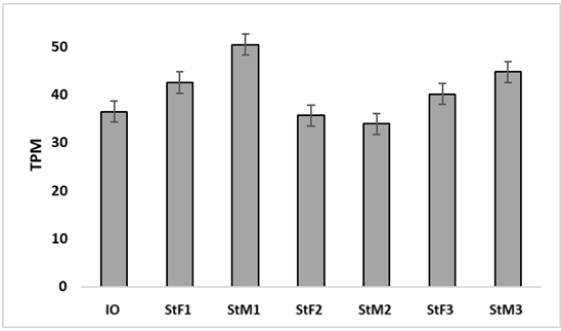

1
C._gigas1 MCAMKVLGVC FIVIFALQQR LFVRAETIVR YQQEQLETAV CE-ENAVCTE LMALP----R ----DNYFSL
C._gigas2 MYSLV-LTTT LIMVLTIAD- --GKDVFI-- ---TRSNSPI CP-PLAVCGN VFEFDRMMDD GSVEPERRHI
P._yessoensis MCS----TTC WIAVLATF-V ACTRGTSITR YQH--FPLPM CS-EDTVCSE ISELPSIKEE ----NNYFSW
L._gigantea ---------- -MATLTLSE- ----PIFLHR ---PNEPRPG CPSANTICST IYQDS----P ENIGDEYLVN
71
C._gigas1 KSCSCPNGYT CPERPG-TST LPFGRGRWYG LCRPVSDIPE CSPGEVARKQ YNGVRDIGYL KYTQIHCLCP
C._gigas2 TNCFCNNSRV CPFNRE-N-M IYQSRTQQEV LCEPVRDLPR CRPGMVARRM YVDSMDFNDK SYYAIRCICP
P._yessoensis MMCQCPGESV CPKSPG-KQT IEVTGSKWYG MCRPKSNIRS CSPGEVGEEY YMGVREIPFG TFTRVHCLCP
L._gigantea SICSCQNGQS CPVDIDHNNT LQVDDGVWYG LCQPTKDFSE CKVNDVATRS FENSDKFQGH GYSELNCICT
141
C._gigas1 GDGQIGMVPS TVWTKTR-RD DPRADSVFEF ECADQTH--- ---------- ------SGSP S-----RKRS
C._gigas2 LNLVPSSRPR VKATVYRNLQ FEGFDRIHNY KCNEEDV--- ---------- ------EEYK ----------
P._yessoensis LLEYEEGQP- ------E-MD ASNPKSIYQL ICSGTGR--- ---------- ------LQAA MKRGRGGSRY
L._gigantea SENKVVLENK IRSEDS--EY GPGVDK---- ICGEEVEKRG IDQGMSSFYK RSQDNGLSSF YKRGSGLSAF
211
C._gigas1 RGRGGF-RKF Y--------F YK--------
C._gigas2 ---------- ---------- --K-------
P._yessoensis GGGKNG-RRF Y--------F YRK-------
L._gigantea YKRGNGLSSF YKRGHDLSAF YKRSRGLNSF YKRRSPFQHV SSFYKRDLGH VSSFYKRAPE NSLSSFYKRS
281
C._gigas1 ---------- ---------- ---------- ---------- ---------- ---------- ----------
C._gigas2 ---------- ---------- ---------- ---------- ---------- ---------- ----------
P._yessoensis ---------- ---------- ---------- ---------- ---------- ---------- ----------
L._gigantea HDIGMNSFYK RSRDNGMSSF YKRSPNDLSN FYKRVPVGLR NFYKRSVGND MLGFYKRTPS SYDLSSFYKR
351
C._gigas1 ---------- ---------- ---------- ---------- ---------- ---------- ----------
C._gigas2 ---------- ---------- ---------- ---------- ---------- ---------- ----------
P._yessoensis ---------- ---------- ---------- ---------- ---------- ---------- ----------
L._gigantea ASGNNALSSF YKRARENDQL SGFYKRAAGN DDLSSFYKRS SGNDDLASFY KRAAGNDDLS SFYKRAAGND
421
C._gigas1 ---------- ---------- ---------- ---------- ---------- ---------- ----------
C._gigas2 ---------- ---------- ---------- ---------- ---------- ---------- ----------
P._yessoensis ---------- ---------- ---------- ---------- ---------- ---------- ----------
L._gigantea NLSSFYKRAA GNDGLSNFYK RAAGNDGLSS FYKRAAGNDN LSNFYKRAAG NDDLSSFYKR AAGNNDLSSF
491
C._gigas1 ---------- ---------- ---------- ---------- ---------- ---------- ----------
C._gigas2 ---------- ---------- ---------- ---------- ---------- ---------- ----------
P._yessoensis ---------- ---------- ---------- ---------- ---------- ---------- ----------
L._gigantea YKRAAGNDDL SGFYKRAAGN DNLYNFYKRA PVASQLSNFY KRGLSSNDLV AFYKRALGNG VSSFYKRANS
561
C._gigas1 ---------- ---------- ---------- ---------- ---------- ---------- ----------
C._gigas2 ---------- ---------- ---------- ---------- ---------- ---------- ----------
P._yessoensis ---------- ---------- ---------- ---------- ---------- ---------- ----------
L._gigantea DLSSFYKRAV DDVSNFYKRS GEDDQTNDNS LSSFYKRSLN GGQNSFYKRS PLDHDVSHFY KRGLDDVSSF
631
C._gigas1 ---------- ---------- ---------- ---------- ---------- ---------- ---
C._gigas2 ---------- ---------- ---------- ---------- ---------- ---------- ---
P._yessoensis ---------- ---------- ---------- ---------- ---------- ---------- ---
L._gigantea YKRNANRLQS FYKRARDNTS NFYKRSPEQQ SSFYKRAPKD NVSSFYKRDS SDNKDVAFYK RSV

