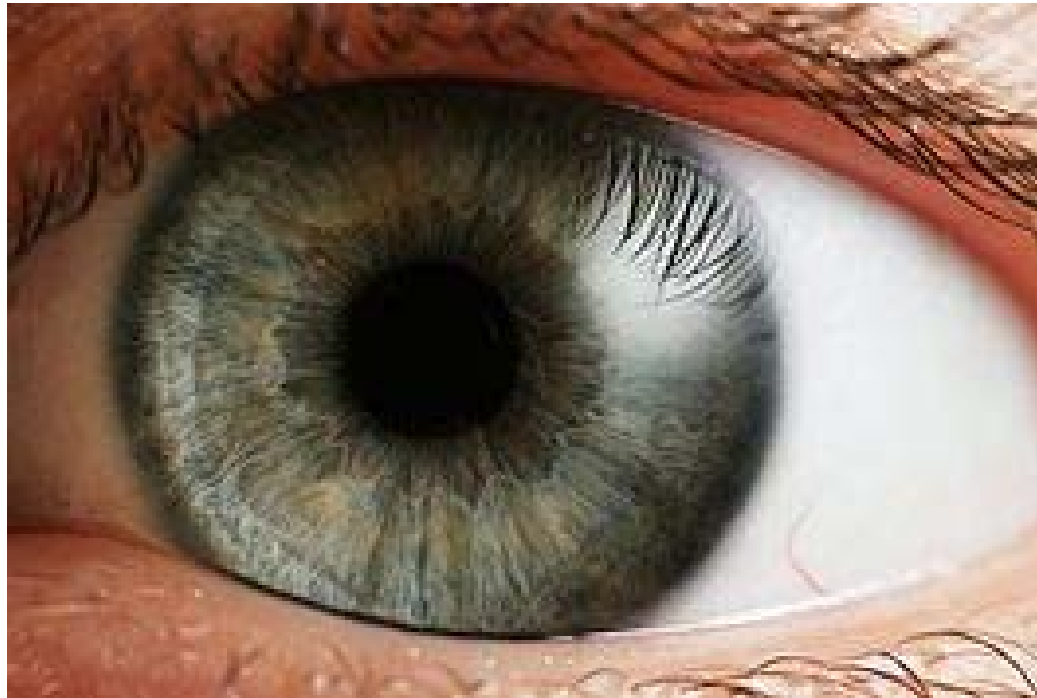


**The Evolution Of Photoreceptors**  
**By Paul Nethercott**

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**[www.CreationismOnline.com](http://www.CreationismOnline.com)**



**[www.wikipedia.com](http://www.wikipedia.com)**

## Homoplasy In The Evolution Of Various Eyes

Non-Compound Eyes	Species
Pit eyes	Jelly Fish Star Fish Flatworms Snails Slugs Gastropod Mollusks Giant clams Spiders Bees Grasshoppers
Spherical lensed eye	Gastropods Copepods Annelids Cephalopods Chitons
Multiple lenses	Pontella Copilia
Refractive cornea	Mammals Birds Reptiles Box Jelly Fish
Reflector eyes	Rotifers Copepods Platyhelminths Scallop Pecten The Spookfish

Compound Eyes	Species
Apposition eyes	Insects Annelids Bivalves Horseshoe Crab Caterpillars
Parabolic Superposition	Mayflies Shrimp Prawns Crayfish Lobsters
Compound Psuedo Pupil	Praying Mantis Dragon Flies
Compound Ocelli	<a href="#">Scutigera</a>
Refracting Superposition	Decapoda Euphausiacea Mysida

## Evolution Of Photoreceptors And Eyes

Group	Arrangement	Ultra Structure	Sub Structure	Hyperlink
Phytoflagellata	Chloroblastic to para flagellar stigmata	Paraflagellar		<a href="http://en.wikipedia.org/wiki/Phytoflagellate">http://en.wikipedia.org/wiki/Phytoflagellate</a>
Dinoflagellata	Eyelets with lenticular body and retinula	Lamellar		<a href="http://en.wikipedia.org/wiki/Dinoflagellata">http://en.wikipedia.org/wiki/Dinoflagellata</a>
Kamptozoa larvae	Everse/inverse ocellar pits	Unpleated		<a href="http://en.wikipedia.org/wiki/Kamptozoa">http://en.wikipedia.org/wiki/Kamptozoa</a>
Nematoda	Everse sensory cell within the amphids	Unpleated		<a href="http://en.wikipedia.org/wiki/Nematoda">http://en.wikipedia.org/wiki/Nematoda</a>
Bryozoa larvae	Everse ocellar pits	Unpleated	Kinocilia	<a href="http://en.wikipedia.org/wiki/Bryozoa">http://en.wikipedia.org/wiki/Bryozoa</a>
Hydrozoa-Leuckartiara	Epithelial eye spots	Unpleated		<a href="http://en.wikipedia.org/wiki/Hydrozoa">http://en.wikipedia.org/wiki/Hydrozoa</a>
Hydrozoa-Anthomedusa	Epithelial to everse ocelli, ex umbrellar	Ciliary	Villi	<a href="http://en.wikipedia.org/wiki/Anthomedusa">http://en.wikipedia.org/wiki/Anthomedusa</a>
Hydrozoa- Leptomedusae	Inverse ocellar cup sub umbrellar	Ciliary	Villi	<a href="http://en.wikipedia.org/wiki/Leptomedusae">http://en.wikipedia.org/wiki/Leptomedusae</a>
Hydrozoa- Leptomedusae	Everse eye spots, ex umbrellar	Ciliary	Lamellae	<a href="http://en.wikipedia.org/wiki/Leptomedusae">http://en.wikipedia.org/wiki/Leptomedusae</a>
Scyphozoa (in general)	Epithelial to everse ocelli and lens eye	Ciliary	Villi	<a href="http://en.wikipedia.org/wiki/Scyphozoa">http://en.wikipedia.org/wiki/Scyphozoa</a>
Scyphozoa Aurelia	Inverse ocellar cups entodermal pigment	Ciliary	Villi	<a href="http://en.wikipedia.org/wiki/Aurelia_(genus)">http://en.wikipedia.org/wiki/Aurelia_(genus)</a>
Ctenophora	Epithelial cell in apical organ	Ciliary	Lamellae	<a href="http://en.wikipedia.org/wiki/Ctenophora">http://en.wikipedia.org/wiki/Ctenophora</a>
Placophora	Marginal cells in everse eyes at megalaesthetes	Ciliary	Lamellae	<a href="http://en.wikipedia.org/wiki/Chiton">http://en.wikipedia.org/wiki/Chiton</a>
Gastropoda-Onchidiidae	Inverse dorsal eyes, closed with lens	Ciliary	Lamellae	<a href="http://en.wikipedia.org/wiki/Onchidiidae">http://en.wikipedia.org/wiki/Onchidiidae</a>
Gastropoda-Heteropoda	Everse cephalic eyes, secondarily altered	Ciliary	Paddles	<a href="http://en.wikipedia.org/wiki/Sea_butterfly">http://en.wikipedia.org/wiki/Sea_butterfly</a>
Bivalvia-Cardiacea	Everse to inverse eyes at mantle edge	Ciliary	Sacs	<a href="http://en.wikipedia.org/wiki/Cardiacea">http://en.wikipedia.org/wiki/Cardiacea</a>
Bivalvia-Pectenidae	Distal retina of inverse eye at mantle edge	Ciliary	Sacs	<a href="http://en.wikipedia.org/wiki/Pectinidae">http://en.wikipedia.org/wiki/Pectinidae</a>
Polychaeta-Serpulimorpha	Everse compound eyes at branchial filaments	Ciliary	Sacs	<a href="http://en.wikipedia.org/wiki/Serpula">http://en.wikipedia.org/wiki/Serpula</a>
Polychaeta- Nereidae	Receptors imbedded in the cerebral ganglia	Ciliary	Digits	<a href="http://en.wikipedia.org/wiki/Nereididae">http://en.wikipedia.org/wiki/Nereididae</a>
Chaetognatha (Sagitta)	Composite inverse eyes of cell clusters	Ciliary	Tubules	<a href="http://en.wikipedia.org/wiki/Chaetognatha">http://en.wikipedia.org/wiki/Chaetognatha</a>
Asteroidea	Everse open or closed eye pits (optic cushion)	Ciliary	Villi	<a href="http://en.wikipedia.org/wiki/Asteroidea">http://en.wikipedia.org/wiki/Asteroidea</a>
Ascidiacea larvae	Inverse to everse ocellus in cerebral vesicle	Ciliary	Disks	<a href="http://en.wikipedia.org/wiki/Ascidiacea">http://en.wikipedia.org/wiki/Ascidiacea</a>
Vertebrata	Inverse lateral and everse dorsal eye	Ciliary	Rods And Cones	<a href="http://en.wikipedia.org/wiki/Vertebrata">http://en.wikipedia.org/wiki/Vertebrata</a>
Ascidiacea-Botryllidae	Inverse photolith organ	Ciliary	?	<a href="http://en.wikipedia.org/wiki/Pleurogona">http://en.wikipedia.org/wiki/Pleurogona</a>
Ascidiacea larvae	Epithelial receptors (roof of cerebral vesicle)	Ciliary	Villi	<a href="http://en.wikipedia.org/wiki/Pleurogona">http://en.wikipedia.org/wiki/Pleurogona</a>
Cephalochordata	Epithelial receptors (roof of cerebral vesicle)	Ciliary	Membranes	<a href="http://en.wikipedia.org/wiki/Cephalochordata">http://en.wikipedia.org/wiki/Cephalochordata</a>
Turbellaria	Epithelial ocellar patches	?	?	<a href="http://en.wikipedia.org/wiki/Turbellaria">http://en.wikipedia.org/wiki/Turbellaria</a>
Turbellaria larvae	First pair of sub epithelial eye spots	?	?	<a href="http://en.wikipedia.org/wiki/Turbellaria">http://en.wikipedia.org/wiki/Turbellaria</a>
Rotatoria	Epithelial frontal eyespots (unicellular)	?	?	<a href="http://en.wikipedia.org/wiki/Rotatoria">http://en.wikipedia.org/wiki/Rotatoria</a>
Kinorhyncha	Everse ocellar cups	?	?	<a href="http://en.wikipedia.org/wiki/Kinorhyncha">http://en.wikipedia.org/wiki/Kinorhyncha</a>
Nematomorpha-Paragordius	Everse closed dorso frontal eye	?	?	<a href="http://en.wikipedia.org/wiki/Paragordius_tricuspidatus">http://en.wikipedia.org/wiki/Paragordius_tricuspidatus</a>

