Supplementary Material

„Diversity of cilia-based mechanosensory systems and their functions in marine animal behaviour"

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Supplementary Table S1. Source data used for filling out the columns in Figure 6.

Taxon	References					
	Directional sensitivity	**axoneme**	**Microvilli (Mv)/ Stereovilli (St)**	**Lab culture[1]**	**Transformation[2]**	**Genome[3,4]**
Nemertea	NK	**9+2:**apical organ of pilidium larva[1], Proboscis[2]	**St:**apical organ of pilidium larva[1,3], Ciliary band collar cells[3,4], Proboscis [2]	NK	*C. lac.*(M)[5] *M. ala.* (M)[6]	*N. gen.*[7]
Platyhelminthes	NK	**9+2:** epidermal receptors[8,9]	**No St**: epidermal receptors[8] **St:** epidermal receptors[8], larval epithelium[10]	*S. med.*, *D. jap.* [11], *M. lig.*, *S.man.*[12]	*S. med.*, *D. jap.*(F,E,M)[13], *M. lig.*(M)[14], *S.man.*(E, L)[15]	*S. med.*[16], *D. jap.*[17], *M. med.*[18], Tape worms[19], *S.man.*[20]
Annelida	NK	**9+2:** CR neurons[21] **Modified:** statocyst cilia[22]	**No St**: statocyst cilia[22] **St:**CR neurons [21]	*P. dum.*[23–25], *C.tel.*[26], *E. jap.*[27] *H.rob.* [28], *Hirudo spp.* (see table 2 in [29])	*P. dum.*[30,31],*C. tel.* [32], *E. jap.*[33] ,*H.rob.* (all species:M) [34]	*C. tel.*[35], *H. rob.*[35] , *E. fet.*[36,37]
Brachiopoda	NK	**9+2**: collar receptors[38]	**Mv**:LFC[39], collar receptors[38, 40]	NK	NK	*L. ana.*[41]
Phoronida	NK	**9+2:**LFC[42–45]	**St:** LFC[42–47]	NK	NK	*P. aus.*[7]

Taxon	References					
	Directional sensitivity	axoneme	Microvilli (Mv)/ Stereovilli (St)	Lab culture[1]	Transformation[2]	Genome[3,4]
Bryozoa	NK	**9+2:**AFC[48,49]	**Mv:** AFC[48,49],**St:** LFC[50]	*E. sul.*[51]	NK	*B. ner.*(T)[52]
Gastrotricha	NK	**9+2:**Statocyst[53], head[54]	**St:**Statocyst[53], head[54]	*L.squ.* (C)	NK	*L.squ.* T)[55], *Meg.* (T)[55], *D. asp.*(T)[55]
Mollusca	**NDS.:** gastropod statocyst cells [56] **DS:** cephalopod statocyst cells [57]	**9+2:** statocyst cilia [58–60], epithelial re ceptors[61]	**No St:** statocyst cells[58–60] **St:**tentacle re ceptors[61,62]	various (see table 2 in [29])	various (e.g. *C. for.*(M) [63], *L. stag.*(M)[64]), bivalves (M/L) [65,66],*C. gig.*(F)[67]	Several species[68]
Entoprocta	NK	**9+2:** Apical organ cells [69]	**St:** Apical organ cells[69]	NK	NK	*B.elo.*(T)[70]
Chaetognatha	NK	**9+2:**ciliary fence [71,72]	**St:**ciliary fence [71,73]	Various *(e.g. P. got., S. his.)* [74–76]	*P. got.*(M)[77]	various[78, 79]
Rotifera	NK	**9+2:** touch bristles[80], anterior sensory endings[80], antennae[80] **9+0:**palpar organ [80]	**No St**: touch bristles[80],antennal receptors[81]	*B. pli./man, A. sie.*	*B. pli./man.*(L/E)[82,83]	Various species [84–87]
Micrognathozoa	NK	**9+0:** sensory bristles [88]	NK	NK	NK	*L.mae.*(T) [89]
Gnathostomulida	NK	**9+2**: ciliary cirri [90,91] Spiral ciliary	**St:** ciliary cirri [90,91] (referred by [94])	NK	NK	Various (T) [89]