B

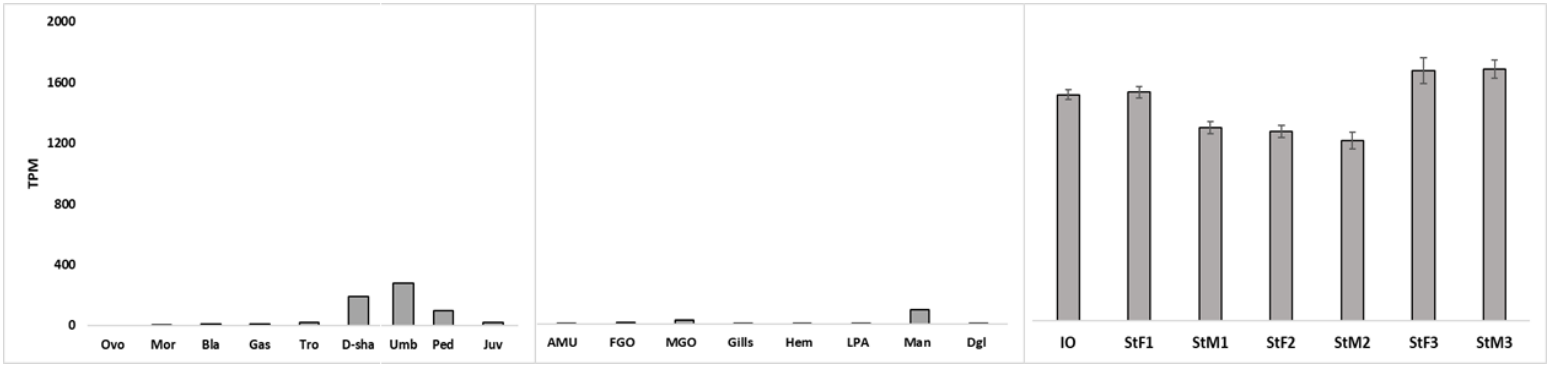
Cragi-FYFY 1

C

D



Cragi-FYFY 2



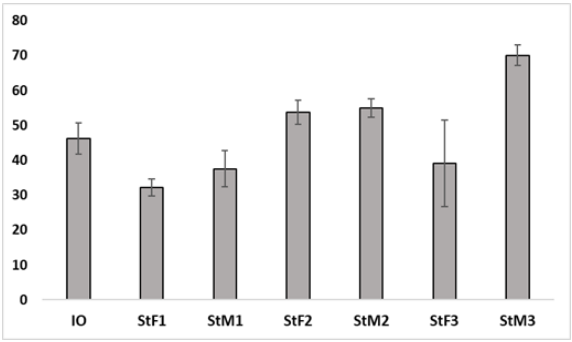
A : Alignment of *C. gigas*1 (CGG_contig_04983), *C. gigas*2 (CGG_contig_26082), *P. yessoensis* (KP79_PYT20341) and *L. gigantea* (XP_009065476.1) FYFY sequences.
B : Expression pattern of Cragi-FYFY2 encoding genes (CHOYP-contog-025391) during development.
C : Expression pattern in adult tissues.
D : Expression pattern of Cragi-FYFY1(CGG_contig_04983) and Cragi-FYFY2 (CGG_contig_26082) encoding genes in the visceral ganglia during the cycle of reproduction.