## Evolution Of Photoreceptors And Eyes

Group	Arrangement	Ultra Structure	Sub Structure	Hyperlink
Placophora larvae	Epithelial ocelli above lateral nerve cords	?	?	<a href="http://en.wikipedia.org/wiki/Chiton">http://en.wikipedia.org/wiki/Chiton</a>
Bivalvia- Filibranchia	Everse ocelli or eye cups (larvae to adults)	?	?	<a href="http://en.wikipedia.org/wiki/Sepia_filibranchia">http://en.wikipedia.org/wiki/Sepia_filibranchia</a>
Bivalvia-Arcacea	Everse compound eyes at mantle edge	?	?	<a href="http://en.wikipedia.org/wiki/Arcoida">http://en.wikipedia.org/wiki/Arcoida</a>
Bivalvia-Adapedonta	Epidermal phaosome cells of the siphon	?	?	<a href="http://en.wikipedia.org/wiki/Bivalvia">http://en.wikipedia.org/wiki/Bivalvia</a>
Gastropoda-Corolla	Subepithelial everse organs at fin edge	?	?	<a href="http://en.wikipedia.org/wiki/Corolla_(gastropod)">http://en.wikipedia.org/wiki/Corolla_(gastropod)</a>
Echiurida-Bonelliidae	Subepithelial eyespots of larvae	?	?	<a href="http://en.wikipedia.org/wiki/Echiuroidea">http://en.wikipedia.org/wiki/Echiuroidea</a>
Sipunculida	Epithelial eyespots at tentacles	?	?	<a href="http://en.wikipedia.org/wiki/Sipunculida">http://en.wikipedia.org/wiki/Sipunculida</a>
Polychaeta-Eunicidae	Epithelial mid ventral eye spots (Palolo)	?	?	<a href="http://en.wikipedia.org/wiki/Eunicidae">http://en.wikipedia.org/wiki/Eunicidae</a>
Polychaeta-Sabellidae	Subepithelial eyespots at the pygidium	?	?	<a href="http://en.wikipedia.org/wiki/Eunicidae">http://en.wikipedia.org/wiki/Eunicidae</a>
Chaetognatha (Eukrohnia)	Compound ommatidial eyes	?	?	<a href="http://en.wikipedia.org/wiki/Chaetognatha">http://en.wikipedia.org/wiki/Chaetognatha</a>
Brachiopoda larvae	Everse ocellar pits	?	?	<a href="http://en.wikipedia.org/wiki/Brachiopoda">http://en.wikipedia.org/wiki/Brachiopoda</a>
Holothuroidea-Apoda	Epithelial eyespots at tentacles	?	?	<a href="http://en.wikipedia.org/wiki/Holothuroidea">http://en.wikipedia.org/wiki/Holothuroidea</a>
Cyclostomata larvae	Epithelial photic cells in tail	?	?	<a href="http://en.wikipedia.org/wiki/Cyclostomata">http://en.wikipedia.org/wiki/Cyclostomata</a>
Nemertini-Lineus	Inverse pigment-cup ocelli	Rhabdomic	Distal	<a href="http://en.wikipedia.org/wiki/Nemertini">http://en.wikipedia.org/wiki/Nemertini</a>
Placophora	Everse closed eyes at megal aesthetes	Rhabdomic	Distal (Part)	<a href="http://en.wikipedia.org/wiki/Chiton">http://en.wikipedia.org/wiki/Chiton</a>
Bivalvia-Filibranchia	Everse pits to closed eyes at mantle edge	?	?	<a href="http://en.wikipedia.org/wiki/Sepia_filibranchia">http://en.wikipedia.org/wiki/Sepia_filibranchia</a>
Bivalvia-Cardiacea	Everse to inverse eyes at mantle edge	Rhabdomic	Lateral (Part)	<a href="http://en.wikipedia.org/wiki/Cardiacea">http://en.wikipedia.org/wiki/Cardiacea</a>
Bivalvia-Pectenidae	Inverse eyes at mantle edge, proximal retina	Rhabdomic	Lateral And Distal	<a href="http://en.wikipedia.org/wiki/Pectinidae">http://en.wikipedia.org/wiki/Pectinidae</a>
Gastropoda	Cephalic everse eye pit to lens eyes	Rhabdomic	Distal	<a href="http://en.wikipedia.org/wiki/Gastropoda">http://en.wikipedia.org/wiki/Gastropoda</a>
Cephalopoda	Everse pinhole eye to lens eye	Rhabdomic	Lateral	<a href="http://en.wikipedia.org/wiki/Cephalopoda">http://en.wikipedia.org/wiki/Cephalopoda</a>
Clitellata	Epithelial to inverse phaosome cells (eyes)	Rhabdomic	Internal	<a href="http://en.wikipedia.org/wiki/Clitellata">http://en.wikipedia.org/wiki/Clitellata</a>
Sipunculida	Everse cerebral tubes	Rhabdomic	Distal	<a href="http://en.wikipedia.org/wiki/Sipunculida">http://en.wikipedia.org/wiki/Sipunculida</a>
Polychaeta (predatory)	Everse eye pits to lens eyes (cephalic)	Rhabdomic	Lateral	<a href="http://en.wikipedia.org/wiki/Polychaete">http://en.wikipedia.org/wiki/Polychaete</a>
Onychophora	Everse lens eyes	Rhabdomic	Lateral And Distal	<a href="http://en.wikipedia.org/wiki/Onychophora">http://en.wikipedia.org/wiki/Onychophora</a>
Arthropoda	Everse compound lateral eyes	Rhabdomic	Lateral	<a href="http://en.wikipedia.org/wiki/Arthropoda">http://en.wikipedia.org/wiki/Arthropoda</a>
Arthropoda (partim)	Everse dorsomedian eyes (ocelli)	Rhabdomic	Internal (Part)	<a href="http://en.wikipedia.org/wiki/Arthropoda">http://en.wikipedia.org/wiki/Arthropoda</a>
Enteropneusta larvae	Everse ocellar pits	Rhabdomic	Lateral	<a href="http://en.wikipedia.org/wiki/Enteropneusta">http://en.wikipedia.org/wiki/Enteropneusta</a>
Pogonophora	Epithelial phaosome cells in two groups	Rhabdomic	Internal	<a href="http://en.wikipedia.org/wiki/Siboglinidae">http://en.wikipedia.org/wiki/Siboglinidae</a>
Asciacea-Ciona	Epithelial siphon ocelli	Rhabdomic	Medial	<a href="http://en.wikipedia.org/wiki/Asciacea">http://en.wikipedia.org/wiki/Asciacea</a>
Asteroidea (Asterias)	Closed eye pit (optic cushion)	Rhabdomic	Distal	<a href="http://en.wikipedia.org/wiki/Asterias">http://en.wikipedia.org/wiki/Asterias</a>

