

Supplementary Table S1- List of studies fish spices included in the current analysis

Phylogeny column - copied from NCBI taxonomy

Fish Specie (Common name) - as found in the reference and NCBI taxonomy

Centriole references – The paper and books that used to interprets the centriole number and status

Centrioles number – **Canonical** centriole number in the sperm

PC – The PC status in the studies species

DC – The DC status in the studies species

Reproduction mode – the type of fertilization (internal or external)

Reproduction references – The paper and books that used to identify if fertilization is internal or external

Color code:

Internal fertilisation with atypical centriole

Internal fertilisation with 1 centriole

External fertilisation with 1 centrioles

Internal fertilisation with 2 centriole

External fertilisation with 2 centrioles

Phylogeny	Fish Specie	Centriole references	Centrioles number	PC	DC	Reproduction	Reproduction reference
Vertebrata; Cyclostomata; Hyperoartia; Petromyzontiformes; Petromyzontidae; Lampetra	<i>Lampetra planeri</i>	(Jamieson, 1991)	2	Canonical	Canonical	External spawning	(Malmqvist, 1980)
	<i>Lampetra fluviatilis</i>	(Jamieson, 1991)					
	<i>Lampetra japonica</i>	(Jamieson, 1991)					
Vertebrata; Cyclostomata; Myxini; Myxiniformes; Myxinidae; Eptatretinae; Eptatretus	<i>Eptatretus burgeri</i> (Inshore hagfish)	(Morisawa, 2005)	2	Canonical	Canonical DC is present	external	(Powell et al., 2005)
Vertebrata; Gnathostomata; Chondrichthyes (cartilaginous fishes); Elasmobranchii; Selachii; Squalomorphii; Squaliformes; Squalidae; Squalus	<i>Squalus suckleyi</i> (Pacific spiny dogfish)	(Stanley, 1971)	2	Canonical	Canonical (in spermatid only)	Internal - viviparous - no sperm casting	(Demirhan and Seyhan, 2006)
Vertebrata; Gnathostomata; Chondrichthyes; Elasmobranchii; Batoidea; Rhinopristiformes; Glaucostegidae; Glaucostegus	<i>Rhinobatus cemiculus</i>	(Mattei, 1970)	2	Canonical	Canonical	Internal – Gustation- no spermcasting	(Diatta et al., 2004)
Vertebrata; Gnathostomata; Chondrichthyes (cartilaginous fishes); Holocephali; Chimaeriformes; Chimaeridae; <i>Hydrolagus</i>	<i>Hydrolagus coliei</i>	(Stanley, 1983)	1 (confirmed)	Undetected	Canonical	Internal - no sperm casting	(Reist, 2019)
Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Chondrostei; Acipenseriformes; Acipenseridae; Acipenserinae; Acipenserini; Acipenser	<i>Acipenser persicus</i> (Persian sturgeon) ;	(Hatef et al., 2011) (Jamieson, 1991)	2	Canonical	Canonical	External	(Ruban et al., 2011)
	<i>Acipenser transmontanus</i>						
	<i>Acipenser ruthenus</i> (Starlet sturgeon)	(Psenicka et al., 2008) (Psenicka et al., 2009)	2	Canonical	Canonical	External	(Niksirat et al., 2017)
	<i>Acipenser baerii</i> (Siberian sturgeon)	(Psenicka et al., 2007) (Psenicka et al., 2008)	2	Canonical	Canonical	External	(Wei et al., 2007)
	<i>Acipenser sinensis</i> (Chinese sturgeon)	(Wei et al., 2007)	2	Canonical	Canonical	External	(Wei et al., 2007)
Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Chondrostei; Acipenseriformes; Acipenseridae; Acipenserinae; Scaphirhynchini; Scaphirhynchus	<i>Scaphirhynchus albus</i> (Pallid sturgeon)	(DiLauro et al., 2001)	2	Canonical	Canonical	External-Spawning	(Flamio Jr et al., 2021)
Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Chondrostei; Acipenseriformes; Acipenseridae; Polyodontidae; Polyodontinae; Polyodontini; Polyodon	<i>Polyodon spathula</i> (Mississippi paddlefish)	(Zarnescu, 2005)	2	Canonical	Canonical	External - Spawning	(Needham, 1965)

Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Cladistia; Polypteriformes; Polypteridae; Polypterus	<i>Polypterus senegalus</i>	(Jamieson, 1991)	2	Canonical	Canonical	External spawning	(Subamia and Sugito, 2008)
Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Holostei; Semionotiformes; Lepisosteidae; Lepisosteus	<i>Lepisosteus osseus</i>	(Jamieson, 1991)	2	Canonical but with modification. The PC is made up of 9 triplets but is terminated at one of its ends by 9 doublets, which we interpret as an abortive flagellum	Canonical	External spawning	(Goff, 1984)
Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Holostei; Amiiformes; Amiidae; Amia	<i>Amia calva</i> (Bowfin)	(Jamieson, 1991)	2	Canonical	Canonical	External spawning	(Koch et al., 2009)
Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Holostei; Semionotiformes	<i>Lepisosteiformes</i> (Gars)	(Jamieson, 1991)	2	Canonical	Canonical	External spawning	(McEachran and Fehrmann, 2021)
Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Osteoglossocephala; Osteoglossomorpha; Osteoglossiformes; Mormyridae	<i>Brienomyrus niger</i>	(Jamieson, 1991)	2	Canonical	Canonical	External spawning	(Alhassan et al., 2014)
	<i>Marcusenius senegalensis</i>						
	<i>Hyperopsius bebe</i>						
	<i>Mormyrus rume</i>						
	<i>Petrocephalus bovei</i>						
Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Osteoglossocephala; Osteoglossomorpha; Osteoglossiformes; Gymnarchidae; Gymnarchus	<i>Gymnarchus niloticus</i>	(Jamieson, 1991)	2	Canonical	Canonical	External spawning	(Little et al., 1993a)
Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri	<i>Neopterygii</i>	(Jamieson, 1991)	2	Canonical	Canonical	External spawning	(Xu and Zhao, 2016)
Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Otomorpha; Ostariophysi; Anotophysi; Gonorynchiformes; Chanoidei; Chanidae; Chanos	<i>Chanos chanos</i>	(Jamieson, 1991)	2	Canonical	Canonical	External spawning	(Lee et al., 1986)
Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Otomorpha; Ostariophysi; Otophysi; Cypriniphysae; Cypriniformes; Cyprinoidei; Leuciscidae; Leuciscinae	<i>Leuciscus victorianus</i>	(Jamieson, 1991)	2	Canonical	Canonical	External spawning	(Rutaisire, 2003)
Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Otomorpha; Ostariophysi; Otophysi; Cypriniphysae; Cypriniformes; Cobitoidei; Cobitidae; Cobitinae; Misgurnus	<i>Misgurnus anguillicaudatus</i>	(Jamieson, 1991)	2	Canonical	Canonical	External spawning	(Fujimoto et al., 2008)
Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Otomorpha; Ostariophysi; Otophysi; Cypriniphysae; Cypriniformes; Cobitoidei; Cobitidae; Cobitinae; Misgurnus	<i>Misgurnus fossilis</i>	(Alavi et al., 2013) (Nadezhdina et al., 2001)	2	Canonical	Canonical	External spawning	(Kostomarova, 1991)
Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Otomorpha; Ostariophysi; Otophysi; Cypriniphysae; Cypriniformes; Cyprinoidei; Danionidae; Danioninae; Danio	<i>Danio rerio</i> (Zebrafish)	(Rupik et al., 2011) (Zhang et al., 2014)	2	Canonical	Canonical	External spawning	(Meinelt et al., 1999)
Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Otomorpha; Ostariophysi; Otophysi; Cypriniphysae; Cypriniformes; Cyprinoidei; Cyprinidae; Cyprininae; Cyprinus	<i>Cyprinus carpio</i> (Common carp)	(Pšenička et al., 2008)	2	Canonical	Canonical	External- Spawning	(Aliniya et al., 2013)
Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Otomorpha; Ostariophysi; Otophysi; Cypriniphysae; Cypriniformes; Cobitoidei; Cobitidae; Cobitinae; Misgurnus	<i>Misgurnus anguillicaudatus</i> (Oriental weatherfish)	(Ohta et al., 1993)	2	Canonical	Canonical	Internal-Insemination	(Fujimoto et al., 2006)
Vertebrata; Gnathostomata; Teleostomi; Euteleostomi;	<i>Acheilognathus rhombeus</i>	(Ohta et al., 1993)	2	Canonical	Canonical	External- Spawning	(Kawamura and

Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Otomorpha; Ostariophysi; Otophysi; Cypriniphysae; Cypriniformes; Cyprinoidei; Acheilognathidae; Acheilognathus							Uehara, 2005)
Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Otomorpha; Ostariophysi; Otophysi; Cypriniphysae; Cypriniformes; Cyprinoidei; Tincidae; Tinca	<i>Tinca tinca</i> (Tench)	(Psenicka et al., 2006)	2	Canonical	Canonical	Internal-Insemination (Artificial)	(Linhart et al., 2006)
Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Otomorpha; Ostariophysi; Otophysi; Cypriniphysae; Cypriniformes; Cyprinoidei; Cyprinidae; Cyprininae; Carassius	<i>Carassius auratus</i> (Goldfish)	(Ohta et al., 1993)	2	Canonical	Canonical	Internal-Insemination (artificial)	(Yamaha and Yamazaki, 2002)
Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Otomorpha; Ostariophysi; Otophysi; Cypriniphysae; Cypriniformes; Cyprinoidei; Acheilognathidae; Rhodeus	<i>Rhodeus ocellatus</i> (Rosy bitterling)	(Ohta, 1991)	2	Canonical	Canonical	Internal - Insemination	(Ueno and Arimoto, 1982)
Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Otomorpha; Ostariophysi; Otophysi; Cypriniphysae; Cypriniformes; Cyprinoidei; Xenocyprididae; Xenocypridinae; Hemiculters	<i>Hemiculter eigenmanni</i>	(Kim, 2019)	2	Canonical	Canonical	External	(Kim, 2019)
Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Otomorpha; Ostariophysi; Otophysi; Cypriniphysae; Cypriniformes; Cyprinoidei; Cyprinidae; Acrossocheilinae; Acrossocheilus	<i>Acrossocheilus fasciatus</i>	(Fu et al., 2016)	2	Canonical	Canonical	External - spawning	(ZHANG and JIANG, 2010)
Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Otomorpha; Ostariophysi; Otophysi; Characiphysae; Characiformes; Characoidei; Lebiasinidae; Lebiasininae	<i>Lebiasina</i>	(Santana et al., 2013)	2	Canonical	Canonical	External- spawning	(Urbano-Bonilla et al., 2016)
Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Otomorpha; Ostariophysi; Otophysi; Cypriniphysae; Cypriniformes; Cyprinoidei	<i>Cyprinidae</i>	(Fürböck et al., 2009)	2	Canonical	Canonical	External- spawning	(Hontela and Stacey, 2019)
Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Otomorpha; Ostariophysi; Otophysi; Cypriniphysae; Cypriniformes; Cyprinoidei; Leuciscidae; Leuciscinae; Chondrostoma	<i>Chondrostoma nasus</i>	(Fürböck et al., 2010)	2	Canonical	Canonical	External spawning	(Peñáz, 1996)
Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Otomorpha; Ostariophysi; Otophysi; Cypriniphysae; Cypriniformes; Cobitoidei; Cobitidae; Cobitinae	<i>Cobitidae</i>	(Jamieson, 1991)	2	Canonical	Canonical	External spawning	(Bohlen, 2008)
Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Otomorpha; Ostariophysi; Otophysi; Characiphysae; Characiformes; Characoidei; Parodontidae; Apareiodon	<i>Apareiodon affinis</i>	(Jamieson, 1991)	2	Canonical	Canonical	External spawning	(Fonseca Ratton et al., 2003)
Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Otomorpha; Ostariophysi; Otophysi; Characiphysae; Characiformes; Characoidei; Curimatidae	<i>Psectrogaster rutiloides</i> (Chiochio)	(Jamieson, 1991)	2	Canonical	Canonical	External spawning	(Riofrio-Quijandria et al., 2017)
Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Otomorpha; Ostariophysi; Otophysi; Characiphysae; Characiformes; Characoidei; Prochilodontidae	<i>Pampus argenteus</i>	(Jamieson, 1991)	2	Canonical	Canonical	External spawning	{Breder, 1966 #388} By Fishbase

Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupecocephala; Otomorpha; Ostariophysi; Otophysi; Characiphysae; Characiformes; Characoidei; Crenuchidae; Characidiinae; Characidium	<i>Characidium gomesi</i>	(Jamieson, 1991)	2	Canonical	Canonical	Internal impregnation	(Pucci et al., 2014)
Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupecocephala; Otomorpha; Ostariophysi; Otophysi; Characiphysae; Characiformes; Characoidei; Hemiodontidae; Anodus	<i>Anodus elongatus</i>	(Jamieson, 1991)	2	Canonical	Canonical	External spawning	(De Lima and Araujo-Lima, 2004)
Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupecocephala; Otomorpha; Ostariophysi; Otophysi; Characiphysae; Characiformes; Characoidei; Triportheidae; Triportheus	<i>triportheus paranensis</i>	(Jamieson, 1991)	2	Canonical	Canonical	External spawning	(Mariac et al., 2021) By <i>Triportheus albus</i>
Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupecocephala; Otomorpha; Ostariophysi; Otophysi; Characiphysae; Characiformes; Characoidei; Serrasalminidae; Piaractus	<i>Piaractus mesopotamicus</i>	(Jamieson, 1991)	2	Canonical	Canonical	External spawning	(Romagosa et al., 1990)
Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupecocephala; Otomorpha; Ostariophysi; Otophysi; Characiphysae; Characiformes; Characoidei; Characidae; Aphyocharacinae; Aphyocharax	<i>Aphyocharax anisitsi</i>	(Jamieson, 1991)	2	Canonical	Canonical	external	(Gonçalves et al., 2005)
Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupecocephala; Otomorpha; Ostariophysi; Otophysi; Characiphysae; Characiformes; Characoidei; Characidae; Cheirodontinae; Serrapinnus	<i>Serrapinnus kriegi</i>	(Jamieson, 1991)	2	Canonical	Canonical	External spawning	(Felicio et al., 2021)
Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupecocephala; Otomorpha; Ostariophysi; Otophysi; Characiphysae; Characiformes; Characoidei; Characidae;	<i>Mimagoniates microlepis</i>	(Jamieson, 1991)	2	Canonical	Canonical	Internal inseminating	(Azevedo et al., 2016)
	<i>Mimagoniates barberi</i>						
	<i>Scopaeocharax rhinodus</i>						
Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupecocephala; Otomorpha; Ostariophysi; Otophysi; Characiphysae; Characiformes; Characoidei; Characidae; Glandulocaudinae; Diapoma	<i>Diapoma speculiferum</i>	(Jamieson, 1991)	2	Canonical	Canonical	Internal inseminating	(Azevedo et al., 2000)
Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupecocephala; Otomorpha; Ostariophysi; Otophysi; Characiphysae; Characiformes; Characoidei; Characidae; Glandulocaudinae; Corynopoma	<i>Corynopoma riisei</i>	(Jamieson, 1991)	2	Canonical	Canonical	Internal inseminating	(Pecio et al., 2007)
Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupecocephala; Otomorpha; Ostariophysi; Otophysi; Characiphysae; Characiformes; Characoidei; Characidae; Glandulocaudinae; Pseudocorynopoma	<i>Pseudocorynopomadoriae</i>	(Jamieson, 1991)	2	Canonical	Canonical	Internal inseminating	(Azevedo et al., 2000)
Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupecocephala; Otomorpha; Ostariophysi; Otophysi; Characiphysae; Characiformes; Characoidei; Characidae; Stevardiinae	<i>Chrysobrycon</i>	(Jamieson, 1991)	2	Canonical	Canonical	Internal inseminating	(Baicere-Silva et al., 2011)
Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupecocephala; Otomorpha; Ostariophysi; Otophysi; Characiphysae; Characiformes; Characoidei; Characidae; Cheirodontinae; Odontostilbe	<i>Odontostilbe dialeptura</i>	(Jamieson, 1991)	2	Canonical	Canonical	External	(Oliveira et al., 2010) By <i>Odontostilbe pequirá</i>
Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupecocephala; Otomorpha; Ostariophysi; Otophysi; Characiphysae; Characiformes; Characoidei; Characidae; Characidae incertae sedis; Brittanichthys	<i>Brittanichthys axelrodi</i>	(Jamieson, 1991)	2	Canonical	Canonical	Internal inseminating	(Javonillo et al., 2007)

Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupecocephala; Otomorpha; Ostariophysi; Otophysi; Characiphysae; Siluriformes; Siluroidei	<i>Schilbidae</i>	(Jamieson, 1991)	2	Canonical	Canonical	External spawning	(Khatun et al., 2019)
	<i>Bagridae pimelodidae</i>						
Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupecocephala; Otomorpha; Ostariophysi; Otophysi; Characiphysae; Gymnotiformes; Gymnotoidei; Gymnotidae; Gymnotus	<i>Gymnotus carapo</i>	(Jamieson, 1991)	2	Canonical	Canonical	External spawning	(Kirschbaum and Schugardt, 2002)
Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupecocephala; Otomorpha; Ostariophysi; Otophysi; Characiphysae; Gymnotiformes; Sternopygoidei; Rhampichthyidae; Rhampichthys	<i>Rhampichthys hahni</i> .	(Jamieson, 1991)	2	Canonical	Canonical	External spawning	(Kirschbaum and Schugardt, 2002) By <i>Rhampichthys</i> sp.
Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupecocephala; Otomorpha; Ostariophysi; Otophysi; Characiphysae; Siluriformes; Siluroidei; Ictaluridae	<i>Ictalurus</i>	(Jamieson, 1991)	2	Canonical	Canonical	External spawning	(Clemens and Sneed, 1957)
Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupecocephala; Otomorpha; Ostariophysi; Otophysi; Characiphysae; Gymnotiformes; Sternopygoidei; Apterodontidae	<i>Apterodontus albifrons</i>	(Jamieson, 1991)	2	Canonical	Canonical	External spawning	(Maulana et al., 2021)
Vertebrata; Actinopterygii; Teleostei; Otomorpha Ostariophysi; Otophysi; Characiphysae; Characiformes; Characoidei; Characidae; Cheirodontinae; Macropsobrycon	<i>Macropsobrycon uruguayanae</i>	(de Oliveira et al., 2008)	2	Canonical	Canonical	Internal-insemination	(Azevedo et al., 2010)
Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupecocephala; Otomorpha; Ostariophysi; Otophysi; Characiphysae; Siluriformes; Siluroidei; Siluridae; Silurus	<i>Silurus microdorsalis</i> (Korean endemic slender catfish)	(Lee and Kim, 2001)	2	Canonical	Canonical	External- spawning	(Ki and Lee, 2018)
Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupecocephala; Otomorpha; Ostariophysi; Otophysi; Characiphysae; Characiformes; Characoidei; Characidae; Characidae incertae sedis; Brittanichthys	<i>Brittanichthys axelrodi</i> (Characid fish)	(Javonillo et al., 2007)	2	Canonical	Canonical	Internal-insemination	(Javonillo et al., 2007)
Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupecocephala; Otomorpha; Ostariophysi; Otophysi; Characiphysae; Characiformes; Characoidei; Chilodontidae; Chilodus	<i>Chilodus punctatus</i> (Spotted headstander)	(Pecio, 2003)	2	Canonical	Canonical	External- Spawning	(Chondoma, 1979)
Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupecocephala; Otomorpha; Ostariophysi; Otophysi; Characiphysae; Characiformes; Characoidei; Alestidae; Phenacogrammus	<i>Phenacogrammus interruptus</i> (Congo tetra)	(Pecio, 2009)	2	Canonical	Canonical	external	(Pecio, 2008)
Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupecocephala; Otomorpha; Ostariophysi; Otophysi; Characiphysae; Characiformes; Characoidei; Characidae; Stevardiinae; Tyttocharax	<i>Tyttocharax tambopataensis</i>	(Pecio et al., 2005b)	2	Canonical	Canonical	Internal-insemination	(Pecio et al., 2005a)
Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupecocephala; Otomorpha; Ostariophysi; Otophysi; Characiphysae; Siluriformes; Siluroidei; Auchenipteridae; Auchenipterinae;	<i>Trachelyopterus galeatus</i> (Common driftwood catfish)	(Parreira et al., 2009a)	2	Canonical	Canonical	Internal-Insemination	(Parreira et al., 2009b)

Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Otomorpha; Ostariophysi; Otophysi; Characiphysae; Characiformes; Characoidei; Characidae; Characidae incertae sedis; Brittanichthys	<i>Brittanichthys axelrodi</i>	(Javonillo et al., 2007)	2	Canonical	Canonical	Internal – Insemination	(Javonillo et al., 2007)
Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Otomorpha; Ostariophysi; Otophysi; Characiphysae; Characiformes; Characoidei; Characidae; Tetragonopterinae; Hemibrycon	<i>Hemibrycon surinamensis</i>	(Baicere-Silva et al., 2011)	2	Canonical	Canonical	External	(Santana et al., 2013)
Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Otomorpha; Ostariophysi; Otophysi; Characiphysae; Siluriformes; Siluroidei; Pimelodidae; Pimelodus	<i>Pimelodus maculatus</i>	(Quagio-Grassiotto and Oliveira, 2008)	2	Canonical	Canonical	External- spawning induction	(Buzollo et al., 2011)
Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Otomorpha; Ostariophysi; Otophysi; Characiphysae; Gymnotiformes; Sternopygoidei; Sternopygidae	<i>Eigenmannia (gymnotiformes)</i>	(Giora and Burns, 2011)	2	Canonical	Canonical	External- spawning	(Vischer, 1989)
Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Otomorpha; Ostariophysi; Otophysi; Characiphysae; Characiformes; Characoidei; Bryconidae; Bryconinae; Brycon	<i>Brycon vermelha</i>	(Faustino et al., 2015b)	2	Canonical	Canonical	external	(Faustino et al., 2015a)
Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Otomorpha; Ostariophysi; Otophysi; Characiphysae; Gymnotiformes; Gymnoidei; Gymnotidae; Gymnotus	<i>Gymnotus cf. anguillaris</i> ,	(França et al., 2007)	2	Canonical	Canonical	External	(Shahin, 2006)
Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Otomorpha; Ostariophysi; Otophysi; Characiphysae; Gymnotiformes; Sternopygoidei; Hypopomidae; Brachyhypopomus	<i>Brachyhypopomus pinnicaudatus</i>	(França et al., 2007)	2	Canonical	Canonical	external	(Miranda et al., 2008)
Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Otomorpha; Ostariophysi; Otophysi; Characiphysae; Siluriformes; Siluroidei; Doradidae; Acanthodoras	<i>Acanthodoras cataphractus</i>	(Quagio-Grassiotto et al., 2011a)	2	Canonical	Canonical	external	(Quagio-Grassiotto et al., 2011b)
Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Otomorpha; Ostariophysi; Otophysi; Characiphysae; Characiformes; Characoidei; Alestidae; Alestes	<i>Alestes dentex</i>	(Shahin, 2006)	2	Canonical	Canonical	External	(Shahin, 2006)
Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Otomorpha; Ostariophysi; Otophysi; Characiphysae; Siluriformes; Loricarioidei	<i>Loricariidae</i>	(Spadella et al., 2012)	2	Canonical	Canonical	external- spawning	(Duarte et al., 2007)
Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Otomorpha; Ostariophysi; Otophysi; Characiphysae; Characiformes; Characoidei; Characidae; Stevardiinae	<i>Monotocheirodon</i>	(Menezes et al., 2013)	2	Canonical	Canonical	Internal- insemination	(Burns and Weitzman, 2006)
Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Otomorpha; Ostariophysi; Otophysi; Characiphysae; Characiformes; Characoidei; Characidae; Pristellinae; Hemigrammus	<i>Hemigrammus erythrozonus</i>	(Pecio et al., 2007)	2	Canonical	Canonical	external	(Pecio et al., 2007)
Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Otomorpha; Ostariophysi; Otophysi; Characiphysae; Gymnotiformes;	<i>Gymnotus carapo</i>	(Kudo et al., 1994)	2	Canonical	Canonical	External- Spawning	(Meneguelli De Souza et al., 2015)

Gymnotoidei; Gymnotidae; Gymnotus							
Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Otomorpha; Ostariophysi; Otophysi; Characiphysae; Characiformes; Characoidei; Characidae; Cheirodontinae; Paracheirodon	<i>Paracheirodon innesi</i> (Neon tetra)	(Jamieson, 1991)	2	Canonical	Canonical	External spawning	(Chapman et al., 1998)
Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Otomorpha; Ostariophysi; Otophysi; Characiphysae; Gymnotiformes; Sternopygoidei; Sternopygidae; Eigenmannia	<i>Eigenmannia</i> (<i>gymnotiformes</i>)	(Jamieson, 1991)	2	Canonical	Canonical	External spawning	(Kirschbaum and Schugardt, 2002) By <i>Eigenmannia lineata</i>
Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Euteleosteiomorpha; Protacanthopterygii; Esociformes; Esocidae; Esox	<i>Esox masquinongy</i>	(Jamieson, 1991)	2	Canonical	Canonical	External spawning	(Diana et al., 2015)
Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Euteleosteiomorpha; Protacanthopterygii	<i>Salmoniformes</i>	(Jamieson, 1991)	2	Canonical	Canonical	External spawning	(Schulz et al., 2006)
Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Euteleosteiomorpha; Protacanthopterygii; Galaxiiformes; Galaxiidae; Galaxiinae; Galaxiini; Galaxias	<i>Galaxias olidus</i>	(Jamieson, 1991)	No centrioles Degraded Specimen Not part of statistics	Undetected	Undetected	External spawning	(olidus is widespread throughout Victoria)
Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Euteleosteiomorpha; Protacanthopterygii; Galaxiiformes; Galaxiidae; Galaxiinae; Galaxiini; Galaxias	<i>Galaxias olidus</i>	(Jamieson, 1991)	2	Undetected	Undetected	External spawning	(O'Connor and Koehn, 1991)
Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Euteleosteiomorpha; Protacanthopterygii; Salmoniformes; Salmonidae; Salmoninae; Oncorhynchus; Oncorhynchus masou	<i>Oncorhynchus masou formosanus</i> (Formosan land-locked salmon)	(Gwo et al., 1999a)	2	Canonical	Canonical	External- spawning	(Healey et al., 2001)
Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Euteleosteiomorpha; Protacanthopterygii; Salmoniformes; Salmonidae; Salmoninae; Oncorhynchus; Oncorhynchus masou	<i>Oncorhynchus masou formosanus</i> (Formosan landlocked salmon)	(Gwo et al., 1996) (Markova and Zhivkova, 2003b)	2	Canonical	Canonical	Internal-insemination	(Gwo et al., 1999b)
Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Euteleosteiomorpha; Protacanthopterygii; Salmoniformes; Salmonidae; Salmoninae; Brachymystax	<i>Brachymystax lenok tsinlingensis</i> (Tsinling lenok trout)	(Guo et al., 2016)	2	Canonical	Canonical	External- spawning	(Yoon et al., 2015)
Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Euteleosteiomorpha; Protacanthopterygii; Salmoniformes; Salmonidae; Salmoninae; Oncorhynchus	<i>Oncorhynchus mykiss</i> (Rainbow trout)	(Markova and Zhivkova, 2003a)	2	Canonical	Canonical	External- spawning	(Sakamoto et al., 1999)
Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Euteleosteiomorpha; Protacanthopterygii; Salmoniformes; Salmonidae; Salmoninae; Salmo	<i>Salmo salar</i> (Atlantic salmon)	(Figueroa et al., 2017)	2	Canonical	Canonical	External- spawning	(Fleming, 1996)
Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Euteleosteiomorpha; Stomiati; Osmeriformes; Plecoglossidae; Plecoglossus	<i>Plecoglossus altivelis</i> (Ayu)	(Ohta et al., 1993)	2	Canonical	Canonical	External- spawning	(Otake et al., 2002)
Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Euteleosteiomorpha; Stomiati; Osmeriformes; Plecoglossidae; Plecoglossus	<i>Mallotus villosus</i> (Newfoundland capelin)	(Beirão et al., 2015)	2	Canonical	Canonical	External - spawning	(Carscadden et al., 1997)
Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei;	<i>Osmerus eperlanus</i>	(Kowalski et al., 2006)	2	Canonical	Canonical	External spawning	(Lyle and Maitland, 1997)