Cragi-GNamide

A

```
                1
C._gigas        ---MYTHRLT VLLLLICLSL GHAQWAQTFG WGGAGNGKRS AWSTSSNSEK YDCSQNNENI LNVISSLVQL
P._yessoensis   MNSLPYVTVS MLLLLSHCDL GHAQWAQTFG WGGAGNGKRS GITDPTT--- --CN-MDLQL VKLMSTLIQH

               71
C._gigas        EVQRLNYCEN KRRMLTQ---
P._yessoensis   ELKRLKTCSE QKIPQDLLDI
```

D



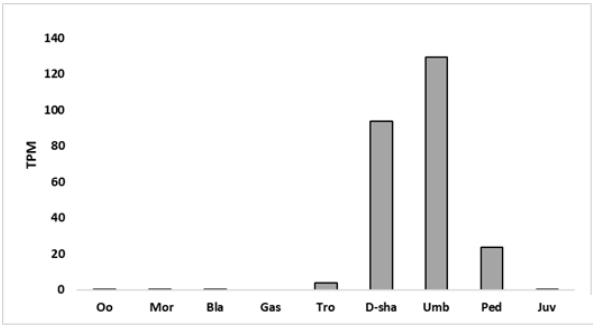
A : Alignment of *C. gigas* (CGG_contig_01838) and *P. yessoensis* (MH045254) sequences.
D : Expression pattern of Cragi-GNamide encoding gene (CGG_contig_01838) in the visceral ganglia dduring the cycle of reproduction.

Cragi-GRWRN

A

```
                1
C._gigas        MVSKECMSLT SLL-VVVLLA SSVVCKDEHY HDNLSDRDVN KRISIFNWRL LYKLYKLKPG LFFR--SRTG
C._virginica    MSPMETLSLR PLIVVVMLIA STAVCQDEKI PEDTTNQGET -KRVFFNWRI LSKIHRERPG FFSISRSRTG
P._yessoensis   MNVRHR---- ---------- ---------- ------NGIT NVLMSMCFLI FFYDVMALPG KQV---SDGG

               71
C._gigas        RAS----SIT QENDGLQKSP ESI-NTPKQG ESPYVPL--P PYLFTSSHLL ANDENEAPKV KRNIGRWRNT
C._virginica    RSS----DFT LENDVNALPL KLLLQSVDTE TLPDFQI--S PDLFPNDNT- -PTDNSLTKE KKNLGRWRNI
P._yessoensis   RKHITSGDFD SL-NTEEIPS ELFLDINDDD GIDDLEHQYE VQQFDDPRY- -VTVEEPGVG KRFLGRWRNL

              141
C._gigas        NWIYSIRPE- ------RRRF SSPYRKK--- ---------- ---------- ---------- ---
C._virginica    NWIYSIRPD- ------GPKF NYLFKTN--- ---------- ---------- ---------- ---
P._yessoensis   NWKLRQRELN KDDVPVGKRF FGRWMNRNYI LSKLEAERKN QVGKRFLGRW RNRNYLLEKM KDE
```

B



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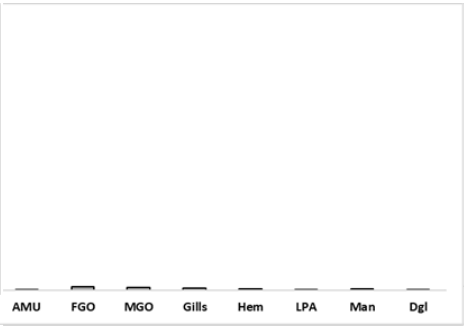
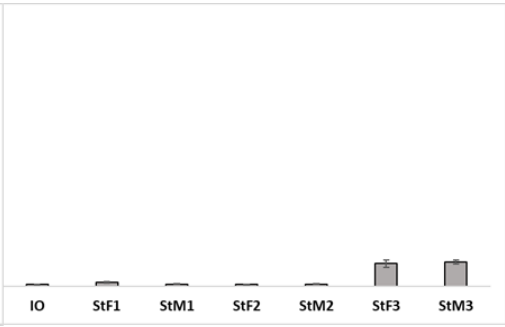


D



A : Alignment of *C. gigas* (CGG_contig_15181), *C. virginica* (XP_022337980) and *P. yessoensis* (XP_021372506) GRWRN sequences.
B : Expression pattern of Cragi-GRWRN encoding gene (CHOYP-contig-008923) during development.
C : Expression pattern in adult tissues.
D : Expression pattern of Cragi-GRWRN encoding gene (CGG_contig_15181) in the visceral ganglia during the cycle of reproduction.