## Evolution Of Photoreceptors And Eyes

Group	Arrangement	Ultra Structure	Sub Structure	Hyperlink
Turbellaria	Inverse pigment-cup ocelli	Diverticular	Villous	<a href="http://en.wikipedia.org/wiki/Turbellaria">http://en.wikipedia.org/wiki/Turbellaria</a>
Trematoda	Inverse pigment-cup ocelli	Diverticular	Villous	<a href="http://en.wikipedia.org/wiki/Trematoda">http://en.wikipedia.org/wiki/Trematoda</a>
Nemertini (?)	Inverse pigment-cup ocelli	Diverticular	Villous	<a href="http://en.wikipedia.org/wiki/Nemertini">http://en.wikipedia.org/wiki/Nemertini</a>
Sipunculida larvae	Inverse pigment-cup ocelli	Diverticular	Villous	<a href="http://en.wikipedia.org/wiki/Sipunculida">http://en.wikipedia.org/wiki/Sipunculida</a>
Polychaeta-Limicola, larvae,	Inverse pigment-cup ocelli	Diverticular	Villous	<a href="http://en.wikipedia.org/wiki/Polychaeta">http://en.wikipedia.org/wiki/Polychaeta</a>
Archiannelida part	Inverse pigment-cup ocelli	Diverticular	Villous	<a href="http://en.wikipedia.org/wiki/Archiannelida">http://en.wikipedia.org/wiki/Archiannelida</a>
Tardigrada	Inverse pigment-cup ocelli	Diverticular	Villous	<a href="http://en.wikipedia.org/wiki/Tardigrada">http://en.wikipedia.org/wiki/Tardigrada</a>
Crustacea-Entomostraca	Composite inverse median eyes (nauplius)	Diverticular	?	<a href="http://en.wikipedia.org/wiki/Crustacea">http://en.wikipedia.org/wiki/Crustacea</a>
Insecta-Diptera	Inverse pigment-cup ocelli of larvae	?	?	<a href="http://en.wikipedia.org/wiki/Insects">http://en.wikipedia.org/wiki/Insects</a>
Rotatoria	Inverse cerebral ocelli	Diverticular	Lamellous	<a href="http://en.wikipedia.org/wiki/Rotatoria">http://en.wikipedia.org/wiki/Rotatoria</a>
Nematoda	Inverse pigment-cup ocelli	Diverticular	Lamellous	<a href="http://en.wikipedia.org/wiki/Nematoda">http://en.wikipedia.org/wiki/Nematoda</a>
Gastrotricha	Unicellular organs, imbedded in brain	?	?	<a href="http://en.wikipedia.org/wiki/Gastrotricha">http://en.wikipedia.org/wiki/Gastrotricha</a>
Kinorhyncha-Echinoderes	Unicellular eyes pots in the brain	?	?	<a href="http://en.wikipedia.org/wiki/Kinorhyncha">http://en.wikipedia.org/wiki/Kinorhyncha</a>
Cephalopoda-Octobranchia	Epistellar body, penetrated by neuron cells	Diverticular	Villous	<a href="http://en.wikipedia.org/wiki/Octopodiformes">http://en.wikipedia.org/wiki/Octopodiformes</a>
Cephalopoda-Decabranchia	Para olfactory vesicles, with neuron cells	Diverticular	Villous	<a href="http://en.wikipedia.org/wiki/Cephalopod">http://en.wikipedia.org/wiki/Cephalopod</a>
Polychaeta-Opheliidae	Segmental inverse ocelli	Diverticular	Villous	<a href="http://en.wikipedia.org/wiki/Polychaeta">http://en.wikipedia.org/wiki/Polychaeta</a>
Polychaeta-Phyllocoemomorpha	Segmental sub epithelial eyespots, posterior body	?	?	<a href="http://en.wikipedia.org/wiki/Polychaeta">http://en.wikipedia.org/wiki/Polychaeta</a>
Tunicata-Thaliacea	Inverse pigment-cup eyes	Diverticular	Villous	<a href="http://en.wikipedia.org/wiki/Tunicata">http://en.wikipedia.org/wiki/Tunicata</a>
Cephalochordata	Inverse pigment-cup eyes ocelli (Hesse cells)	Diverticular	Villous	<a href="http://en.wikipedia.org/wiki/Cephalochordata">http://en.wikipedia.org/wiki/Cephalochordata</a>
Porifera larvae	Sub epithelial unicellular lements	?	?	<a href="http://en.wikipedia.org/wiki/Porifera">http://en.wikipedia.org/wiki/Porifera</a>

**Evolution Of Photoreceptors And Eyes  
Sorted By Eye Arrangement**

Group	Eye Arrangement	Ultra Structure	Sub Structure	Hyperlink
Gastropoda	Cephalic everse eye pit to lens eyes	Rhabdomic	Distal	<a href="http://en.wikipedia.org/wiki/Gastropoda">http://en.wikipedia.org/wiki/Gastropoda</a>
Phytoflagellata	Chloroblastic to para flagellar stigmata	Paraflagellar		<a href="http://en.wikipedia.org/wiki/Phytoflagellate">http://en.wikipedia.org/wiki/Phytoflagellate</a>
Asteroidea (Asterias)	Closed eye pit (optic cushion)	Rhabdomic	Distal	<a href="http://en.wikipedia.org/wiki/Asterias">http://en.wikipedia.org/wiki/Asterias</a>
Chaetognatha (Sagitta)	Composite inverse eyes of cell clusters	Ciliary	Tubules	<a href="http://en.wikipedia.org/wiki/Chaetognatha">http://en.wikipedia.org/wiki/Chaetognatha</a>
Crustacea-Entomostraca	Composite inverse median eyes (nauplius)	Diverticular	?	<a href="http://en.wikipedia.org/wiki/Crustacea">http://en.wikipedia.org/wiki/Crustacea</a>
Chaetognatha (Eukrohnia)	Compound ommatidial eyes	?	?	<a href="http://en.wikipedia.org/wiki/Chaetognatha">http://en.wikipedia.org/wiki/Chaetognatha</a>
Bivalvia-Pectenidae	Distal retina of inverse eye at mantle edge	Ciliary	Sacs	<a href="http://en.wikipedia.org/wiki/Pectenidae">http://en.wikipedia.org/wiki/Pectenidae</a>
Bivalvia-Adapedonta	Epidermal phaosome cells of the siphon	?	?	<a href="http://en.wikipedia.org/wiki/Bivalvia">http://en.wikipedia.org/wiki/Bivalvia</a>
Cephalopoda-Octobranchia	Epistellar body, penetrated by neuron cells	Diverticular	Villous	<a href="http://en.wikipedia.org/wiki/Octopodiformes">http://en.wikipedia.org/wiki/Octopodiformes</a>
Ctenophora	Epithelial cell in apical organ	Ciliary	Lamellae	<a href="http://en.wikipedia.org/wiki/Ctenophora">http://en.wikipedia.org/wiki/Ctenophora</a>
Hydrozoa-Leuckartiara	Epithelial eye spots	Unpleated		<a href="http://en.wikipedia.org/wiki/Hydrozoa">http://en.wikipedia.org/wiki/Hydrozoa</a>
Sipunculida	Epithelial eyespots at tentacles	?	?	<a href="http://en.wikipedia.org/wiki/Sipunculida">http://en.wikipedia.org/wiki/Sipunculida</a>
Holothuroidea-Apoda	Epithelial eyespots at tentacles	?	?	<a href="http://en.wikipedia.org/wiki/Holothuroidea">http://en.wikipedia.org/wiki/Holothuroidea</a>
Rotatoria	Epithelial frontal eyespots (unicellular)	?	?	<a href="http://en.wikipedia.org/wiki/Rotatoria">http://en.wikipedia.org/wiki/Rotatoria</a>
Polychaeta-Eunicidae	Epithelial mid ventral eye spots (Palolo)	?	?	<a href="http://en.wikipedia.org/wiki/Eunicidae">http://en.wikipedia.org/wiki/Eunicidae</a>
Turbellaria	Epithelial ocellar patches	?	?	<a href="http://en.wikipedia.org/wiki/Turbellaria">http://en.wikipedia.org/wiki/Turbellaria</a>
Placophora larvae	Epithelial ocelli above lateral nerve cords	?	?	<a href="http://en.wikipedia.org/wiki/Chiton">http://en.wikipedia.org/wiki/Chiton</a>
Pogonophora	Epithelial phaosome cells in two groups	Rhabdomic	Internal	<a href="http://en.wikipedia.org/wiki/Siboglinidae">http://en.wikipedia.org/wiki/Siboglinidae</a>
Cyclostomata larvae	Epithelial photic cells in tail	?	?	<a href="http://en.wikipedia.org/wiki/Cyclostomata">http://en.wikipedia.org/wiki/Cyclostomata</a>
Asciacea larvae	Epithelial receptors (roof of cerebral vesicle)	Ciliary	Villi	<a href="http://en.wikipedia.org/wiki/Pleurogona">http://en.wikipedia.org/wiki/Pleurogona</a>
Cephalochordata	Epithelial receptors (roof of cerebral vesicle)	Ciliary	Membranes	<a href="http://en.wikipedia.org/wiki/Cephalochordata">http://en.wikipedia.org/wiki/Cephalochordata</a>
Asciacea-Ciona	Epithelial siphon ocelli	Rhabdomic	Medial	<a href="http://en.wikipedia.org/wiki/Asciacea">http://en.wikipedia.org/wiki/Asciacea</a>
Scyphozoa (in general)	Epithelial to everse ocelli and lens eye	Ciliary	Villi	<a href="http://en.wikipedia.org/wiki/Scyphozoa">http://en.wikipedia.org/wiki/Scyphozoa</a>
Hydrozoa-Anthomedusa	Epithelial to everse ocelli, ex umbrellar	Ciliary	Villi	<a href="http://en.wikipedia.org/wiki/Anthomedusa">http://en.wikipedia.org/wiki/Anthomedusa</a>
Clitellata	Epithelial to inverse phaosome cells (eyes)	Rhabdomic	Internal	<a href="http://en.wikipedia.org/wiki/Clitellata">http://en.wikipedia.org/wiki/Clitellata</a>
Gastropoda-Heteropoda	Everse cephalic eyes, secondarily altered	Ciliary	Paddles	<a href="http://en.wikipedia.org/wiki/Sea_butterfly">http://en.wikipedia.org/wiki/Sea_butterfly</a>
Sipunculida	Everse cerebral tubes	Rhabdomic	Distal	<a href="http://en.wikipedia.org/wiki/Sipunculida">http://en.wikipedia.org/wiki/Sipunculida</a>
Nematomorpha-Paragordius	Everse closed dorso frontal eye	?	?	<a href="http://en.wikipedia.org/wiki/Paragordius_tricuspidatus">http://en.wikipedia.org/wiki/Paragordius_tricuspidatus</a>
Placophora	Everse closed eyes at megal aesthetes	Rhabdomic	Distal (Part)	<a href="http://en.wikipedia.org/wiki/Chiton">http://en.wikipedia.org/wiki/Chiton</a>
Polychaeta-Serpulimorpha	Everse compound eyes at branchial filaments	Ciliary	Sacs	<a href="http://en.wikipedia.org/wiki/Serpula">http://en.wikipedia.org/wiki/Serpula</a>
Bivalvia-Arcacea	Everse compound eyes at mantle edge	?	?	<a href="http://en.wikipedia.org/wiki/Arcoida">http://en.wikipedia.org/wiki/Arcoida</a>
Arthropoda	Everse compound lateral eyes	Rhabdomic	Lateral	<a href="http://en.wikipedia.org/wiki/Arthropoda">http://en.wikipedia.org/wiki/Arthropoda</a>