Eurypterygia; Ctenosquamata; Acanthomorpha; Euacanthomorpha; Percormorphaceae; Eupercaria; Perciformes; Cottioidei; Hexagrammales	<i>Hexagrammos otakii</i>						
Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Euteleosteiomorpha; Neoteleostei; Eurypterygia; Ctenosquamata; Acanthomorpha; Euacanthomorpha; Percormorphaceae; Eupercaria; Perciformes; Cottioidei; Cottidae; Alcichthys	<i>Alcichthys alcicornis</i>	(Jamieson, 1991)	2	Canonical	Canonical	External spawning	(Munehara, 1988)
Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Euteleosteiomorpha; Neoteleostei; Eurypterygia; Ctenosquamata; Acanthomorpha; Euacanthomorpha; Percormorphaceae; Eupercaria; Eupercaria incertae sedis	<i>Moronidae</i>	(Jamieson, 1991)	2	Canonical	Canonical	External spawning	(Martins et al., 2012)
Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Euteleosteiomorpha; Neoteleostei; Eurypterygia; Ctenosquamata; Acanthomorpha; Euacanthomorpha; Percormorphaceae; Eupercaria; Spariformes	<i>Pagrus major</i>	(Jamieson, 1991)	2	Canonical	Canonical	External spawning	(Matsuyama et al., 1988)
	<i>Lagodon rhomboides</i>						
	<i>Acanthopagrus australis</i>						
	<i>Boops boops</i>						
	<i>Diplodus sargus</i>						
Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Euteleosteiomorpha; Neoteleostei; Eurypterygia; Ctenosquamata; Acanthomorpha; Euacanthomorpha; Percormorphaceae; Eupercaria; Labriformes	<i>Labridae</i>	(Jamieson, 1991)	2	Canonical	Canonical	External spawning	(Fedderm, 1965)
	<i>Thalassoma pavo</i>						
	<i>Thalassoma bifasciatum</i>						
	<i>Symphodus ocellatus</i>						
	<i>Lahnolaimus maximus</i>						
Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Euteleosteiomorpha; Neoteleostei; Eurypterygia; Ctenosquamata; Acanthomorpha; Euacanthomorpha; Percormorphaceae; Eupercaria; Perciformes; Cottioidei; Zoarcales; Zoarcidae; Zoarcinae; Zoarces	<i>Zoarces elongatus</i>	(Jamieson, 1991)	2	Canonical	Canonical	External spawning	(De Lima and Araujo-Lima, 2004)
Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Euteleosteiomorpha; Neoteleostei; Eurypterygia; Ctenosquamata; Acanthomorpha; Euacanthomorpha; Percormorphaceae; Eupercaria; Perciformes; Cottioidei; Zoarcales; Anarhichadidae; Anarhichas	<i>Anarhichas lupus</i>	(Jamieson, 1991)	2	Canonical	Canonical	External spawning	(Johannessen et al., 1993)
Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Euteleosteiomorpha; Neoteleostei; Eurypterygia; Ctenosquamata; Acanthomorpha; Euacanthomorpha; Percormorphaceae; Eupercaria; Perciformes; Cottioidei; Cottidae; Trichodontidae; Arctoscopus	<i>Arctoscopus japonicus</i>	(Jamieson, 1991)	2	Canonical	Canonical	External spawning	(Lee et al., 2006)
Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Euteleosteiomorpha; Neoteleostei; Eurypterygia; Ctenosquamata; Acanthomorpha; Euacanthomorpha; Percormorphaceae; Eupercaria; Uranoscopiformes; Pinguididae	<i>Parapercis</i>	(Jamieson, 1991)	2	Canonical	Canonical	External spawning	(Pankhurst and Kime, 1991)
Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Euteleosteiomorpha; Neoteleostei; Eurypterygia; Ctenosquamata; Acanthomorpha; Euacanthomorpha; Percormorphaceae; Eupercaria; Uranoscopiformes; Ammodytidae; Ammodytes	<i>Ammodytes personatus</i>	(Jamieson, 1991)	2	Canonical	Canonical	External spawning	(KIM et al., 1999)
Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai;	<i>Uranoscopus scaber</i>	(Jamieson, 1991)	2	Canonical	Canonical	External spawning	(Ak et al., 2011)

Clupeocephala; Euteleostomorpha; Neoteleostei; Eurypterygia; Ctenosquamata; Acanthomorpha; Euacanthomorphacea; Percomorphaceae; Eupercaria; Uranoscopiformes							
Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Euteleostomorpha; Neoteleostei; Eurypterygia; Ctenosquamata; Acanthomorpha; Euacanthomorphacea; Percomorphaceae; Eupercaria; Perciformes; Percoidae	<i>Trachinidae</i>	(Jamieson, 1991)	2	Canonical	Canonical	External spawning	(Hamed and Chakroun-Marzouk, 2017)
Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Euteleostomorpha; Neoteleostei; Eurypterygia; Ctenosquamata; Acanthomorpha; Euacanthomorphacea; Percomorphaceae; Eupercaria; Tetraodontiformes; Tetraodontoidei; Tetradontoidea; Tetraodontidae; Tetractenos	<i>Tetractenos hamiltoni</i>	(Jamieson, 1991)	2	Canonical	Canonical	External spawning	(Piah and Bucher, 2014)
Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Euteleostomorpha; Neoteleostei; Eurypterygia; Ctenosquamata; Acanthomorpha; Euacanthomorphacea; Percomorphaceae; Eupercaria; Centrarchiformes; Percichthyoidei; Percichthyidae; Nannoperca	<i>Nannoperca oxleyana</i>	(Jamieson, 1991)	2	Canonical	Canonical	External spawning	(Knight et al., 2007)
Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Euteleostomorpha; Neoteleostei; Eurypterygia; Ctenosquamata; Acanthomorpha; Euacanthomorphacea; Percomorphaceae; Eupercaria; Lophiiformes; Ceratioidei; Neoceratiidae; Neoceratias	<i>Neoceratias spinifer</i>	(Jamieson, 1991)	2	Canonical	Canonical	External spawning	(Pietsch, 2005)
Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Euteleostomorpha; Neoteleostei; Eurypterygia; Ctenosquamata; Acanthomorpha; Euacanthomorphacea; Percomorphaceae; Eupercaria; Tetraodontiformes; Balistidae; Balistidae; Pseudobalistes	<i>Pseudobalistes fuscus</i>	(Jamieson, 1991)	2	Canonical	Canonical	External spawning	(Gladstone, 1994)
Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Euteleostomorpha; Neoteleostei; Eurypterygia; Ctenosquamata; Acanthomorpha; Euacanthomorphacea; Percomorphaceae; Eupercaria; Perciformes; Serranoidei; Serranidae; Epinephelinae; Epinephelini; Plectropomus	<i>Plectropomus leopardus</i>	(Jamieson, 1991)	2	Canonical	Canonical	External spawning	(Zeller, 1998)
Vertebrata; Actinopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Euteleostomorpha; Neoteleostei; Eurypterygia; Ctenosquamata; Acanthomorpha; Euacanthomorphacea; Percomorphaceae; Eupercaria; Eupercaria incertae sedis; Sciaenidae; Miichthys	<i>Miichthys miiuy</i>	(Miao et al., 2013)	2	Canonical	Canonical	External- spawning	(Yoon et al., 2006)
Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Euteleostomorpha; Neoteleostei; Eurypterygia; Ctenosquamata; Acanthomorpha; Euacanthomorphacea; Percomorphaceae; Eupercaria; Eupercaria incertae sedis; Sciaenidae; Paralonchurus	<i>Paralonchurus brasiliensis</i> (Banded croaker)	(Gusmao-Pompiani et al., 2005)	2	Canonical	Canonical	External spawning	(Costa et al., 2015)
Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Euteleostomorpha; Neoteleostei; Eurypterygia; Ctenosquamata; Acanthomorpha; Euacanthomorphacea; Percomorphaceae; Eupercaria; Spariformes; Sparidae; Acanthopagrus	<i>Acanthopagrus latus</i>	(Gwo, 1995)	2	Canonical	Canonical	External -spawning	(Alex Hesp et al., 2004)
	<i>Acanthopagrus australis</i>	(Gwo et al., 2005)	2	Canonical	Canonical	External -spawning	(Alex Hesp et al., 2004)
Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Euteleostomorpha; Neoteleostei; Eurypterygia; Ctenosquamata;	<i>Epinephelus malabaricus</i> (Malabar grouper)	(GWO et al., 1994) (Jamieson, 1991)	2	Canonical	Canonical	External spawning	(Gaspere and Bryceson, 2013)