Cragi-GSWN

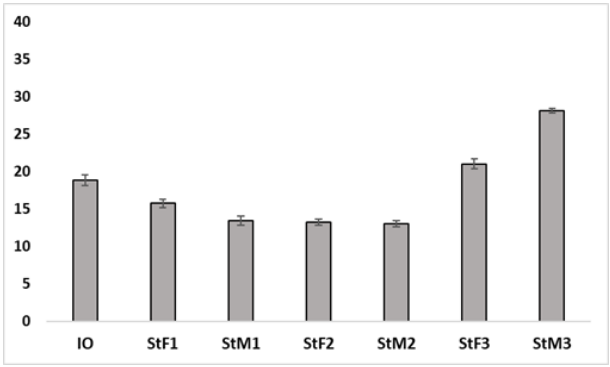
A

```
                1
C._gigas        MPRQLYTALF L---VLVALL LSSTPEVSAK SSCSYACMKT LFSCKRRS-- -----EGDCC
C._virginica    -MSRLYTFLA M---TLIAS- IFTTTEVGAK SSCSYDCMKS LFACKRRS-- -----EGDCC
L._gigantea     --MKRFTLLA L---LLVAIL YISQS--ESK CQGVTKCMVN LFTCKREQIS VN--IAADCC
A._californica  --MELTSPLL LVISSFLAVY VINFTDAGPL DPCVFQCMRG VLKCKREQSV VGLSQKVDCC
P._yessoensis   --MKAFCIL- -----LALAV FMASMTTTSG RSCYFMCLRD LILCKRTT-- -----GTGCC

               61
C._gigas        NKFTECFHTC DLAA---PPC ----AGKRGS WNKRYQVSQG YED-RE-LYP YY--------
C._virginica    NKFTDCFLAC GLSA---PPC ----AGKRGS WNKRYEVPGR YED-GE-LYP YY--------
L._gigantea     KEYFECFNEC KPGSR--PPC KNTAPGKRGS WNKRYSSRYG SDILGD-IIS GY--------
A._californica  QKYKMCYLVC RPDAESVPPC -GGAKGKRGS WNKRTQAANT CNNNGHQHVP DFDDVVDLGQ
P._yessoensis   DKFLG---SC APGCG--VKN AKCKGTKRGS WNKRADYEE- -NPLEE-YYP MI--------

              121
C._gigas        ---
C._virginica    ---
L._gigantea     ---
A._californica  RFY
P._yessoensis   ---
```