**Evolution Of Photoreceptors And Eyes  
Sorted By Eye Arrangement**

Group	Eye Arrangement	Ultra Structure	Sub Structure	Hyperlink
Arthropoda (partim)	Everse dorsomedian eyes (ocelli)	Rhabdomic	Internal (Part)	<a href="http://en.wikipedia.org/wiki/Arthropoda">http://en.wikipedia.org/wiki/Arthropoda</a>
Polychaeta (predatory)	Everse eye pits to lens eyes (cephalic)	Rhabdomic	Lateral	<a href="http://en.wikipedia.org/wiki/Polychaete">http://en.wikipedia.org/wiki/Polychaete</a>
Hydrozoa- Leptomedusae	Everse eye spots, ex umbrellar	Ciliary	Lamellae	<a href="http://en.wikipedia.org/wiki/Leptomedusae">http://en.wikipedia.org/wiki/Leptomedusae</a>
Onychophora	Everse lens eyes	Rhabdomic	Lateral And Distal	<a href="http://en.wikipedia.org/wiki/Onychophora">http://en.wikipedia.org/wiki/Onychophora</a>
Kinorhyncha	Everse ocellar cups	?	?	<a href="http://en.wikipedia.org/wiki/Kinorhyncha">http://en.wikipedia.org/wiki/Kinorhyncha</a>
Bryozoa larvae	Everse ocellar pits	Unpleated	Kinocilia	<a href="http://en.wikipedia.org/wiki/Bryozoa">http://en.wikipedia.org/wiki/Bryozoa</a>
Brachiopoda larvae	Everse ocellar pits	?	?	<a href="http://en.wikipedia.org/wiki/Brachiopoda">http://en.wikipedia.org/wiki/Brachiopoda</a>
Enteropneusta larvae	Everse ocellar pits	Rhabdomic	Lateral	<a href="http://en.wikipedia.org/wiki/Enteropneusta">http://en.wikipedia.org/wiki/Enteropneusta</a>
Bivalvia- Filibranchia	Everse ocelli or eye cups (larvae to adults)	?	?	<a href="http://en.wikipedia.org/wiki/Sepia_filibranchia">http://en.wikipedia.org/wiki/Sepia_filibranchia</a>
Asteroidea	Everse open or closed eye pits (optic cushion)	Ciliary	Villi	<a href="http://en.wikipedia.org/wiki/Asteroidea">http://en.wikipedia.org/wiki/Asteroidea</a>
Cephalopoda	Everse pinhole eye to lens eye	Rhabdomic	Lateral	<a href="http://en.wikipedia.org/wiki/Cephalopoda">http://en.wikipedia.org/wiki/Cephalopoda</a>
Bivalvia-Filibranchia	Everse pits to closed eyes at mantle edge	?	?	<a href="http://en.wikipedia.org/wiki/Sepia_filibranchia">http://en.wikipedia.org/wiki/Sepia_filibranchia</a>
Nematoda	Everse sensory cell within the amphids	Unpleated		<a href="http://en.wikipedia.org/wiki/Nematoda">http://en.wikipedia.org/wiki/Nematoda</a>
Bivalvia-Cardiacea	Everse to inverse eyes at mantle edge	Ciliary	Sacs	<a href="http://en.wikipedia.org/wiki/Cardiacea">http://en.wikipedia.org/wiki/Cardiacea</a>
Bivalvia-Cardiacea	Everse to inverse eyes at mantle edge	Rhabdomic	Lateral (Part)	<a href="http://en.wikipedia.org/wiki/Cardiacea">http://en.wikipedia.org/wiki/Cardiacea</a>
Kamptozoa larvae	Everse/inverse ocellar pits	Unpleated		<a href="http://en.wikipedia.org/wiki/Kamptozoa">http://en.wikipedia.org/wiki/Kamptozoa</a>
Dinoflagellata	Eyelets with lenticular body and retinula	Lamellar		<a href="http://en.wikipedia.org/wiki/Dinoflagellata">http://en.wikipedia.org/wiki/Dinoflagellata</a>
Turbellaria larvae	First pair of sub epithelial eye spots	?	?	<a href="http://en.wikipedia.org/wiki/Turbellaria">http://en.wikipedia.org/wiki/Turbellaria</a>
Rotatoria	Inverse cerebral ocelli	Diverticular	Lamellous	<a href="http://en.wikipedia.org/wiki/Rotatoria">http://en.wikipedia.org/wiki/Rotatoria</a>
Gastropoda-Onchidiidae	Inverse dorsal eyes, closed with lens	Ciliary	Lamellae	<a href="http://en.wikipedia.org/wiki/Onchidiidae">http://en.wikipedia.org/wiki/Onchidiidae</a>
Bivalvia-Pectenidae	Inverse eyes at mantle edge, proximal retina	Rhabdomic	Lateral And Distal	<a href="http://en.wikipedia.org/wiki/Pectenidae">http://en.wikipedia.org/wiki/Pectenidae</a>
Vertebrata	Inverse lateral and everse dorsal eye	Ciliary	Rods And Cones	<a href="http://en.wikipedia.org/wiki/Vertebrata">http://en.wikipedia.org/wiki/Vertebrata</a>
Hydrozoa- Leptomedusae	Inverse ocellar cup sub umbrellar	Ciliary	Villi	<a href="http://en.wikipedia.org/wiki/Leptomedusae">http://en.wikipedia.org/wiki/Leptomedusae</a>
Scyphozoa Aurelia	Inverse ocellar cups entodermal pigment	Ciliary	Villi	<a href="http://en.wikipedia.org/wiki/Aurelia_(genus)">http://en.wikipedia.org/wiki/Aurelia_(genus)</a>
Ascidiacea-Botryllidae	Inverse photolith organ	Ciliary	?	<a href="http://en.wikipedia.org/wiki/Pleurogona">http://en.wikipedia.org/wiki/Pleurogona</a>
Tunicata-Thaliacea	Inverse pigment-cup eyes	Diverticular	Villous	<a href="http://en.wikipedia.org/wiki/Tunicata">http://en.wikipedia.org/wiki/Tunicata</a>
Cephalochordata	Inverse pigment-cup eyes ocelli (Hesse cells)	Diverticular	Villous	<a href="http://en.wikipedia.org/wiki/Cephalochordata">http://en.wikipedia.org/wiki/Cephalochordata</a>