Acanthomorphata; Euacanthomorphacea; Percomorphaceae; Eupercaria; Perciformes; Serranoidei; Serranidae; Epinephelinae; Epinephelini; Epinephelus							
Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Euteleostomorpha; Neoteleostei; Eurypterygia; Ctenosquamata; Acanthomorphata; Euacanthomorphacea; Percomorphaceae; Eupercaria; Eupercaria incertae sedis; Sciaenidae; Larimus	<i>Larimus breviceps</i> (Shorthead drum)	(Gusmao-Pompiani et al., 2005)	2	Canonical	Canonical	External spawning	(Santos et al., 2021)
Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Euteleostomorpha; Neoteleostei; Eurypterygia; Ctenosquamata; Acanthomorphata; Euacanthomorphacea; Percomorphaceae; Eupercaria; Eupercaria incertae sedis; Sciaenidae; Cynoscion	<i>Cynoscion striatus</i> (South American striped weakfish)	(Gusmao-Pompiani et al., 2005)	2	Canonical	Canonical	External spawning	(Militelli and Macchi, 2006)
Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Euteleostomorpha; Neoteleostei; Eurypterygia; Ctenosquamata; Acanthomorphata; Euacanthomorphacea; Percomorphaceae; Eupercaria; Eupercaria incertae sedis; Sciaenidae; Micropogonias	<i>Micropogonias furnieri</i> (Whitemouth croaker)	(Gusmao-Pompiani et al., 2005)	2	Canonical	Canonical	External spawning	(Acha et al., 1999)
Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Euteleostomorpha; Neoteleostei; Eurypterygia; Ctenosquamata; Acanthomorphata; Euacanthomorphacea; Percomorphaceae; Eupercaria; Eupercaria incertae sedis; Sciaenidae; Menticirrhus	<i>Menticirrhus americanus</i> (Southern kingcroaker)	(Gusmao-Pompiani et al., 2005)	2	Canonical	Canonical	External spawning	(Harding and Chittenden, 1987)
Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Euteleostomorpha; Neoteleostei; Eurypterygia; Ctenosquamata; Acanthomorphata; Euacanthomorphacea; Percomorphaceae; Eupercaria; Eupercaria incertae sedis; Sciaenidae; Umbrina	<i>Umbrina coroides</i> (Shi drum)	(Gusmao-Pompiani et al., 2005)	2	Canonical	Canonical	External spawning	{Breder, 1966 #390} By Fishbase
Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Euteleostomorpha; Neoteleostei; Eurypterygia; Ctenosquamata; Acanthomorphata; Euacanthomorphacea; Percomorphaceae; Eupercaria; Eupercaria incertae sedis; Sciaenidae; Stellifer	<i>Stellifer rastrifer</i> (rake stardrum)	(Gusmao-Pompiani et al., 2005)	2	Canonical	Canonical	External spawning	(Camargo and Isaac, 2005)
Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Euteleostomorpha; Neoteleostei; Eurypterygia; Ctenosquamata; Acanthomorphata; Euacanthomorphacea; Percomorphaceae; Eupercaria; Eupercaria incertae sedis; Sciaenidae; Plagioscion	<i>Plagioscion squamosissimus</i> (South American silver croaker)	(Gusmao-Pompiani et al., 2005)	2	Canonical	Canonical	External spawning	(Bialetzki et al., 2004)
Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Euteleostomorpha; Neoteleostei; Eurypterygia; Ctenosquamata; Acanthomorphata; Euacanthomorphacea; Percomorphaceae; Eupercaria; Eupercaria incertae sedis; Siganidae; Siganus	<i>Siganus fuscescens</i> (mottled spinefoot)	(Gwo et al., 2004b)	2	Canonical	Canonical	External spawning	(Hara et al., 1986)
	<i>Siganus rivulatus</i>						
Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Euteleostomorpha; Neoteleostei; Eurypterygia; Ctenosquamata; Acanthomorphata; Euacanthomorphacea; Percomorphaceae; Eupercaria; Perciformes; Serranoidei; Serranidae; Epinephelinae; Epinephelini; Epinephelus	<i>Epinephelus bruneus</i> (Longtooth grouper)	(Lim and Le, 2013) (Kim et al., 2013)	2	Canonical	Canonical	External spawning	(Song et al., 2005)
Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Euteleostomorpha; Neoteleostei; Eurypterygia; Ctenosquamata;	<i>Sander lucioperca</i> (Pike-perch)	(Lahnsteiner and Mansour, 2004) (Krištan et al., 2014)	2	Canonical	Canonical	External spawning	(Lappalainen et al., 2003)

Acanthomorphata; Euacanthomorphacea; Percomorphaceae; Eupercaria; Perciformes; Percidae; Lucioperlinae; Sander							
Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Euteleosteiomorphia; Neoteleostei; Eurypterygia; Ctenosquamata; Acanthomorphata; Euacanthomorphacea; Percomorphaceae; Eupercaria; Centrarchiformes; Centrarchoidei; Siniperidae; Siniperca	<i>Siniperca chuatsi</i> (Mandarin fish)	(Luo et al., 2011)	2	Canonical	Canonical	External spawning	(Doi et al., 2004)
	<i>Siniperca kneri</i> (Big-eye mandarin fish)	(Luo et al., 2011)	2	Canonical	Canonical	External spawning	(Zhao et al., 2019)
	<i>Siniperca scherzeri</i> (Leopard mandarin fish)	(Luo et al., 2011)	2	Canonical	Canonical	External spawning	(Zhang et al., 2009)
Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Euteleosteiomorphia; Neoteleostei; Eurypterygia; Ctenosquamata; Acanthomorphata; Euacanthomorphacea; Percomorphaceae; Eupercaria; Eupercaria incertae sedis; Scatophagidae; Scatophagus	<i>Scatophagus argus</i>	(Madhavi et al., 2015)	2	Canonical	Canonical	External spawning	(Cai et al., 2010)
Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Euteleosteiomorphia; Neoteleostei; Eurypterygia; Ctenosquamata; Acanthomorphata; Euacanthomorphacea; Percomorphaceae; Eupercaria; Perciformes; Percidae; Percinae; Perca	<i>Perca fluviatilis</i> (Eurasian perch)	(Hatef et al., 2013)	2	Canonical	Canonical	External spawning	(Snickars et al., 2010)
Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Euteleosteiomorphia; Neoteleostei; Eurypterygia; Ctenosquamata; Acanthomorphata; Euacanthomorphacea; Percomorphaceae; Eupercaria; Perciformes; Scorpaenidae; Scorpaeninae; Parascorpaena	<i>Parascorpaena picta</i>	(Pavlov and Emel'yanova, 2018)	2	Canonical	Canonical	Internal insemination	(Natal'ya and Pavlov, 2017)
Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Euteleosteiomorphia; Neoteleostei; Eurypterygia; Ctenosquamata; Acanthomorphata; Euacanthomorphacea; Percomorphaceae; Eupercaria; Perciformes; Cottidae; Cottidae; Cottus	<i>Cottus hangiongensis</i>	(Quinitio and Takahashi, 1992)	2	Canonical	Canonical	External spawning	(Goto, 1988)
Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Euteleosteiomorphia; Neoteleostei; Eurypterygia; Ctenosquamata; Acanthomorphata; Euacanthomorphacea; Percomorphaceae; Eupercaria; Tetraodontiformes; Tetraodontoidei; Tetraodontoidea; Tetraodontidae; Takifugu	<i>Takifugu niphobles</i> (pufferfish)	(Morisawa, 2001)	2	Canonical	Canonical	External spawning	(Gallego et al., 2013)
	<i>Takifugu paradilis</i>						
	<i>Takifugu peocilonotus</i>						
	<i>Takifugu porphyreus</i>						
	<i>Takifugu radiatus</i>						
	<i>Takifugu rubripes</i>						
	<i>Takifugu xanthopterus</i>						
Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Euteleosteiomorphia; Neoteleostei; Eurypterygia; Ctenosquamata; Acanthomorphata; Euacanthomorphacea; Percomorphaceae; Eupercaria; Spariformes; Sparidae; Pagellus	<i>Pagellus bogaraveo</i> (Blackspot seabream)	(Maricchiolo et al., 2010)	2	Canonical	Canonical	External spawning	(Micale et al., 2002)
Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Euteleosteiomorphia; Neoteleostei; Eurypterygia; Ctenosquamata; Acanthomorphata; Euacanthomorphacea; Percomorphaceae; Eupercaria; Perciformes; Serranoidei; Serranidae; Serraninae	<i>Serranus atricauda</i>	(Jamieson, 1991)	2	Canonical	Canonical	External spawning	(Neves et al., 2014)
	<i>Serranus cabrilla</i>						
	<i>Serranus scriba</i>						
Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Euteleosteiomorphia; Neoteleostei; Eurypterygia; Ctenosquamata; Acanthomorphata; Euacanthomorphacea; Percomorphaceae; Ovalentaria;	<i>Jenynsia lineata</i>	(Jamieson, 1991)	2	Canonical	Canonical	internal	{Wischnath, 1993 #389} (Barimo et al., 2007) By fishbase