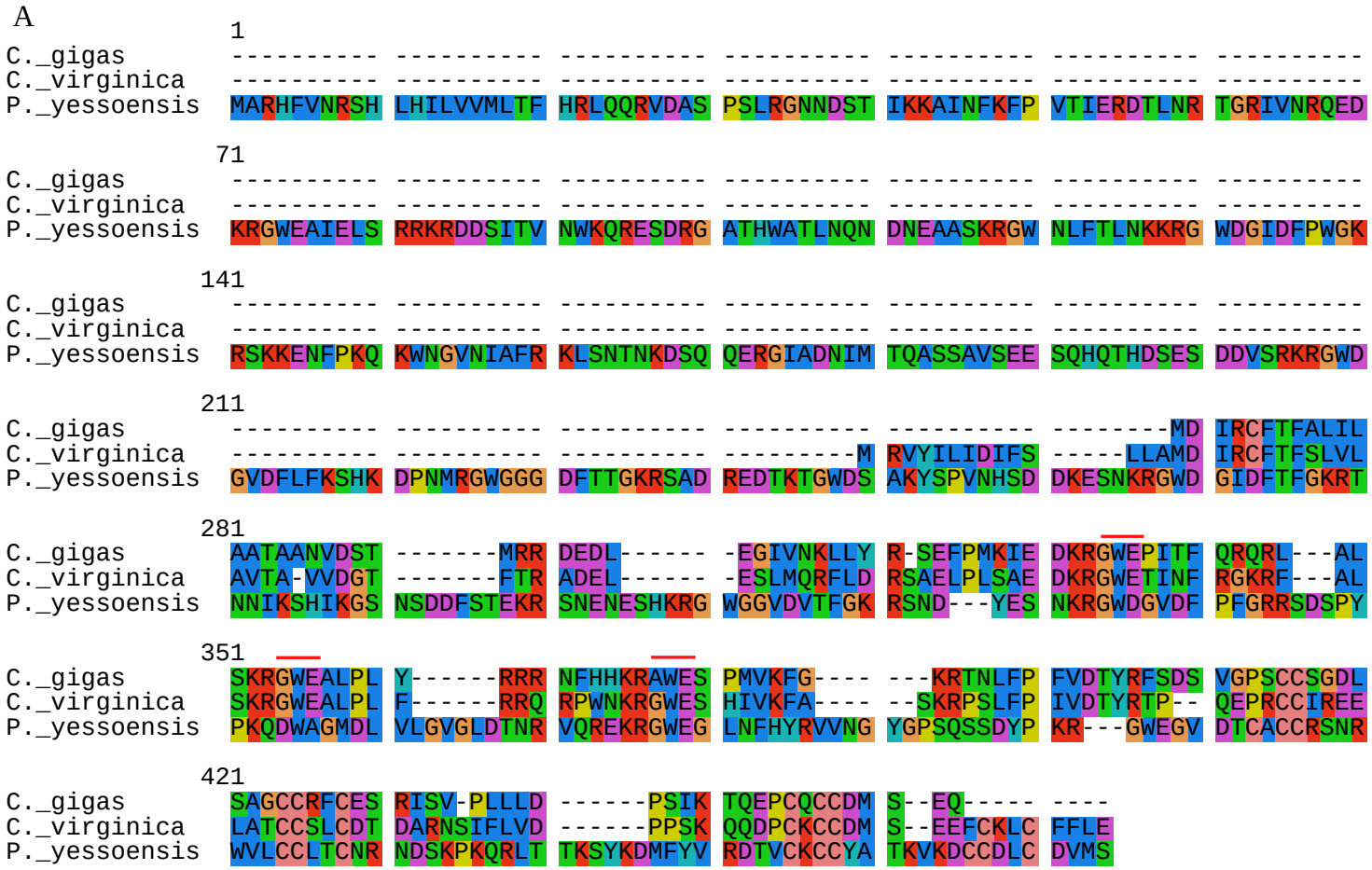
D



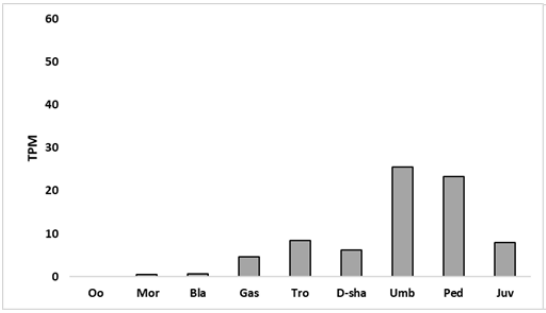
A : Alignment of *C. gigas* (CGG_contig_26157), *C. virginica* (XR_002636430.1), *L. gigantea* (XM_009047650.1), *A. californica* (XM_013087810.1) and *P. yessoensis* (XR_002464777.1) GSWN sequences.
D : Expression pattern of Cragi-GSWN encoding gene (CGG_contig_26157) in the visceral ganglia during the cycle of reproduction.

Cragi-GWE

A



B



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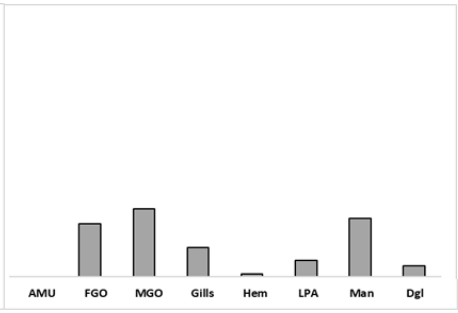
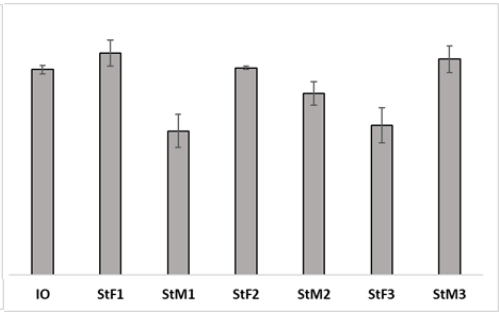