**Evolution Of Photoreceptors And Eyes  
Sorted By Eye Arrangement**

Group	Eye Arrangement	Ultra Structure	Sub Structure	Hyperlink
Nemertini-Lineus	Inverse pigment-cup ocelli	Rhabdomic	Distal	<a href="http://en.wikipedia.org/wiki/Nemertini">http://en.wikipedia.org/wiki/Nemertini</a>
Turbellaria	Inverse pigment-cup ocelli	Diverticular	Villous	<a href="http://en.wikipedia.org/wiki/Turbellaria">http://en.wikipedia.org/wiki/Turbellaria</a>
Trematoda	Inverse pigment-cup ocelli	Diverticular	Villous	<a href="http://en.wikipedia.org/wiki/Trematoda">http://en.wikipedia.org/wiki/Trematoda</a>
Nemertini (?)	Inverse pigment-cup ocelli	Diverticular	Villous	<a href="http://en.wikipedia.org/wiki/Nemertini">http://en.wikipedia.org/wiki/Nemertini</a>
Sipunculida larvae	Inverse pigment-cup ocelli	Diverticular	Villous	<a href="http://en.wikipedia.org/wiki/Sipunculida">http://en.wikipedia.org/wiki/Sipunculida</a>
Polychaeta-Limicola and larvae,	Inverse pigment-cup ocelli	Diverticular	Villous	<a href="http://en.wikipedia.org/wiki/Polychaeta">http://en.wikipedia.org/wiki/Polychaeta</a>
Archiannelida part	Inverse pigment-cup ocelli	Diverticular	Villous	<a href="http://en.wikipedia.org/wiki/Archiannelida">http://en.wikipedia.org/wiki/Archiannelida</a>
Tardigrada	Inverse pigment-cup ocelli	Diverticular	Villous	<a href="http://en.wikipedia.org/wiki/Tardigrada">http://en.wikipedia.org/wiki/Tardigrada</a>
Nematoda	Inverse pigment-cup ocelli	Diverticular	Lamellous	<a href="http://en.wikipedia.org/wiki/Nematoda">http://en.wikipedia.org/wiki/Nematoda</a>
Insecta-Diptera	Inverse pigment-cup ocelli of larvae	?	?	<a href="http://en.wikipedia.org/wiki/Insects">http://en.wikipedia.org/wiki/Insects</a>
Asciacea larvae	Inverse to everse ocellus in cerebral vesicle	Ciliary	Disks	<a href="http://en.wikipedia.org/wiki/Asciacea">http://en.wikipedia.org/wiki/Asciacea</a>
Placophora	Marginal cells in everse eyes at megal aesthetes	Ciliary	Lamellae	<a href="http://en.wikipedia.org/wiki/Chiton">http://en.wikipedia.org/wiki/Chiton</a>
Cephalopoda-Decabrachia	Para olfactory vesicles, with neuron cells	Diverticular	Villous	<a href="http://en.wikipedia.org/wiki/Cephalopod">http://en.wikipedia.org/wiki/Cephalopod</a>
Polychaeta- Nereidae	Receptors imbedded in the cerebral ganglia	Ciliary	Digits	<a href="http://en.wikipedia.org/wiki/Nereidae">http://en.wikipedia.org/wiki/Nereidae</a>
Polychaeta-Opheliidae	Segmental inverse ocelli	Diverticular	Villous	<a href="http://en.wikipedia.org/wiki/Polychaeta">http://en.wikipedia.org/wiki/Polychaeta</a>
Polychaeta-Phyllocomorpha	Segmental sub epithelial eyespots, posterior body	?	?	<a href="http://en.wikipedia.org/wiki/Polychaeta">http://en.wikipedia.org/wiki/Polychaeta</a>
Porifera larvae	Sub epithelial unicellular lements	?	?	<a href="http://en.wikipedia.org/wiki/Porifera">http://en.wikipedia.org/wiki/Porifera</a>
Gastropoda-Corolla	Subepithelial everse organs at fin edge	?	?	<a href="http://en.wikipedia.org/wiki/Corolla_(gastropod)">http://en.wikipedia.org/wiki/Corolla_(gastropod)</a>
Polychaeta-Sabellidae	Subepithelial eyespots at the pygidium	?	?	<a href="http://en.wikipedia.org/wiki/Eunicidae">http://en.wikipedia.org/wiki/Eunicidae</a>
Echiurida-Bonelliidae	Subepithelial eyespots of larvae	?	?	<a href="http://en.wikipedia.org/wiki/Echiuroidea">http://en.wikipedia.org/wiki/Echiuroidea</a>
Kinorhyncha-Echinoderes	Unicellular eyes pots in the brain	?	?	<a href="http://en.wikipedia.org/wiki/Kinorhyncha">http://en.wikipedia.org/wiki/Kinorhyncha</a>
Gastrotricha	Unicellular organs, imbedded in brain	?	?	<a href="http://en.wikipedia.org/wiki/Gastrotricha">http://en.wikipedia.org/wiki/Gastrotricha</a>



**Evolution Of Photoreceptors And Eyes  
Sorted By Eye Structure**

Group	Eye Arrangement	Ultra Structure	Sub Structure	Hyperlink
Chaetognatha (Eukrohnia)	Compound ommatidial eyes	?	?	<a href="http://en.wikipedia.org/wiki/Chaetognatha">http://en.wikipedia.org/wiki/Chaetognatha</a>
Bivalvia-Adapedonta	Epidermal phaosome cells of the siphon	?	?	<a href="http://en.wikipedia.org/wiki/Bivalvia">http://en.wikipedia.org/wiki/Bivalvia</a>
Sipunculida	Epithelial eyespots at tentacles	?	?	<a href="http://en.wikipedia.org/wiki/Sipunculida">http://en.wikipedia.org/wiki/Sipunculida</a>
Holothuroidea-Apoda	Epithelial eyespots at tentacles	?	?	<a href="http://en.wikipedia.org/wiki/Holothuroidea">http://en.wikipedia.org/wiki/Holothuroidea</a>
Rotatoria	Epithelial frontal eyespots (unicellular)	?	?	<a href="http://en.wikipedia.org/wiki/Rotatoria">http://en.wikipedia.org/wiki/Rotatoria</a>
Polychaeta-Eunicidae	Epithelial mid ventral eye spots (Palolo)	?	?	<a href="http://en.wikipedia.org/wiki/Eunicidae">http://en.wikipedia.org/wiki/Eunicidae</a>
Turbellaria	Epithelial ocellar patches	?	?	<a href="http://en.wikipedia.org/wiki/Turbellaria">http://en.wikipedia.org/wiki/Turbellaria</a>
Placophora larvae	Epithelial ocelli above lateral nerve cords	?	?	<a href="http://en.wikipedia.org/wiki/Chiton">http://en.wikipedia.org/wiki/Chiton</a>
Cyclostomata larvae	Epithelial photic cells in tail	?	?	<a href="http://en.wikipedia.org/wiki/Cyclostomata">http://en.wikipedia.org/wiki/Cyclostomata</a>
Nematomorpha-Paragordius	Everse closed dorso frontal eye	?	?	<a href="http://en.wikipedia.org/wiki/Paragordius_tricuspidatus">http://en.wikipedia.org/wiki/Paragordius_tricuspidatus</a>
Bivalvia-Arcacea	Everse compound eyes at mantle edge	?	?	<a href="http://en.wikipedia.org/wiki/Arcoida">http://en.wikipedia.org/wiki/Arcoida</a>
Kinorhyncha	Everse ocellar cups	?	?	<a href="http://en.wikipedia.org/wiki/Kinorhyncha">http://en.wikipedia.org/wiki/Kinorhyncha</a>
Brachiopoda larvae	Everse ocellar pits	?	?	<a href="http://en.wikipedia.org/wiki/Brachiopoda">http://en.wikipedia.org/wiki/Brachiopoda</a>
Bivalvia- Filibranchia	Everse ocelli or eye cups (larvae to adults)	?	?	<a href="http://en.wikipedia.org/wiki/Sepia_filibranchia">http://en.wikipedia.org/wiki/Sepia_filibranchia</a>
Bivalvia-Filibranchia	Everse pits to closed eyes at mantle edge	?	?	<a href="http://en.wikipedia.org/wiki/Sepia_filibranchia">http://en.wikipedia.org/wiki/Sepia_filibranchia</a>
Turbellaria larvae	First pair of sub epithelial eye spots	?	?	<a href="http://en.wikipedia.org/wiki/Turbellaria">http://en.wikipedia.org/wiki/Turbellaria</a>
Insecta-Diptera	Inverse pigment-cup ocelli of larvae	?	?	<a href="http://en.wikipedia.org/wiki/Insects">http://en.wikipedia.org/wiki/Insects</a>
Polychaeta-Phyllocomorpha	Segmental sub epithelial eyespots, posterior body	?	?	<a href="http://en.wikipedia.org/wiki/Polychaeta">http://en.wikipedia.org/wiki/Polychaeta</a>
Porifera larvae	Sub epithelial unicellular lements	?	?	<a href="http://en.wikipedia.org/wiki/Porifera">http://en.wikipedia.org/wiki/Porifera</a>
Gastropoda-Corolla	Subepithelial everse organs at fin edge	?	?	<a href="http://en.wikipedia.org/wiki/Corolla_(gastropod)">http://en.wikipedia.org/wiki/Corolla_(gastropod)</a>
Polychaeta-Sabellidae	Subepithelial eyespots at the pygidium	?	?	<a href="http://en.wikipedia.org/wiki/Eunicidae">http://en.wikipedia.org/wiki/Eunicidae</a>
Echiurida-Bonelliidae	Subepithelial eyespots of larvae	?	?	<a href="http://en.wikipedia.org/wiki/Echiuroidea">http://en.wikipedia.org/wiki/Echiuroidea</a>
Kinorhyncha-Echinoderes	Unicellular eyes pots in the brain	?	?	<a href="http://en.wikipedia.org/wiki/Kinorhyncha">http://en.wikipedia.org/wiki/Kinorhyncha</a>
Gastrotricha	Unicellular organs, imbedded in brain	?	?	<a href="http://en.wikipedia.org/wiki/Gastrotricha">http://en.wikipedia.org/wiki/Gastrotricha</a>
Asciacea-Botryllidae	Inverse photolith organ	Ciliary	?	<a href="http://en.wikipedia.org/wiki/Pleurogona">http://en.wikipedia.org/wiki/Pleurogona</a>
Polychaeta- Nereidae	Receptors imbedded in the cerebral ganglia	Ciliary	Digits	<a href="http://en.wikipedia.org/wiki/Nereididae">http://en.wikipedia.org/wiki/Nereididae</a>
Asciacea larvae	Inverse to everse ocellus in cerebral vesicle	Ciliary	Disks	<a href="http://en.wikipedia.org/wiki/Asciacea">http://en.wikipedia.org/wiki/Asciacea</a>
Ctenophora	Epithelial cell in apical organ	Ciliary	Lamellae	<a href="http://en.wikipedia.org/wiki/Ctenophora">http://en.wikipedia.org/wiki/Ctenophora</a>
Hydrozoa- Leptomedusae	Everse eye spots, ex umbrellar	Ciliary	Lamellae	<a href="http://en.wikipedia.org/wiki/Leptomedusae">http://en.wikipedia.org/wiki/Leptomedusae</a>
Gastropoda-Onchidiidae	Inverse dorsal eyes, closed with lens	Ciliary	Lamellae	<a href="http://en.wikipedia.org/wiki/Onchidiidae">http://en.wikipedia.org/wiki/Onchidiidae</a>
Placophora	Marginal cells in everse eyes at megal aesthetes	Ciliary	Lamellae	<a href="http://en.wikipedia.org/wiki/Chiton">http://en.wikipedia.org/wiki/Chiton</a>
Cephalochordata	Epithelial receptors (roof of cerebral vesicle)	Ciliary	Membranes	<a href="http://en.wikipedia.org/wiki/Cephalochordata">http://en.wikipedia.org/wiki/Cephalochordata</a>