Eurypterygia; Ctenosquamata; Acanthomorpha; Euacanthomorpha; Percomorphaceae; Ovalentaria; Atherinomorphae; Atheriniformes; Pseudomugilidae; Pseudomugil	<i>Pseudomugil tenellus</i>						
Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Euteleostei; Neoteleostei; Eurypterygia; Ctenosquamata; Acanthomorpha; Euacanthomorpha; Percomorphaceae; Ovalentaria; Atherinomorphae; Atheriniformes; Melanotaeniidae; Iriatherina	<i>Iriatherina wernerii</i>	(Jamieson, 1991)	2	Canonical	Canonical	External spawning	(Herjayanto et al., 2016)
Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Euteleostei; Neoteleostei; Eurypterygia; Ctenosquamata; Acanthomorpha; Euacanthomorpha; Percomorphaceae; Ovalentaria; Atherinomorphae; Atheriniformes; Melanotaeniidae; Melanotaenia	<i>Melanotaenia Maccullochi</i>	(Jamieson, 1991)	2	Canonical	Canonical	External spawning	(Oulton et al., 2013)
	<i>Melanotaenia Duboulayi</i>						
Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Euteleostei; Neoteleostei; Eurypterygia; Ctenosquamata; Acanthomorpha; Euacanthomorpha; Percomorphaceae; Ovalentaria; Atherinomorphae; Atheriniformes; Melanotaeniidae;	<i>Melanotaenia</i>	(Jamieson, 1991)	2	Canonical	Canonical	External spawning	(Reid and Holdway, 1995)
Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Euteleostei; Neoteleostei; Eurypterygia; Ctenosquamata; Acanthomorpha; Euacanthomorpha; Percomorphaceae; Ovalentaria; Blenniiformes; Gobiesocidae; Gobiesocinae	<i>Lepidogaster lepidogaster</i>	(Jamieson, 1991)	2	Canonical	Canonical	External spawning	(Faria and Gonçalves, 2010)
Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Euteleostei; Neoteleostei; Eurypterygia; Ctenosquamata; Acanthomorpha; Euacanthomorpha; Percomorphaceae; Ovalentaria; Mugilomorphae; Mugiliformes; Mugilidae; Chelon	<i>Liza dumerilii</i>	(Jamieson, 1991)	2	Canonical	Canonical	External spawning	(Van der Horst and Erasmus, 1981)
Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Euteleostei; Neoteleostei; Eurypterygia; Ctenosquamata; Acanthomorpha; Euacanthomorpha; Percomorphaceae; Ovalentaria; Atherinomorphae; Cyprinodontiformes; Cyprinodontoides; Poeciliidae; Poeciliinae; Poecilia	<i>Poecilia reticulata</i>	(Jamieson, 1991) (Billard et al., 1970)	1 (Confirmed)	Atypical triplets become occluded and is reduced to a remnant	Canonical	Internal insemination- no spermcasting	(Boschetto et al., 2011)
Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Euteleostei; Neoteleostei; Eurypterygia; Ctenosquamata; Acanthomorpha; Euacanthomorpha; Percomorphaceae; Ovalentaria; Atherinomorphae; Cyprinodontiformes; Cyprinodontoides; Poeciliidae; Poeciliinae; Poecilia	<i>Poecilia latipinna</i>	(Grier, 1973).	1 (Confirmed)	Atypical	Canonical	Internal insemination	(Boschetto et al., 2011)
Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Euteleostei; Neoteleostei; Eurypterygia; Ctenosquamata; Acanthomorpha; Euacanthomorpha; Percomorphaceae; Ovalentaria; Atherinomorphae; Atheriniformes; Atherinopsidae; Atherinopsinae; Odontesthes	<i>Odontesthes bonariensis</i>	(Gárriz and Miranda, 2013)	2	Canonical	Canonical	External- spawning	(Miranda et al., 2006)
Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Euteleostei; Neoteleostei; Eurypterygia; Ctenosquamata; Acanthomorpha; Euacanthomorpha; Percomorphaceae; Ovalentaria; Atherinomorphae; Cyprinodontiformes; Cyprinodontoides; Poeciliidae; Poeciliinae; Gambusia	<i>Gambusia affinis</i> (Estern mosquitofish)	Spermiogenesis in the Teleost <i>Gambusia affinis</i> with Particular Reference to the Role Played by Microtubules H.J. Grier	1 (Confirmed)	Atypical " Proximal centriole (pc) is electron dense and no longer contains distinct tubules"	Canonical	Internal	(Zhu et al., 2015)

Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Euteleostei; Neoteleostei; Eurypterygia; Ctenosquamata; Acanthomorphata; Euacanthomorphacea; Percomorphaceae; Ovalentaria; Cichlomorphae; Cichliformes; Cichlidae; African cichlids; Pseudocrenilabrinae; Oreochromini; Oreochromis	Oreochromis niloticus (Nile tilapia)	(Shalaby and Migeed, 2012)	2	Canonical	Canonical	External spawning	(LITTLE et al., 1993b)
Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Euteleostei; Neoteleostei; Eurypterygia; Ctenosquamata; Acanthomorphata; Euacanthomorphacea; Percomorphaceae; Ovalentaria; Atherinomorphae; Cyprinodontiformes; Aplocheiloidei; Rivulidae; Melanorivulus	Melanorivulus punctatus	(Cassel et al., 2014)	2	Canonical	Canonical	External spawning	(Cassel et al., 2013)
Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Euteleostei; Neoteleostei; Eurypterygia; Ctenosquamata; Acanthomorphata; Euacanthomorphacea; Percomorphaceae; Ovalentaria; Atherinomorphae; Beloniformes; Belonoidei; Zenarchopteridae; Hemirhamphodon	Hemirhamphodon pogonognathus	(Jamieson, 1989)	1 (Confirmed)	Undetected	Canonical	Internal- no spermcasting	(Jamieson and Grier, 1993)
Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Euteleostei; Neoteleostei; Eurypterygia; Ctenosquamata; Acanthomorphata; Euacanthomorphacea; Percomorphaceae; Ovalentaria; Cichlomorphae; Cichliformes; Cichlidae; New World cichlids; Geophaginae; Geophagini; Satanoperca	Satanoperca jurupari (Demon eartheater)	(Matos et al., 2002)	2	Canonical	Canonical	External spawning	(Tavares-Dias et al., 2017)
Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Euteleostei; Neoteleostei; Eurypterygia; Ctenosquamata; Acanthomorphata; Euacanthomorphacea; Percomorphaceae; Ovalentaria; Atherinomorphae; Cyprinodontiformes; Cyprinodontoides; Anablepidae; Anablepinae; Anableps	Anableps anableps	(Greven and Schmahl, 2006) (Jamieson, 1991)	2	Canonical	Canonical	internal	(Turner, 1938)
Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Euteleostei; Neoteleostei; Eurypterygia; Ctenosquamata; Acanthomorphata; Euacanthomorphacea; Percomorphaceae; Ovalentaria; Cichlomorphae; Cichliformes; Cichlidae; New World cichlids; Cichlinae; Cichlini; Cichla	Cichla intermedia	(Quagio-Grassiotto et al., 2003)	2	Canonical	Canonical	external	(Willis et al., 2007)
Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Euteleostei; Neoteleostei; Eurypterygia; Ctenosquamata; Acanthomorphata; Euacanthomorphacea; Percomorphaceae; Ovalentaria; Mugilomorphae; Mugiliformes; Mugilidae; Chelon	Chelon auratus	(Bruslé, 1981)	2	Canonical	Canonical	External spawning	(Kesiktaş et al., 2020)
Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Euteleostei; Neoteleostei; Eurypterygia; Ctenosquamata; Acanthomorphata; Euacanthomorphacea; Percomorphaceae; Ovalentaria; Atherinomorphae; Beloniformes; Adrianichthyoidei; Adrianichthyidae; Oryziinae; Oryzias	Oryzias latipes	(Grier, 1976)	2	Undetected	Canonical	External spawning	(Koger et al., 1999)
Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Euteleostei; Neoteleostei; Eurypterygia; Ctenosquamata; Acanthomorphata; Euacanthomorphacea; Percomorphaceae; Ovalentaria; Atherinomorphae; Cyprinodontiformes; Cyprinodontoides; Poeciliidae; Poeciliinae; Poecilia	Lebistes reticulatus	(Mattei and Boisson, 1966) (Grönberg and Telkkä, 1967) (Gronberg and Wartiovaara, 1972) (Asai, 1971)	unknown	PC is present in spermatid at stage that chromatid material has begun to condensate	DC is present in spermatid at stage that chromatid material has begun to condensate	External spawning	(Brewer, 1979)

Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Clupeocephala; Euteleostei; Osteoglossocephalai; Eurypterygia; Ctenosquamata; Acanthomorphata; Euacanthomorphacea; Percomorphaceae; Syngnathii; Syngnathiformes; Syngnathidae; Syngnathinae	<i>Opistognathus whitehursti</i>	(Jamieson, 1991)	2	Canonical	Canonical	External spawning	(Thompson, 1974) (Demirel and Yüksek, 2013)
Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Clupeocephala; Euteleostei; Osteoglossocephalai; Eurypterygia; Ctenosquamata; Acanthomorphata; Euacanthomorphacea; Percomorphaceae; Syngnathii; Syngnathiformes; Syngnathidae; Syngnathinae	<i>Syngnathus acusimilis</i>	(Jamieson, 1991)	2	Canonical	Canonical	External spawning	(Kornienko, 2001)
	<i>Syngnathus abaster</i>						
Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Clupeocephala; Euteleostei; Osteoglossocephalai; Eurypterygia; Ctenosquamata; Acanthomorphata; Euacanthomorphacea; Percomorphaceae; Syngnathii; Syngnathiformes; Syngnathidae; Syngnathinae	<i>Helicolenus dactylopterus dactylopterus</i>	(Jamieson, 1991)	2	Canonical	Canonical	External spawning	(Muñoz et al., 2010)
Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Clupeocephala; Euteleostei; Osteoglossocephalai; Eurypterygia; Ctenosquamata; Acanthomorphata; Euacanthomorphacea; Percomorphaceae; Syngnathii; Syngnathiformes; Mullidae; Mullidae; Parupeneus	<i>Parupeneus spilurus</i>	(Gwo et al., 2004b)	2	Canonical	Canonical	External - spawning	(Bandai et al., 2020)
Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Clupeocephala; Euteleostei; Osteoglossocephalai; Eurypterygia; Ctenosquamata; Acanthomorphata; Euacanthomorphacea; Percomorphaceae; Syngnathii; Syngnathiformes; Mullidae; Mullidae; Parupeneus	<i>Parupeneus spilurus</i> (Blackspot goatfish)	(Gwo et al., 2004a)	2	Canonical	Canonical	External spawning	(Bandai et al., 2020)
	<i>Parupeneus multifasciatus</i>	(Emel'yanova and Pavlov, 2012)	2	Canonical	Canonical	External spawning	(Bandai et al., 2020)
	<i>Parupeneus barberinoides</i>	(Emel'yanova and Pavlov, 2012)	2	Canonical	Canonical	External spawning	(Bandai et al., 2020)
Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Clupeocephala; Euteleostei; Osteoglossocephalai; Eurypterygia; Ctenosquamata; Acanthomorphata; Euacanthomorphacea; Percomorphaceae; Syngnathii; Syngnathiformes; Mullidae; Mullidae; Pseudupeneus	<i>Pseudupeneus prayensis</i>	(Jamieson, 1991)	2	Canonical	Canonical	External spawning	(Konoyima and Seisay)
Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Clupeocephala; Euteleostei; Osteoglossocephalai; Eurypterygia; Ctenosquamata; Acanthomorphata; Euacanthomorphacea; Percomorphaceae; Carangaria; Carangiformes; Carangidae; Trachurus	<i>Trachurus mediterraneus</i>	(Jamieson, 1991)	2	Canonical	Canonical	External spawning	(Demirel and Yüksek, 2013)
Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Clupeocephala; Euteleostei; Osteoglossocephalai; Eurypterygia; Ctenosquamata; Acanthomorphata; Euacanthomorphacea; Percomorphaceae; Carangaria; Carangaria incertae sedis	<i>Galeoides dedactylus</i>	(Jamieson, 1991)	2	Canonical	Canonical	External spawning	(Onyia, 1973)
Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Clupeocephala; Euteleostei; Osteoglossocephalai; Eurypterygia; Ctenosquamata; Acanthomorphata; Euacanthomorphacea; Percomorphaceae; Carangaria; Carangaria incertae sedis; Centropomidae; Lates	<i>Lates calcarifer</i>	(Jamieson, 1991)	2	Canonical	Canonical	External spawning	(Moore, 1982)
Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Clupeocephala; Euteleostei; Osteoglossocephalai; Eurypterygia; Ctenosquamata; Acanthomorphata; Euacanthomorphacea; Percomorphaceae; Carangaria; Istiophoriformes; Istiophoridae; Istiompax	<i>Makaira indica</i>	(van der Straten et al., 2006)	2	Canonical	Canonical	External- spawning	(de Sylva and Breder, 1997)
Vertebrata; Gnathostomata; Teleostomi; Euteleostomi;	<i>Kareius bicoloratus</i>	(Kang et al., 2016)	2	Canonical	Canonical	External - spawning	(Uehara and Shimizu,

Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupecocephala; Euteleostei; Neoteleostei; Eurypterygia; Ctenosquamata; Acanthomorphata; Euacanthomorphacea; Percomorphaceae; Carangaria; Pleuronectiformes; Pleuronectoidei; Pleuronectidae; Kareius							1996)
Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupecocephala; Euteleostei; Neoteleostei; Eurypterygia; Ctenosquamata; Acanthomorphata; Euacanthomorphacea; Percomorphaceae; Carangaria; Carangiformes; Carangidae; Seriola	<i>Seriola dumerilii</i> (Greater amberjack)	(Maricchiolo et al., 2002)	2	Canonical	Canonical	External spawning	(Marino et al., 1995)
Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupecocephala; Euteleostei; Neoteleostei; Eurypterygia; Ctenosquamata; Acanthomorphata; Euacanthomorphacea; Percomorphaceae; Carangaria; Pleuronectiformes; Pleuronectoidei; Soleidae; Solea	<i>Solea senegalensis</i> (Senegalese sole)	(Medina et al., 2000)	2	Canonical	Canonical	External spawning	(Dinis et al., 1999)
Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupecocephala; Euteleostei; Neoteleostei; Eurypterygia; Ctenosquamata; Acanthomorphata; Euacanthomorphacea; Percomorphaceae; Carangaria; Carangaria incertae sedis; Centropomidae; Lates	<i>Nile perch</i>	(Kahwa et al., 2019)	2	Canonical	Canonical	External spawning	(Kitchell et al., 1997)
Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupecocephala; Euteleostei; Neoteleostei; Eurypterygia; Ctenosquamata; Acanthomorphata; Euacanthomorphacea; Percomorphaceae; Carangaria; Carangaria incertae sedis; Polynemidae; Polydactylus	<i>Polydactylus virginicus</i> (Barbu)	(Gusmao-Pompiani et al., 2005)	2	Canonical	Canonical	External spawning	(Klawe and Alverson, 1964) By <i>Polydactylus approximans</i>
Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupecocephala; Euteleostei; Neoteleostei; Eurypterygia; Ctenosquamata; Acanthomorphata; Euacanthomorphacea; Percomorphaceae; Carangaria; Pleuronectiformes; Pleuronectoidei; Pleuronectidae; Platichthys	<i>Platichthys tellatus</i> (Pallas)	(Kwon and Kim, 2014)	2	Canonical	Canonical	External spawning	(Spies and Rice, 1988)
Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupecocephala; Euteleostei; Neoteleostei; Eurypterygia; Ctenosquamata; Acanthomorphata; Euacanthomorphacea; Percomorphaceae; Carangaria; Pleuronectiformes; Pleuronectoidei; Pleuronectidae; Platichthys	<i>Platichthys flesus</i> (European flounder)	(Jones and Butler, 1988)	2	Canonical	Canonical	External spawning	(Florin and Höglund, 2008)
Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupecocephala; Euteleostei; Neoteleostei; Eurypterygia; Ctenosquamata; Acanthomorphata; Euacanthomorphacea; Percomorphaceae; Carangaria; Carangiformes; Rachycentridae; Rachycentron	<i>Rachycentron canadum</i> (Cobia)	(Dhanasekar et al., 2018)	2	Canonical	Canonical	External spawning	(Benetti et al., 2008)
Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupecocephala; Otomorpha; Clupei; Clupeiformes; Clupeoidei; Engraulidae; Engraulinae; Engraulis	<i>Engraulis japonicus</i>	(Fu et al., 2016)	1 (Confirmed)	Undetected	Canonical	External	(Lee et al., 2006)
Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupecocephala; Otomorpha; Clupei; Clupeiformes; Clupeoidei; Clupeidae; Spratelloidinae; Spratelloides	<i>Spratelloides gracilis</i> (Silver-stripe round herring)	(Gwo et al., 2006)	1 (Confirmed)	Undetected	Canonical	External- Spawning- no spermcasting	(Mogi et al., 2009)
Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupecocephala; Otomorpha; Clupei; Clupeiformes; Clupeoidei; Clupeidae; Clupeinae; Sardinops	<i>Sardinops melanostictus</i>	(Jamieson, 1991)	2	Canonical	Canonical	External spawning	(Watanabe et al., 1996)
Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupecocephala; Euteleostei; Neoteleostei; Eurypterygia; Ctenosquamata; Acanthomorphata; Euacanthomorphacea; Percomorphaceae; Carangaria; Pleuronectiformes; Pleuronectoidei; Paralicthyidae; Paralicthys	<i>Paralicthys olivaceus</i> <i>Paralicthys flesus</i>	(Jamieson, 1991)	2	Canonical	Canonical	External spawning	(Yasuda et al., 2013)