Taxon	References					
	Directional sensitivity	axoneme	Microvilli (Mv)/ Stereovilli (St)	Lab culture1	Transformation 2	Genome3,4
		organ[92,93]				
Arthropoda	**DS:** bristle receptors[95]	**9+0:** chordotonal receptors[96] **Mod:** campaniform sensilla[96]	**NoSt:** Type I receptor cells	Several species (marine *P. haw.*[97])	Several species (F,M, E)	Several species
Onychophora	NK	**Mod:**antenna bipolar cell[98], upside-down cell[98]	**St:**upside-down cell[98]	NK	NK	*E. row.*(T)[99, 100]
Tardigrada	NK	**Mod:** cirri ciliary cells[101], anterio-lateral sensory field, sub-oral sensory region [102]	**NoSt:** cirri ciliary cells[101]	NK	*H. exe* (M)[103]	*H. exe*[104]. *R. var.*[105]
Nematoda	NK	**9+0:**metaneme proprioceptor[106] **Modifed**: labial and setal mechanoreceptors[107–109], Mechanosensillum [110],	**NoSt:** labial and setal mechanoreceptors[107,108] **St(like):** metaneme proprioceptor [106]	Not widespread (only one report found[111])	Various species (M,B,F,S)[112–114]	Several species[115]
Nematomorpha	NK	NK	NK	*P. var.*[116]	NK	*Gordius* sp.(T)[117]
Loricifera	NK	NK	**St:**N-flosculi[118,119]	NK	NK	*A. ele.*(T) [89]

Taxon	References					
	Directional sensitivity	**axoneme**	**Microvilli (Mv)/ Stereovilli (St)**	**Lab culture**[1]	**Transformation**[2]	**Genome**[3,4]
Kinorhyncha	NK	**9+0:** Sensory spot Type I & II cells[120] **Mod:** scalid type I[121–123] **9+2:** sensory spot receptor [124]	**St:** Sensory spot type I cell [120,122] **NoSt:** scalid type I[121,122], sensory spot type II cell[120]	NK	NK	*Pycnophyes sp.* (T)[117]
Priapulida	NK	**9+2:** epithelial receptors [125,126] **9+0:** epithelial receptors (distally)[125], type 2 receptors [127]	**St:** epithelial receptors[125,126], scalid receptors [127,128]	NK	NK	*H. spi.*(T) [129], *T. cor.* (T)[89]
Vertebrata	**DS:** Hair cells	**9+2:** hair cells	**St:** hair cells	Several species	Several species	Several species
Tunicata	**DS(tentative):** graded length of stereovilli [130]	**9+2:** coronal sensory cell [130] **Mod:** Langherans receptors [131]	**No St:** coronal sensory cell[130], Langherans receptors [131] **St:** coronal sensory cell [130]	Various species (e.g. *Ciona* [132], *O.dio.* [133,134], *D. geg.*[135])	Various species (M,E)	Various species [136](e.g. *C. int.*[137].,*O. dio.*[138], *S. tho* [139])
Cephalochordata	NK	**9+2:** Type 1 cell[140] **Mod:** Type 2 cell[140,141]	**No St.**: oral spine cell[142] **St:** Type I cell[141]	Various species [143–145]	*Branch. spp.*(M)[145,146]	*Branch. spp.*[147,148]
Hemichordata	NK	**9+2:** tentacle cilia[149]	Mv: tentacle cilia[149]	NK	*S.kov.* (M) [150,151]	*S. kov./P. fla.*[152]

Taxon	References					
	Directional sensitivity	axoneme	Microvilli (Mv)/ Stereovilli (St)	Lab culture[1]	Transformation[2]	Genome[3,4]
Echinodermata	NK	**9+2:**ciliary band cells[153] Ciliated cells pedicellariae[154,155]	Mv: ciliary band cells[153] Podial sensory receptors[156] Ciliated cells pedicellariae[154,155] **NoSt:**sea cucumber statocyst cells [157]	Various species (C)[158,159]	Various species (M)[160]	Various species [161]
Xenacoelomorpha	**DS (tentative):**Structural asymmetry of stereovilli [162,163]	**9+2:** Epidermal sensory cells[162,163]	**No St:** Type 1 epidermal sensory cells [162] **St:** Type 2 epidermal sensory cells [162,163]	*H. mia.* [164] *I. pul., C. mac.* [165] *S. ros.*[166]	*H. mia.*(M, S), *I. pul.*(S)[167], *N. fus.*[168]	Various species (T)[169]
Cnidaria	**DS:**hair bundles[170] **DS(tentative):**C,F & T cells [171,172] **NDS:**Cnidocytes[173]	**9+2:** C,F & T cells [171,172], statocyst cells hair bundle cell[174] **Mod:**nematocyte[175], Concentric hair cells[176]	**NoSt:** Type A statocyst sensory cells[177] **St:**nematocyte C,F & T cells [171,172] hair bundle cell[174] proprioceptor [178]	Various species(e.g. *N.vec.* [179], *C. hem.*[180])	Various species(S, M,E)[181–185],	Various species[186]
Placozoa	NK	NK	NK	*T.adh.* [187]	*T. adh.*(S)[188]	*T.adh.*[189]
Ctenophora	**DS:**balancer cilia[190]	**9+2:** Balancer cilia[190] Tastborsten[191]	**No St:** Balancer cilia[190] **St(like):** actin peg[191]	Various species[192]	*M.lei.*(M)	*P. bac.*[193], *M. lei.* [194]
Porifera	NK	**9+0:** osculum biciliated cells [195]	(Mv): apopylar cells [196]	variou sspecies[197]	*T. wil.*(F) [198],, *E. mue.*(F)[198], *S.*	*A. que.*[200], *S.car.*, *X. tes.*[201]