**Evolution Of Photoreceptors And Eyes  
Sorted By Eye Structure**

Group	Eye Arrangement	Ultra Structure	Sub Structure	Hyperlink
Gastropoda-Heteropoda	Everse cephalic eyes, secondarily altered	Ciliary	Paddles	<a href="http://en.wikipedia.org/wiki/Sea_butterfly">http://en.wikipedia.org/wiki/Sea_butterfly</a>
Vertebrata	Inverse lateral and everse dorsal eye	Ciliary	Rods And Cones	<a href="http://en.wikipedia.org/wiki/Vertebrata">http://en.wikipedia.org/wiki/Vertebrata</a>
Bivalvia-Pectenidae	Distal retina of inverse eye at mantle edge	Ciliary	Sacs	<a href="http://en.wikipedia.org/wiki/Pectenidae">http://en.wikipedia.org/wiki/Pectenidae</a>
Polychaeta-Serpulimorpha	Everse compound eyes at branchial filaments	Ciliary	Sacs	<a href="http://en.wikipedia.org/wiki/Serpula">http://en.wikipedia.org/wiki/Serpula</a>
Bivalvia-Cardiacea	Everse to inverse eyes at mantle edge	Ciliary	Sacs	<a href="http://en.wikipedia.org/wiki/Cardiacea">http://en.wikipedia.org/wiki/Cardiacea</a>
Chaetognatha (Sagitta)	Composite inverse eyes of cell clusters	Ciliary	Tubules	<a href="http://en.wikipedia.org/wiki/Chaetognatha">http://en.wikipedia.org/wiki/Chaetognatha</a>
Ascidacea larvae	Epithelial receptors (roof of cerebral vesicle)	Ciliary	Villi	<a href="http://en.wikipedia.org/wiki/Pleurogona">http://en.wikipedia.org/wiki/Pleurogona</a>
Scyphozoa (in general)	Epithelial to everse ocelli and lens eye	Ciliary	Villi	<a href="http://en.wikipedia.org/wiki/Scyphozoa">http://en.wikipedia.org/wiki/Scyphozoa</a>
Hydrozoa-Anthomedusa	Epithelial to everse ocelli, ex umbrellar	Ciliary	Villi	<a href="http://en.wikipedia.org/wiki/Anthomedusa">http://en.wikipedia.org/wiki/Anthomedusa</a>
Asteroidea	Everse open or closed eye pits (optic cushion)	Ciliary	Villi	<a href="http://en.wikipedia.org/wiki/Asteroidea">http://en.wikipedia.org/wiki/Asteroidea</a>
Hydrozoa- Leptomedusae	Inverse ocellar cup sub umbrellar	Ciliary	Villi	<a href="http://en.wikipedia.org/wiki/Leptomedusae">http://en.wikipedia.org/wiki/Leptomedusae</a>
Scyphozoa Aurelia	Inverse ocellar cups entodermal pigment	Ciliary	Villi	<a href="http://en.wikipedia.org/wiki/Aurelia_(genus)">http://en.wikipedia.org/wiki/Aurelia_(genus)</a>
Crustacea-Entomostraca	Composite inverse median eyes (nauplius)	Diverticular	?	<a href="http://en.wikipedia.org/wiki/Crustacea">http://en.wikipedia.org/wiki/Crustacea</a>
Rotatoria	Inverse cerebral ocelli	Diverticular	Lamellous	<a href="http://en.wikipedia.org/wiki/Rotatoria">http://en.wikipedia.org/wiki/Rotatoria</a>
Nematoda	Inverse pigment-cup ocelli	Diverticular	Lamellous	<a href="http://en.wikipedia.org/wiki/Nematoda">http://en.wikipedia.org/wiki/Nematoda</a>
Cephalopoda-Octobranchia	Epistellar body, penetrated by neuron cells	Diverticular	Villous	<a href="http://en.wikipedia.org/wiki/Octopodiformes">http://en.wikipedia.org/wiki/Octopodiformes</a>
Tunicata-Thaliacea	Inverse pigment-cup eyes	Diverticular	Villous	<a href="http://en.wikipedia.org/wiki/Tunicata">http://en.wikipedia.org/wiki/Tunicata</a>
Cephalochordata	Inverse pigment-cup eyes ocelli (Hesse cells)	Diverticular	Villous	<a href="http://en.wikipedia.org/wiki/Cephalochordata">http://en.wikipedia.org/wiki/Cephalochordata</a>
Turbellaria	Inverse pigment-cup ocelli	Diverticular	Villous	<a href="http://en.wikipedia.org/wiki/Turbellaria">http://en.wikipedia.org/wiki/Turbellaria</a>
Trematoda	Inverse pigment-cup ocelli	Diverticular	Villous	<a href="http://en.wikipedia.org/wiki/Trematoda">http://en.wikipedia.org/wiki/Trematoda</a>
Nemertini (?)	Inverse pigment-cup ocelli	Diverticular	Villous	<a href="http://en.wikipedia.org/wiki/Nemertini">http://en.wikipedia.org/wiki/Nemertini</a>
Sipunculida larvae	Inverse pigment-cup ocelli	Diverticular	Villous	<a href="http://en.wikipedia.org/wiki/Sipunculida">http://en.wikipedia.org/wiki/Sipunculida</a>

