

Supplement Table S1. Full list of taxa and sequences used in the present study. Accession numbers of the sequences reported for the first time are given in bold.

1- in Genbank as *Styracaster paucispinus*

2 - in Genbank as *Porcellanaster nudus*

3 - in Genbank as *Porcellanaster* cf. *ceruleus*

4 - in Genbank as *Porcellanaster* cf. *ceruleus*

5 - in Genbank as *Porcellanaster* cf. *pedunculatus*

6 - in Genbank as *Styracaster armatus*

Order	Family	Species	Voucher	COI	16S rRNA
Paxillosida	Porcellanasteridae	<i>Abyssaster paucispinus</i> ¹	NHMUK:MCF 185546345	KU519573	KU519527
		<i>Abyssaster tara</i>	KB1 2124	KY908346	KY908362
		<i>Caulaster</i> sp.A (1) ²	BIO1216	KY908349	KY908357
		<i>Caulaster</i> sp.A (2) ³	NHM 168	KU519568	-
		<i>Caulaster</i> sp.A (2) ⁴	NHM 253	-	KU519525
		<i>Caulaster pedunculatus</i> ⁵	AI2169-1/ AI2169-2	KY908350	KY908358
		<i>Eremicaster crassus</i>	KB2 085	OQ866314	OQ859152
		<i>Eremicaster pacificus</i>	RBCM EC00029	HM542928	-
		<i>Eremicaster pacificus</i>	RBCM EC00036	-	HM543144
		<i>Eremicaster vicinus</i>	ErvicLV71-10-8-1	MW591939	MW591925
		<i>Hyphalaster inermis</i>	AI1611-1/ AI1611-2	KY908347	KY908360
		<i>Porcellanaster ceruleus</i>	MR/V386-1/ MR/V386-2	KY908348	KY908359
		<i>Sidonaster vaneyi</i>	Ech245	EU870027	
		<i>Styracaster caroli</i>	Vit-02101	OQ866315	OQ859153
		<i>Styracaster chuni</i>	JC037-1	KY908353 ⁶	OQ865224

	<i>Styracaster horridus</i>	Vit-02056	OQ866316	OQ859154
	<i>Styracaster longispinus</i>	StlonSO223-11-10-1	MW591940	MW591926
	<i>Styracaster robustus</i>	-	KY908354	KY908361
	<i>Styracaster yapensis</i>	AS040	MF582454	MF595880
	Styracaster sp.	DM-02608	OQ866317	OQ859155
	<i>Thoracaster cylindratus</i>	Vit39-1	KY908351	
		Vit39-2		KY908363
	<i>Vitjazaster djakonovi</i>	KB223-2/ KB223-4	KY908352	KY908356
Ctenodiscididae	<i>Ctenodiscus crispatus</i>	BIOUG<CAN>:HLC-24199/ CASIZ 173281	HM473909	EU072940
Pseudarchasteridae	<i>Pseudarchaster alascensis</i>	RBCM EC00145/RBCM EC00143	HM542963	HM543149
	<i>Pseudarchaster parelii</i>	Unknown/CASIZ 120380	AF217384	EU722965
Luidiidae	<i>Luidia foliolata</i> 1	Unknown/CASIZ 105625	AF217380	EU072952
	<i>Luidia foliolata</i> 2	NEOCAL07-0114/AMCC 113401	HM542257	DQ297097
Astropectinidae	<i>Astropecten articulatus</i>	AMCC 113394/Aarti-SCa2	DQ380242	FJ177546

		<i>Astropecten duplicatus</i>	ACAP024/Adup1-SCa2	KC626152	FJ177540
		<i>Dipsacaster borealis</i>	RBCM EC00025/CASIZ 143420	HM400306	EU722960
		<i>Psilaster charcoti</i>	A02.14T/A04N.04	GU227097	GU226974
		<i>Psilaster pectinatus</i>	RBCM EC00040/RBCM EC00044	HM542973	HM543150
		<i>Thrissacanthias penicillatus</i>	RBCM EC00045/CASIZ 115075	HM542995	EU722968
Notomyotid a	Benthopectinidae	<i>Benthopecten claviger</i>	RBCM EC00053/RBCM EC00053	HM542922	HM543141
		<i>Benthopecten acanthonotus</i>	RBCM EC00051/RBCM EC00050	HM542920	HM543140
Valvatida	Linckiidae	<i>Linckia laevigata</i> 1	BOL_L15/ AMCC 114339	KF834598	DQ297095
		<i>Linckia laevigata</i> 2	BOL_L20/unknown	KF834601	AY279318