Taxon	References					
	Directional sensitivity	**axoneme**	**Microvilli (Mv)/ Stereovilli (St)**	**Lab culture1**	**Transformation 2**	**Genome3,4**
				(e.g. *S. dom.*, *E. mue.*)	*dom.*(L) [199]	
Choano-flagellates*	NK	**9+2:** flagellum	NK	*S.rose.*[202]	*S.rose.*(E)[202]	*M.bre.*[203], *S.ros.*[204], various species (T) [205]

NOTES:

1 Marine species where the complete life cycle can be reproduced in the lab are included. Non-marine aquatic species are underscored. If no culturable aquatic species exist for a particular taxon, species that can be easily obtained from commercial or other suppliers throughout the year are also included (C). Seasonal species are marked (S).

2 Representative reports in any species of a given phlyum are included. Transformation methods considered: microinjection (M), biobalistics (B), electroporation (E), lipofection (L), feeding (F), or soaking (S). Reports in non-aquatic species are included as they may spur development in aquatic/marine species.

3 Only species with assembled and published genomes are included. If no genome sequence is available for a given taxon, species with sequenced transcriptome (T) are included.

4 List of sequenced animal genomes available in Wikipedia: https://en.wikipedia.org/wiki/List_of_sequenced_animal_genomes

*No evidence to our knowledge of mechanosensitivity of the choanoflagellate cilium.

Species abbreviations

A. ele.**: Armorloricus elegans;* ***A. que.: *Amphimedon queenslandica*; ***A. sie.**: Asplanchna sieboldi;* ***B. elo.**: Barentsia elongata*; ***B. ner.**: Bugula neritina;* ***B. pli./man.**: Brachionus plicatilis/manjavas;* **Branch. spp.**: *Branchiostoma spp.*; ***B. ste.**: Berghia stephanieae;* ***C.for.**: Crepidula fornicata*; ***C.gig:*** Crassostrea *gigas*; ***C. int.**: Ciona intestinalis;* ***C. lac.**: Cerebratulus lacteus;* ***C. mac.**: Convolutriloba macropyga;* ***D.asp.**: Diuronotus aspetos;* ***D. geg.**: Dolioletta gegenbauri;* ***D. jap.**;Dugesia japonica*; ***E. jap.**: Enchytraeus japonensis*; ***E. fet.**: Eisenia fetida;* ***E. mue.**: Ephydatia muelleri;* ***E. row.**: Euperipatoides rowelli*; ***F. sul.**: Fredericella sultana*; ***H. exe.(duj.)**: Hypsibius exemplaris (dujardini);* **Hirudo spp.**; ***H. mia.**: Hofstenia miamia,* ***H.rob.**: Helobdella robusta*; ***H. spi.**: Halicryptus spinulosus;* ***H. spp**: Hirudo spp.,* ***I. pul.**: Isodiametra pulchra;* ***L. ana.**:* Lingula anatina; ***L. mae.**: Limnognathia maerski,**L.squ.**: Lepidodermella squamata*, ***L.sta.**: Lymnaea stagnalis;* ***Meg.** : Megadasys sp.* ***M. ala.**: Maculaura alaskensis*, ***M. lei.**: Mnemiopsis leidy;,* ***M. lig.**: Macrostomum lignano;* ***N. fus.** : Neochildia fusca*; ***N. gen. :** Notospermus geniculatus;* ***N.vec. :*** *Nematostella vectensis*; ***O. dio.**: Oikopleura dioica;* ***P. aus.**: Phoronis australis;* ***P. bac.**: Pleurobrachia bachei;* ***P. fla.**: Ptychodera flava;* ***P. got.**: Paraspadella gotoi*; ***P. haw.** : Parhyale hawaiensis*; ***P. var.**: Paragordius varius*; ***R. var.**: Ramazzottius varieornatus;* ***S. car.**: Stylissa carteri*; ***S. dom.**: Suberites domuncula;* ***S. kow.**: Saccoglossus kowalevskii;* ***S. man.**: Schistosoma mansoni,* ***S. his.**: Sagitta hispida*; ***S. med.** : Schmidtea mediterranea;* ***S. pur.: ; S. ros.**: Symsagittifera roscoffensis;* ***S. rose.**: Salpingoeca rosetta;* ***S.tho.**: Salpa thompsoni;* ***T.cor.**: Tubiluchus cf. corallicola*; ***T. wil.**: Tethya wilhelma*, ***X. tes.:*** *Xestospongia testudinaria*

Other abbreviations: **AFC**: abfrontal cilia; DS: directionally sensitive; LFC: laterofrontal cilia, **NDS**: not directionally sensitive, **NK**: not to our knowledge

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