**Evolution Of Photoreceptors And Eyes  
Sorted By Eye Structure**

Group	Eye Arrangement	Ultra Structure	Sub Structure	Hyperlink
Polychaeta-Limicola and larvae,	Inverse pigment-cup ocelli	Diverticular	Villous	<a href="http://en.wikipedia.org/wiki/Polychaeta">http://en.wikipedia.org/wiki/Polychaeta</a>
Archiannelida part	Inverse pigment-cup ocelli	Diverticular	Villous	<a href="http://en.wikipedia.org/wiki/Archiannelida">http://en.wikipedia.org/wiki/Archiannelida</a>
Tardigrada	Inverse pigment-cup ocelli	Diverticular	Villous	<a href="http://en.wikipedia.org/wiki/Tardigrada">http://en.wikipedia.org/wiki/Tardigrada</a>
Cephalopoda-Decabrachia	Para olfactory vesicles, with neuron cells	Diverticular	Villous	<a href="http://en.wikipedia.org/wiki/Cephalopod">http://en.wikipedia.org/wiki/Cephalopod</a>
Polychaeta-Opheliidae	Segmental inverse ocelli	Diverticular	Villous	<a href="http://en.wikipedia.org/wiki/Polychaeta">http://en.wikipedia.org/wiki/Polychaeta</a>
Dinoflagellata	Eyelets with lenticular body and retinula	Lamellar		<a href="http://en.wikipedia.org/wiki/Dinoflagellata">http://en.wikipedia.org/wiki/Dinoflagellata</a>
Phytoflagellata	Chloroblastic to para flagellar stigmata	Paraflagellar		<a href="http://en.wikipedia.org/wiki/Phytoflagellate">http://en.wikipedia.org/wiki/Phytoflagellate</a>
Gastropoda	Cephalic everse eye pit to lens eyes	Rhabdomic	Distal	<a href="http://en.wikipedia.org/wiki/Gastropoda">http://en.wikipedia.org/wiki/Gastropoda</a>
Asteroidea (Asterias)	Closed eye pit (optic cushion)	Rhabdomic	Distal	<a href="http://en.wikipedia.org/wiki/Asterias">http://en.wikipedia.org/wiki/Asterias</a>
Sipunculida	Everse cerebral tubes	Rhabdomic	Distal	<a href="http://en.wikipedia.org/wiki/Sipunculida">http://en.wikipedia.org/wiki/Sipunculida</a>
Nemertini-Lineus	Inverse pigment-cup ocelli	Rhabdomic	Distal	<a href="http://en.wikipedia.org/wiki/Nemertini">http://en.wikipedia.org/wiki/Nemertini</a>
Placophora	Everse closed eyes at megal aesthetes	Rhabdomic	Distal (Part)	<a href="http://en.wikipedia.org/wiki/Chiton">http://en.wikipedia.org/wiki/Chiton</a>
Pogonophora	Epithelial phaosome cells in two groups	Rhabdomic	Internal	<a href="http://en.wikipedia.org/wiki/Siboglinidae">http://en.wikipedia.org/wiki/Siboglinidae</a>
Clitellata	Epithelial to inverse phaosome cells (eyes)	Rhabdomic	Internal	<a href="http://en.wikipedia.org/wiki/Clitellata">http://en.wikipedia.org/wiki/Clitellata</a>
Arthropoda (partim)	Everse dorsomedian eyes (ocelli)	Rhabdomic	Internal (Part)	<a href="http://en.wikipedia.org/wiki/Arthropoda">http://en.wikipedia.org/wiki/Arthropoda</a>
Arthropoda	Everse compound lateral eyes	Rhabdomic	Lateral	<a href="http://en.wikipedia.org/wiki/Arthropoda">http://en.wikipedia.org/wiki/Arthropoda</a>
Polychaeta (predatory)	Everse eye pits to lens eyes (cephalic)	Rhabdomic	Lateral	<a href="http://en.wikipedia.org/wiki/Polychaete">http://en.wikipedia.org/wiki/Polychaete</a>
Enteropneusta larvae	Everse ocellar pits	Rhabdomic	Lateral	<a href="http://en.wikipedia.org/wiki/Enteropneusta">http://en.wikipedia.org/wiki/Enteropneusta</a>
Cephalopoda	Everse pinhole eye to lens eye	Rhabdomic	Lateral	<a href="http://en.wikipedia.org/wiki/Cephalopoda">http://en.wikipedia.org/wiki/Cephalopoda</a>
Bivalvia-Cardiacea	Everse to inverse eyes at mantle edge	Rhabdomic	Lateral (Part)	<a href="http://en.wikipedia.org/wiki/Cardiacea">http://en.wikipedia.org/wiki/Cardiacea</a>
Onychophora	Everse lens eyes	Rhabdomic	Lateral And Distal	<a href="http://en.wikipedia.org/wiki/Onychophora">http://en.wikipedia.org/wiki/Onychophora</a>
Bivalvia-Pectenidae	Inverse eyes at mantle edge, proximal retina	Rhabdomic	Lateral And Distal	<a href="http://en.wikipedia.org/wiki/Pectenidae">http://en.wikipedia.org/wiki/Pectenidae</a>
Ascidiacea-Ciona	Epithelial siphon ocelli	Rhabdomic	Medial	<a href="http://en.wikipedia.org/wiki/Ascidiacea">http://en.wikipedia.org/wiki/Ascidiacea</a>
Hydrozoa-Leuckartiara	Epithelial eye spots	Unpleated		<a href="http://en.wikipedia.org/wiki/Hydrozoa">http://en.wikipedia.org/wiki/Hydrozoa</a>
Nematoda	Everse sensory cell within the amphids	Unpleated		<a href="http://en.wikipedia.org/wiki/Nematoda">http://en.wikipedia.org/wiki/Nematoda</a>
Kamptozoa larvae	Everse/inverse ocellar pits	Unpleated		<a href="http://en.wikipedia.org/wiki/Kamptozoa">http://en.wikipedia.org/wiki/Kamptozoa</a>
Bryozoa larvae	Everse ocellar pits	Unpleated	Kinocilia	<a href="http://en.wikipedia.org/wiki/Brvozoa">http://en.wikipedia.org/wiki/Brvozoa</a>

**Evolution Of Photoreceptors And Eyes  
Sorted By Phyletic Group**

Group	Eye Arrangement	Ultra Structure	Sub Structure	Hyperlink
Archiannelida part	Inverse pigment-cup ocelli	Diverticular	Villous	<a href="http://en.wikipedia.org/wiki/Archiannelida">http://en.wikipedia.org/wiki/Archiannelida</a>
Arthropoda	Everse compound lateral eyes	Rhabdomeric	Lateral	<a href="http://en.wikipedia.org/wiki/Arthropoda">http://en.wikipedia.org/wiki/Arthropoda</a>
Arthropoda (partim)	Everse dorsomedian eyes (ocelli)	Rhabdomeric	Internal (Part)	<a href="http://en.wikipedia.org/wiki/Arthropoda">http://en.wikipedia.org/wiki/Arthropoda</a>
Ascidacea larvae	Epithelial receptors (roof of cerebral vesicle)	Ciliary	Villi	<a href="http://en.wikipedia.org/wiki/Pleurogona">http://en.wikipedia.org/wiki/Pleurogona</a>
Ascidacea larvae	Inverse to everse ocellus in cerebral vesicle	Ciliary	Disks	<a href="http://en.wikipedia.org/wiki/Ascidacea">http://en.wikipedia.org/wiki/Ascidacea</a>
Ascidacea-Botryllidae	Inverse photolith organ	Ciliary	?	<a href="http://en.wikipedia.org/wiki/Pleurogona">http://en.wikipedia.org/wiki/Pleurogona</a>
Ascidacea-Ciona	Epithelial siphon ocelli	Rhabdomeric	Medial	<a href="http://en.wikipedia.org/wiki/Ascidacea">http://en.wikipedia.org/wiki/Ascidacea</a>
Asteroidea	Everse open or closed eye pits (optic cushion)	Ciliary	Villi	<a href="http://en.wikipedia.org/wiki/Asteroidea">http://en.wikipedia.org/wiki/Asteroidea</a>
Asteroidea (Asterias)	Closed eye pit (optic cushion)	Rhabdomeric	Distal	<a href="http://en.wikipedia.org/wiki/Asterias">http://en.wikipedia.org/wiki/Asterias</a>
Bivalvia- Filibranchia	Everse ocelli or eye cups (larvae to adults)	?	?	<a href="http://en.wikipedia.org/wiki/Sepia_filibranchia">http://en.wikipedia.org/wiki/Sepia_filibranchia</a>
Bivalvia-Adapedonta	Epidermal phaosome cells of the siphon	?	?	<a href="http://en.wikipedia.org/wiki/Bivalvia">http://en.wikipedia.org/wiki/Bivalvia</a>
Bivalvia-Arcacea	Everse compound eyes at mantle edge	?	?	<a href="http://en.wikipedia.org/wiki/Arcoida">http://en.wikipedia.org/wiki/Arcoida</a>
Bivalvia-Cardiacea	Everse to inverse eyes at mantle edge	Ciliary	Sacs	<a href="http://en.wikipedia.org/wiki/Cardiacea">http://en.wikipedia.org/wiki/Cardiacea</a>
Bivalvia-Cardiacea	Everse to inverse eyes at mantle edge	Rhabdomeric	Lateral (Part)	<a href="http://en.wikipedia.org/wiki/Cardiacea">http://en.wikipedia.org/wiki/Cardiacea</a>
Bivalvia-Filibranchia	Everse pits to closed eyes at mantle edge	?	?	<a href="http://en.wikipedia.org/wiki/Sepia_filibranchia">http://en.wikipedia.org/wiki/Sepia_filibranchia</a>
Bivalvia-Pectenidae	Distal retina of inverse eye at mantle edge	Ciliary	Sacs	<a href="http://en.wikipedia.org/wiki/Pectinidae">http://en.wikipedia.org/wiki/Pectinidae</a>
Bivalvia-Pectenidae	Inverse eyes at mantle edge, proximal retina	Rhabdomeric	Lateral And Distal	<a href="http://en.wikipedia.org/wiki/Pectinidae">http://en.wikipedia.org/wiki/Pectinidae</a>
Brachiopoda larvae	Everse ocellar pits	?	?	<a href="http://en.wikipedia.org/wiki/Brachiopoda">http://en.wikipedia.org/wiki/Brachiopoda</a>
Bryozoa larvae	Everse ocellar pits	Unpleated	Kinocilia	<a href="http://en.wikipedia.org/wiki/Brvozoa">http://en.wikipedia.org/wiki/Brvozoa</a>
Cephalochordata	Epithelial receptors (roof of cerebral vesicle)	Ciliary	Membranes	<a href="http://en.wikipedia.org/wiki/Cephalochordata">http://en.wikipedia.org/wiki/Cephalochordata</a>
Cephalochordata	Inverse pigment-cup eyes ocelli (Hesse cells)	Diverticular	Villous	<a href="http://en.wikipedia.org/wiki/Cephalochordata">http://en.wikipedia.org/wiki/Cephalochordata</a>
Cephalopoda	Everse pinhole eye to lens eye	Rhabdomeric	Lateral	<a href="http://en.wikipedia.org/wiki/Cephalopoda">http://en.wikipedia.org/wiki/Cephalopoda</a>
Cephalopoda-Decabrachia	Para olfactory vesicles, with neuron cells	Diverticular	Villous	<a href="http://en.wikipedia.org/wiki/Cephalopod">http://en.wikipedia.org/wiki/Cephalopod</a>
Cephalopoda-Octobrachia	Epistellar body, penetrated by neuron cells	Diverticular	Villous	<a href="http://en.wikipedia.org/wiki/Octopodiformes">http://en.wikipedia.org/wiki/Octopodiformes</a>
Chaetognatha (Eukrohnia)	Compound ommatidial eyes	?	?	<a href="http://en.wikipedia.org/wiki/Chaetognatha">http://en.wikipedia.org/wiki/Chaetognatha</a>
Chaetognatha (Sagitta)	Composite inverse eyes of cell clusters	Ciliary	Tubules	<a href="http://en.wikipedia.org/wiki/Chaetognatha">http://en.wikipedia.org/wiki/Chaetognatha</a>
Clitellata	Epithelial to inverse phaosome cells (eyes)	Rhabdomeric	Internal	<a href="http://en.wikipedia.org/wiki/Clitellata">http://en.wikipedia.org/wiki/Clitellata</a>
Crustacea-Entomostraca	Composite inverse median eyes (nauplius)	Diverticular	?	<a href="http://en.wikipedia.org/wiki/Crustacea">http://en.wikipedia.org/wiki/Crustacea</a>
Ctenophora	Epithelial cell in apical organ	Ciliary	Lamellae	<a href="http://en.wikipedia.org/wiki/Ctenophora">http://en.wikipedia.org/wiki/Ctenophora</a>
Cyclostomata larvae	Epithelial photic cells in tail	?	?	<a href="http://en.wikipedia.org/wiki/Cyclostomata">http://en.wikipedia.org/wiki/Cyclostomata</a>
Dinoflagellata	Eyelets with lenticular body and retinula	Lamellar		<a href="http://en.wikipedia.org/wiki/Dinoflagellata">http://en.wikipedia.org/wiki/Dinoflagellata</a>
Echiurida-Bonelliidae	Subepithelial eyespots of larvae	?	?	<a href="http://en.wikipedia.org/wiki/Echiuroidea">http://en.wikipedia.org/wiki/Echiuroidea</a>