Gnathostomata; Teleostomi; Euteleostomi; Sarcopterygii; Dipnotetrapodomorpha; Dipnomorpha; Ceratodontae; Ceratodontiformes; Ceratodontoidei; Ceratodontidae	<i>Neoceratodus forsteri</i>	(Jamieson, 1991)	2	Canonical	Canonical	External spawning	(Espinoza et al., 2013)
Gnathostomata; Teleostomi; Euteleostomi; Sarcopterygii; Dipnotetrapodomorpha; Dipnomorpha; Ceratodontae; Ceratodontiformes; Lepidosirenoidei; Lepidosirenidae; Lepidosiren	<i>Lepidosiren paradoxa</i>	(Jamieson, 1991)	2	Canonical	Canonical	External spawning	(Kerr and Sedgwick, 1900)
Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Sarcopterygii; Dipnotetrapodomorpha; Tetrapoda; Amniota; Sauropsida; Sauria; Lepidosauria; Sphenodontia; Sphenodontidae; Sphenodon	<i>Sphenodon punctatus</i> (Tuatara)	(Healy and Jamieson, 1994)	2	Canonical	Canonical	Internal – (artificial) insemination	(Lamar et al., 2021)
Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Euteleostei; Neoteleostei; Eurypterygia; Ctenosquamata; Acanthomorphata; Euacanthomorphacea; Percomorphaceae; Gobiaria; Gobiiformes; Gobioidi; Gobiidae; Oxudercinae; Boleophthalmus	<i>Boleophthalmus pectinirostris</i> (Mudskipper)	(Chung, 2008)	2	Canonical	Canonical	External spawning	(Wanshu et al., 2007)
Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Euteleostei; Neoteleostei; Eurypterygia; Ctenosquamata; Acanthomorphata; Euacanthomorphacea; Percomorphaceae; Gobiaria; Kurtiformes; Apogonoidei	<i>Apogonidae</i>	(Jamieson, 1991)	2	Canonical	Canonical	External spawning	(Ishihara and Tachihara, 2011)
Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Euteleostei; Neoteleostei; Eurypterygia; Ctenosquamata; Acanthomorphata; Euacanthomorphacea; Percomorphaceae; Gobiaria; Gobiiformes; Gobioidi; Gobiidae; Benthophilinae; Neogobiini; Neogobius	<i>Neogobius melanostomus</i> (Round goby)	(Allen et al., 2004)	2	Canonical	Canonical	External -spawning	(Meunier et al., 2009)
Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Euteleostei; Neoteleostei; Eurypterygia; Ctenosquamata; Acanthomorphata; Euacanthomorphacea; Percomorphaceae; Gobiaria; Gobiiformes; Eleotroidei; Eleotridae; Eleotrinae; Hypseleotris	<i>Hypseleotris galii</i>	(Jamieson, 1991)	2	Canonical	Canonical	External spawning	(Mackay, 1973)
Gnathostomata; Teleostomi; Euteleostomi; Sarcopterygii; Coelacanthimorpha; Coelacanthiformes; Coelacanthidae; Latimeria	<i>Latimeria chalumnae</i>	(Jamieson, 1991)	2	Canonical	Canonical	internal	(Balon, 1991)
Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Osteoglossocephala; Osteoglossomorpha; Osteoglossiformes; Pantodontidae; Pantodon	<i>Pantodon buchholzi</i>	(Jamieson, 1991)	1 (unconfirmed)	Undetected	Canonical	Internal insemination- no spermcasting	(Dymek and Pecio, 2020)
Gnathostomata; Teleostomi; Euteleostomi; Sarcopterygii; Dipnotetrapodomorpha; Tetrapoda; Amphibia; Batrachia; Caudata; Salamandroidea; Plethodontidae; Plethodontinae	<i>Paronochelus</i> (Cardinal fish)	(Jamieson, 1991)	2	Canonical	Canonical	External spawning	(Lahnsteiner, 2003)
Gnathostomata; Teleostomi; Euteleostomi; Sarcopterygii; Dipnotetrapodomorpha; Dipnomorpha; Ceratodontae; Ceratodontiformes; Lepidosirenoidei; Protopteridae	<i>Protopterus</i>	(Jamieson, 1991)	2	Canonical	Canonical	External spawning	(MOSILLE and MMNOYA, 1988) By <i>Protopterus aethiopicus</i>
Vertebrata; Actinopterygii; Teleostei ; Osteoglossocephalai; Clupeocephala Clupeocephala; Otomorpha; Ostariophysi; Otophysi; Characiphysae; Siluriformes; Siluroidei; Pimelodidae; Rhamdia	<i>Rhamdia Quelen</i>	(Quagio-Grassiotto et al., 2005)	2	Canonical	Canonical	External- spawning	(Pereira et al., 2006)
Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Euteleostei; Neoteleostei; Eurypterygia; Ctenosquamata; Acanthomorphata; Euacanthomorphacea; Percomorphaceae; Gobiaria; Gobiiformes; Eleotroidei; Eleotridae; Eleotrinae; Hypseleotris	<i>Lepidogalaxias salamandroides</i> (Dwarf pencilfish)	(Leung, 1988) (Jamieson, 1991)	1 (Confirmed)	Undetected	Canonical	Internal - no spermcasting	(PUSEY and STEWART, 2008)
Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Euteleostei; Neoteleostei; Eurypterygia; Ctenosquamata; Acanthomorphata; Euacanthomorphacea; Percomorphaceae; Gobiaria; Gobiiformes; Eleotroidei; Eleotridae; Eleotrinae; Hypseleotris	<i>Gadus morhua</i> (Atlantic cod)	(Alavi et al., 2021), (Trippel, 2003)	2	Canonical	Canonical	External spawning	(Fordham and Trippel, 1999)

Neoteleostei; Eurypterygia; Ctenosquamata; Acanthomorphata; Paracanthopterygii; Zeiogadaria; Gadariae; Gadiformes; Gadoidei; Gadidae; Gadus							
Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Euteleosteiomorpha; Neoteleostei; Eurypterygia; Ctenosquamata; Acanthomorphata; Euacanthomorphaceae; Percomorphaceae; Pelagiaria; Scombriformes; Scombridae; Scombrinae; Thunnini; Thunnus	<i>Thunnus thynnus</i> (Bluefin tuna)	(Abascal et al., 2004)	2	Canonica	Canonical	External spawning	(Karakulak et al., 2004)
Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Euteleosteiomorpha; Neoteleostei; Eurypterygia; Ctenosquamata; Acanthomorphata; Euacanthomorphaceae; Percomorphaceae; Pelagiaria; Scombriformes; Stromateidae; Pampus	<i>Pampus argenteus</i>	(Chung et al., 2010)	2	Canonical	Canonical	External spawning	(Almatar et al., 2004)
Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Euteleosteiomorpha; Neoteleostei; Eurypterygia; Ctenosquamata; Acanthomorphata; Euacanthomorphaceae; Percomorphaceae; Pelagiaria; Scombriformes; Scombridae; Scombrinae; Scombrini	<i>Scomber australicus</i>	(Jamieson, 1991)	2	Canonical	Canonical	External spawning	(Dickerson et al., 1992)
	<i>Scomber japonicus</i>						
	<i>Scomber Tritor</i>						
	<i>Thunnus thynnus</i>						
	<i>Euthynnus alletteratus</i>						
Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; teleostei	<i>Elopiformes,</i>	(Jamieson and Mattel, 2009)	2	Canonical PC is modified; there is extension of the proximal centriole as two elongate bundles of 4 and 5 triplets	Canonical	External spawning	(Almatar et al., 2004)
	<i>Anguilliformes,</i>	(Parenti and Johnson, 1996)					
	<i>Notacanthiformes</i>						
Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Euteleosteiomorpha; Neoteleostei; Eurypterygia; Ctenosquamata; Myctophata; Myctophiformes; Myctophidae; Lampanyctus	<i>Lampanyctus crocodilus</i> (Jewel lanternfish)	(Ribes et al., 2015) (Jamieson, 1991)	2	Canonical, Two parallel centrioles that give rise to two flagella of the 9+0 type	Canonical	External spawning- no spermcasting	(Fanelli et al., 2014)
Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Elopoccephalai; Elopoccephala	<i>Elopomorpha</i>	(Jamieson, 1991)	2	Canonical	Canonical	External spawning	(Arai and Chino, 2018)

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