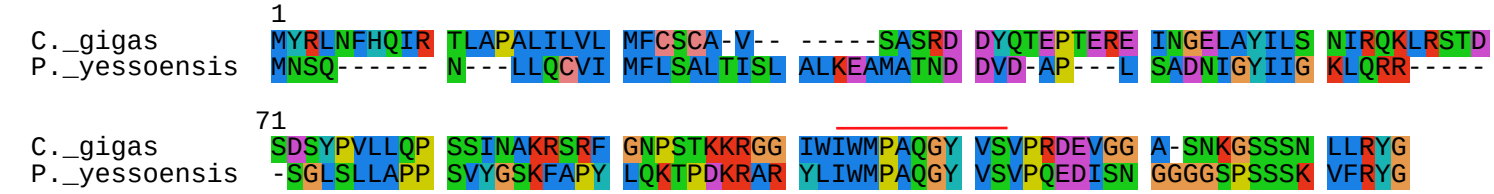
D



A : Alignment of *C. gigas* (CGG_contig_24907), *C. virginica* (XP_022318468.1) and *P. yessoensis* (MH045253) GWE sequences.
B : Expression pattern of Cragi-GWE encoding gene (CHOYP-contig-049345) during development.
C : Expression pattern in adult tissues.

Cragi-IWMPxxGYxx

A



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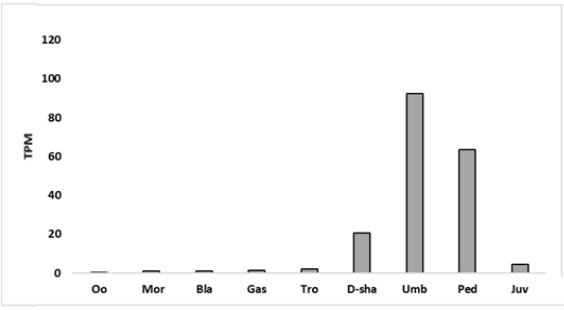

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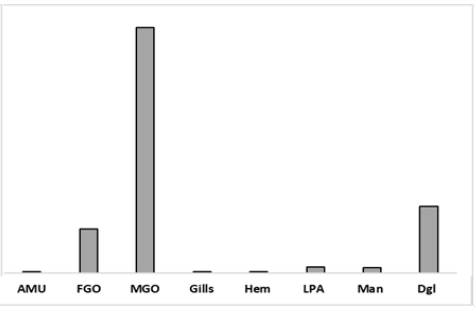

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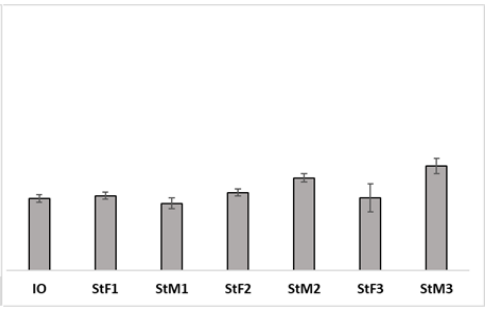


A : Alignment of *C. gigas* (CGG_contig_09620) and *P. yessoensis* (MH045262) IWMPxxGYxx sequences.
B : Expression pattern of Cragi-IWMPxxGYxx encoding gene (CHOYP-contig-025394) during development.
C : Expression pattern in adult tissues.
D : Expression pattern of Cragi-IWMPxxGYxx encoding gene (CGG_contig_09620)in the visceral ganglia during the cycle of reproduction.

Cragi-LXRYamide

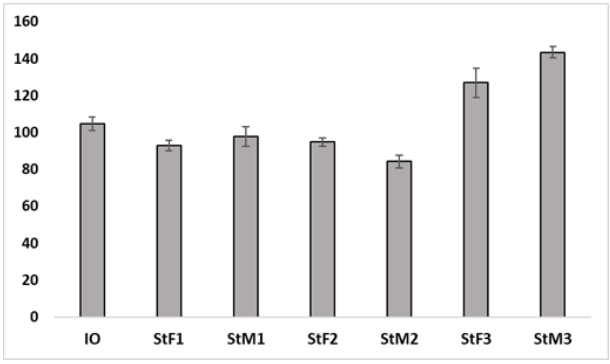
A

```
                1
C._gigas        MMNWGLTVML LAALTCVF-- --KCEDGSDA EGWI------ -----VESTD YNSQ-VSLLK KLIESEMNKE
P._yessoensis   -MH---GQIM LPVILCLISM LSSFTDATDA SGEVPISSGN LLREILESRD FTDVEKEILK YIIFSDVK--

               71
C._gigas        RRQKQFEEEM ARLYMDSSPS ELRPVPRKKS YLWFRSKSSA NPVQTVQTRV SIGQSLHPPP EETNKPKGLF
P._yessoensis   ----DFVERK -EASAESRED SDSGIERKRS HLWAYRQNNI -PI---QTRV AFGRQLMRNS NGHGSNSNLL

              141
C._gigas        RYGKK
P._yessoensis   RYGK-
```

