

Table S1. Accession numbers or citations of VP/OT-type peptide and precursor in deuterostomes.

Classification	Abbreviations	Full Species name	Accession numbers or citations
Deuterostomes	<i>H_sapVP</i>	<i>Homo sapiens (vasopressin)</i>	M25647
	<i>H_sapOT</i>	<i>Homo sapiens (oxytocin)</i>	M25650
	<i>S_pli</i>	<i>Styela plicata</i>	AB255884
	<i>C_int</i>	<i>Ciona intestinalis</i>	AB432887
	<i>B_flo</i>	<i>Branchiostoma floridae</i>	XM_002608950
	<i>S_kow</i>	<i>Saccoglossus kowalevskii</i>	FF512954
	<i>S_pur</i>	<i>Strongylocentrotus purpuratus</i>	XM_003724442.2
	<i>A_jap</i>	<i>Apostichopus japonicus</i>	MF401997
	<i>H_gla</i>	<i>Holothuria glaberrima</i>	[53]
	<i>H_sca</i>	<i>Holothuria scabra</i>	
	<i>A_rub</i>	<i>Asterias rubens</i>	GenBank: KT601711
	<i>A_pla</i>	<i>Acanthaster planci</i>	[36]
	<i>O_vic</i>	<i>Ophionotus victoriae</i>	[48]
	<i>O_ara</i>	<i>Ophiopsila aranea</i>	
	<i>A_fil</i>	<i>Amphiura filiformis</i>	
	<i>An_jap</i>	<i>Anneissia japonica</i>	[47]
	<i>A_med</i>	<i>Antedon mediterranea</i>	
	<i>F_ser</i>	<i>Florometra serratissima</i>	

Table S2. Primers used for RACE, RT-qPCR analysis and Plasmid construction.

Primers	Sequence (5'-3')	Used
<i>Holotocin precursor-R</i>	GATTACGCCAAGCTTTGGCTAGGCTT TCAGTGTGTGGAGT	5'RACE
<i>AjHOR-R</i>	GATTACGCCAAGCTTAAATGTAGTCC TCGGTCCAGCGGGG	5'RACE
<i>AjHOR-F</i>	GATTACGCCAAGCTTGAATCACGTGG CCACTACGACAGCC	3'RACE
<i>Holotocin precursor-F</i>	ATGTGTTCTGTGCCGCTCTT	RT-qPCR
<i>Holotocin precursor-R</i>	GCAATGGTCTCCTACGACTTCA	
<i>AjHOR-F</i>	ATGATGACGAGGAACACAATGG	
<i>AjHOR-R</i>	AGCAGACGATATACACGGTTACT	
<i>AjCCKP1-F</i>	GTTAGTCAACCCGAAGGA	
<i>AjCCKP1-R</i>	TGAATATCGTGCGAGGAG	
<i>AjCCKP2-F</i>	TCAGTAATATGCGTCCTTGCT	
<i>AjCCKP2-R</i>	TCCAGTGCTTCCAGTTCATC	

β -Actin-F	AAGGTTATGCTCTTCCTCACGCT	
β -Actin-R	GATGTCACGGACGATTTCACG	
β -Tubulin-F	GAAAGCCTTACGACGGAACA	
β -Tubulin-R	CACCACGTGGACTCAAAATG	
Holotocin precursor-F(ISH)	CCACTGTGAGGTGAATGTGCAAGATGTC	In situ hybridization
Holotocin precursor-R(ISH)	TGTCTCCAATACCGCCTGGCTCGTA	
AjHOR-F(PC)	CGCGGATCCAAAATGGCGGTGCACTACGC	pcDNA3.1(+) plasmid constructed
AjHOR-R(PC)	CCGGAATTCTCAAAAATGCCGAATTAGCGT	
AjHOR-F(EGFP)	CCGGAATTCTGAAAATGGCGGTGCAC TACGC	EGFP plasmid constructed
AjHOR-R(EGFP)	CGCGGATCCCGAAAATGCCGAATTAGC GTTAT	

Table S3. Accession numbers of VP/OT-type, NPS/CCAP/NG peptide-type, and TRH-type neuropeptide receptors.

Abbreviations	Full species name	Accession numbers
<i>H_sapV1aR</i>	<i>Homo sapiens</i>	NM_000706.4
<i>H_sapV1bR</i>	<i>Homo sapiens</i>	NM_000707.4
<i>H_sapV2R</i>	<i>Homo sapiens</i>	NM_000054.5
<i>H_sapOTR</i>	<i>Homo sapiens</i>	NM_001354655.1
<i>A_japVPOTR</i>	<i>Apostichopus japonicus</i>	PIK60987
<i>S_kowVPOTR</i>	<i>Saccoglossus kowalevskii</i>	XP_002735546
<i>S_purVPOTR</i>	<i>Strongylocentrotus purpuratus</i>	XM_779280.4
<i>A_rubVPOTR</i>	<i>Asterias rubens</i>	MK279533
<i>L_staVPOTR</i>	<i>Lymnaea stagnalis</i>	U27464.1 ^a
<i>E_fetVPOTR</i>	<i>Eisenia fetida</i>	AB121771.1
<i>T_casVPOTR</i>	<i>Tribolium castaneum</i>	EU128495.1
<i>H_sapNPSR</i>	<i>Homo sapiens</i>	AY310326.1
<i>B_floNPSR1</i>	<i>Branchiostoma floridae</i>	XP_002605431
<i>B_floNPSR2</i>	<i>Branchiostoma floridae</i>	XP_002605430
<i>A_japNPSR</i>	<i>Apostichopus japonicus</i>	PIK35938
<i>A_rubNGFFYR</i>	<i>Asterias rubens</i>	KP171535
<i>S_purNGFFFR</i>	<i>Strongylocentrotus purpuratus</i>	KP171538
<i>L_gigCCAPR</i>	<i>Lottia gigantea</i>	XP_009061331
<i>C_telCCAPR</i>	<i>Capitella teleta</i>	ELU12393
<i>D_melCCAPR</i>	<i>Drosophila melanogaster</i>	AY219842
<i>T_casCCAPR</i>	<i>Tribolium castaneum</i>	NM_001083326
<i>H_sapTRHR</i>	<i>Homo sapiens</i>	ENSG00000174417
<i>S_purTRHR</i>	<i>Strongylocentrotus purpuratus</i>	XP_783972.2
<i>P_dumTRHR</i>	<i>Platynereis dumerilii</i>	AKQ63029
<i>P_cauTRHR</i>	<i>Priapulus caudatus</i>	XP_014663378
<i>D_pulTRHR</i>	<i>Daphnia pulex</i>	ADZ15312
<i>C_eleTRHR</i>	<i>Caenorhabditis elegans</i>	CCD66234
<i>L_varOTR</i>	<i>Lytechinus variegatus</i>	XM_041620700.1
<i>P_minV1aR</i>	<i>Patiria miniata</i>	XM_038193257.1