D



A : Alignment of *C. gigas* (CGG_contig_20802) and *P.yessoensis* (AXN93520.1) LXRYamide sequences.
D : Expression pattern of Cragi-LXRYamide encoding gene (CGG_contig_20802) in the visceral ganglia during the cycle of reproduction.

Cragi-RTLFamide

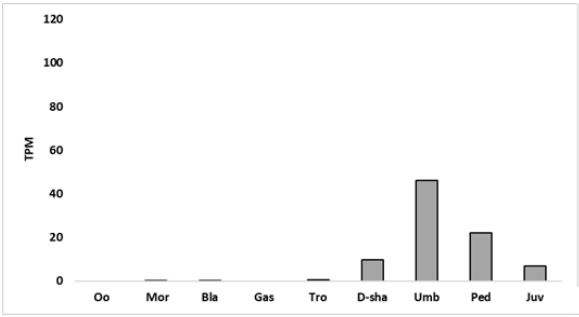
A

```
                1
C._gigas        MKTGVLFYVT IVCGISASVV CARNSQFKHL PVFPGFLNRP LSTSPHFDLQ NLYRTVDKRF NMDNRAFGED
L._gigantea     ---------- ---------- MMMIKHWNRL -IFCGLVVDH LHKSAFY-LQ S------KKY NIDQETYGED

               71
C._gigas        DRFNHFMDWR TLFGKRS--- ---------- ----FGGPDK IGFHNMESPF KSYYQNWRER FFPKKKGANK
L._gigantea     PYFSGVLATH FVYGLQGNNT RYIRANAGCK HFDVYAGPEN VPVSRFSFDA KVSERDWRTT FLPQFRACVE

              141
C._gigas        --
L._gigantea     AG
```

B



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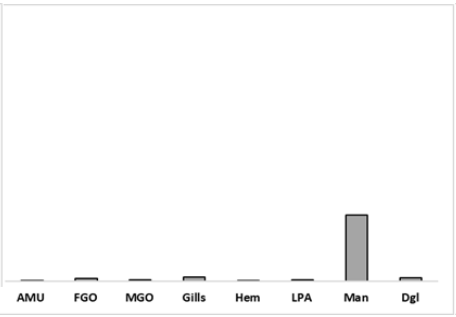
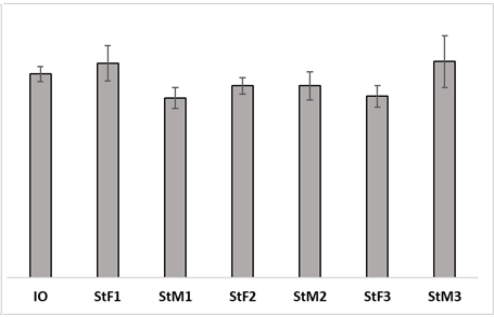


D



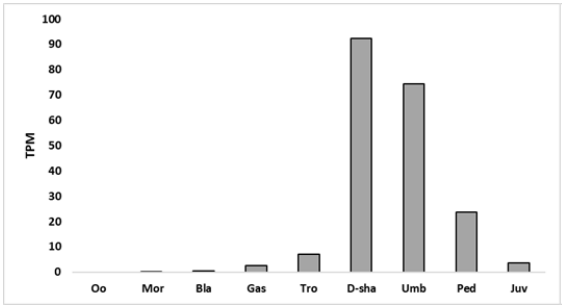
A : Alignment of *C. gigas* (CGG_contig_04103) and *L. gigantea* (XM_009063916.1) RTLFamide sequences.
B : Expression pattern of Cragi-RTLFamide encoding gene (CHOYP_contig_039290) during development.
C : Expression pattern in adult tissues.
D : Expression pattern of Cragi-RTLFamide encoding gene (CGG_contig_04103) in the visceral ganglia during the cycle of reproduction.

Cragi-SLRFamide

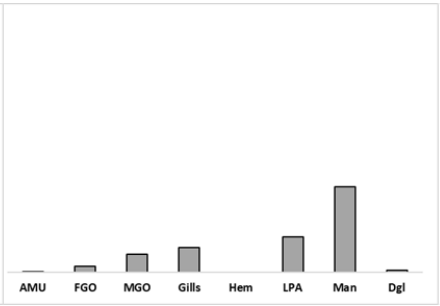
A

```
                1
C._gigas        MNISSAAMLR VFVVALWAIA ILCQ----NT NGLTALENIL A-----EETK DDYLRDVDDD SVLDQRTREE
C._virginica    MNILSNSVLR LFVVALWAIA ILCR----NT NGLTALENIL A-----EETK DDYLRDVDDD SALDQRTREE
P._yessoensis   MEV------T TYKVAIAVLM FVCLMISDSQ CGIP-LNSFL SASNGKLERD ADDVDNFDEE TANIQGVRGQ

               71
C._gigas        DLKKLILKKL RFRELPNDSS SEVLNSLVKR VPDSFRYGDS LVDKVAALLR I-KM-RPTKS PQVRMPSLRF
C._virginica    DLKKLILKKL RFRELPNDSS SEVLSNLVKR VPDSYRFGES LVDKVAALLR F-KM-RPTKS PQVRMPSLRF
P._yessoensis   DLRKLILKKL RFRDLDDQSP PSLLESIQFP VK---RDQDN LVDKVAALLS GLKVRQISDS PSVRMPSLRF

              141
C._gigas        G
C._virginica    G
P._yessoensis   G
```

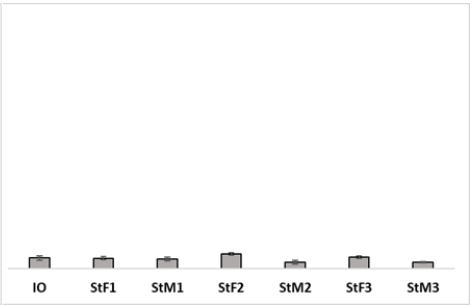
B



C



D



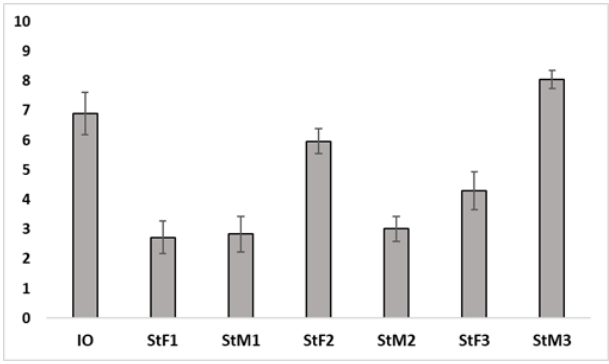
A : Alignment of *C. gigas* (CGG_contig_15407), *C. virginica* (XP_022327616.1) and *P. yessoensis* (XP_021354453.1) SLRFamide sequences.
B : Expression pattern of Cragi-SLRFamide encoding gene (CHOYP-contig-005956) during development.
C : Expression pattern in adult tissues.
D : Expression pattern of Cragi-SLRFamide encoding gene (CGG_contig_15407) in the visceral ganglia during the cycle of reproduction.

Cragi-WGAGamide

A

```
                1
C._gigas        -MWNFATVKC LV------FI LTLPGFLA-- --RIWDY--- --E-YMDRRN ERPPFRGLPD ILRELYHKHS
C._virginica    MMWSLGTFMC LF------FV ITLPGCLA-- --DIWNH--- --G-YRNKNI DRPSFLGLPD LLRGAWTRQS
P._yessoensis   --MQPNIYVC SYVAVVVVIL STIAHCYPSK QIDLFTDSLP DDSYFFEDRS DRRASLAAPV LS-----LSS

               71
C._gigas        QNL-PPNRHI ATVKRGDRYS INDLIAYLKG MVGSDEIYHT GRSTYVRWGA GG--
C._virginica    RDP-SPEHRS PTVKRGDRYS INDLIAYLKG MVGSDEIYHT GRSTYVRWGA GG--
P._yessoensis   RTYHPLQQLI KRGYQNKRYS LNDLIARLRA MVGSDEIRHS GRSSYLRFGA GGKR
```

D



A : Alignment of *C. gigas* (CGG_contig_15208), *C. virginica* (XP_022335259.1) and *P. yessoensis* (A0A210QE07) WGAGamide sequences.
D : Expression pattern of Cragi-WGAGamide encoding gene (CGG_contig_15208) in the visceral ganglia during the cycle of reproduction.