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Enteropneusta larvae	Everse ocellar pits	Rhabdomic	Lateral	<a href="http://en.wikipedia.org/wiki/Enteropneusta">http://en.wikipedia.org/wiki/Enteropneusta</a>
Gastropoda	Cephalic everse eye pit to lens eyes	Rhabdomic	Distal	<a href="http://en.wikipedia.org/wiki/Gastropoda">http://en.wikipedia.org/wiki/Gastropoda</a>
Gastropoda-Corolla	Subepithelial everse organs at fin edge	?	?	<a href="http://en.wikipedia.org/wiki/Corolla_(gastropod)">http://en.wikipedia.org/wiki/Corolla_(gastropod)</a>
Gastropoda-Heteropoda	Everse cephalic eyes, secondarily altered	Ciliary	Paddles	<a href="http://en.wikipedia.org/wiki/Sea_butterfly">http://en.wikipedia.org/wiki/Sea_butterfly</a>
Gastropoda-Onchidiidae	Inverse dorsal eyes, closed with lens	Ciliary	Lamellae	<a href="http://en.wikipedia.org/wiki/Onchidiidae">http://en.wikipedia.org/wiki/Onchidiidae</a>
Gastrotricha	Unicellular organs, imbedded in brain	?	?	<a href="http://en.wikipedia.org/wiki/Gastrotricha">http://en.wikipedia.org/wiki/Gastrotricha</a>
Holothuroidea-Apoda	Epithelial eyespots at tentacles	?	?	<a href="http://en.wikipedia.org/wiki/Holothuroidea">http://en.wikipedia.org/wiki/Holothuroidea</a>
Hydrozoa- Leptomedusae	Everse eye spots, ex umbrellar	Ciliary	Lamellae	<a href="http://en.wikipedia.org/wiki/Leptomedusae">http://en.wikipedia.org/wiki/Leptomedusae</a>
Hydrozoa- Leptomedusae	Inverse ocellar cup sub umbrellar	Ciliary	Villi	<a href="http://en.wikipedia.org/wiki/Leptomedusae">http://en.wikipedia.org/wiki/Leptomedusae</a>
Hydrozoa-Anthomedusa	Epithelial to everse ocelli, ex umbrellar	Ciliary	Villi	<a href="http://en.wikipedia.org/wiki/Anthomedusa">http://en.wikipedia.org/wiki/Anthomedusa</a>
Hydrozoa-Leuckartiara	Epithelial eye spots	Unpleated		<a href="http://en.wikipedia.org/wiki/Hydrozoa">http://en.wikipedia.org/wiki/Hydrozoa</a>
Insecta-Diptera	Inverse pigment-cup ocelli of larvae	?	?	<a href="http://en.wikipedia.org/wiki/Insects">http://en.wikipedia.org/wiki/Insects</a>
Kamptozoa larvae	Everse/inverse ocellar pits	Unpleated		<a href="http://en.wikipedia.org/wiki/Kamptozoa">http://en.wikipedia.org/wiki/Kamptozoa</a>
Kinorhyncha	Everse ocellar cups	?	?	<a href="http://en.wikipedia.org/wiki/Kinorhyncha">http://en.wikipedia.org/wiki/Kinorhyncha</a>
Kinorhyncha-Echinoderes	Unicellular eyes pots in the brain	?	?	<a href="http://en.wikipedia.org/wiki/Kinorhyncha">http://en.wikipedia.org/wiki/Kinorhyncha</a>
Nematoda	Everse sensory cell within the amphids	Unpleated		<a href="http://en.wikipedia.org/wiki/Nematoda">http://en.wikipedia.org/wiki/Nematoda</a>
Nematoda	Inverse pigment-cup ocelli	Diverticular	Lamellous	<a href="http://en.wikipedia.org/wiki/Nematoda">http://en.wikipedia.org/wiki/Nematoda</a>
Nematomorpha-Paragordius	Everse closed dorso frontal eye	?	?	<a href="http://en.wikipedia.org/wiki/Paragordius_tricuspidatus">http://en.wikipedia.org/wiki/Paragordius_tricuspidatus</a>
Nemertini (?)	Inverse pigment-cup ocelli	Diverticular	Villous	<a href="http://en.wikipedia.org/wiki/Nemertini">http://en.wikipedia.org/wiki/Nemertini</a>
Nemertini-Lineus	Inverse pigment-cup ocelli	Rhabdomic	Distal	<a href="http://en.wikipedia.org/wiki/Nemertini">http://en.wikipedia.org/wiki/Nemertini</a>
Onychophora	Everse lens eyes	Rhabdomic	Lateral And Distal	<a href="http://en.wikipedia.org/wiki/Onychophora">http://en.wikipedia.org/wiki/Onychophora</a>
Phytoflagellata	Chloroblastic to para flagellar stigmata	Paraflagellar		<a href="http://en.wikipedia.org/wiki/Phytoflagellate">http://en.wikipedia.org/wiki/Phytoflagellate</a>
Placophora	Everse closed eyes at megalaesthetes	Rhabdomic	Distal (Part)	<a href="http://en.wikipedia.org/wiki/Chiton">http://en.wikipedia.org/wiki/Chiton</a>
Placophora	Marginal cells in everse eyes at megalaesthetes	Ciliary	Lamellae	<a href="http://en.wikipedia.org/wiki/Chiton">http://en.wikipedia.org/wiki/Chiton</a>

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Placophora larvae	Epithelial ocelli above lateral nerve cords	?	?	<a href="http://en.wikipedia.org/wiki/Chiton">http://en.wikipedia.org/wiki/Chiton</a>
Pogonophora	Epithelial phaosome cells in two groups	Rhabdomeric	Internal	<a href="http://en.wikipedia.org/wiki/Siboglinidae">http://en.wikipedia.org/wiki/Siboglinidae</a>
Polychaeta (predatory)	Everse eye pits to lens eyes (cephalic)	Rhabdomeric	Lateral	<a href="http://en.wikipedia.org/wiki/Polychaete">http://en.wikipedia.org/wiki/Polychaete</a>
Polychaeta- Nereidae	Receptors imbedded in the cerebral ganglia	Ciliary	Digits	<a href="http://en.wikipedia.org/wiki/Nereididae">http://en.wikipedia.org/wiki/Nereididae</a>
Polychaeta-Eunicidae	Epithelial mid ventral eye spots (Palolo)	?	?	<a href="http://en.wikipedia.org/wiki/Eunicidae">http://en.wikipedia.org/wiki/Eunicidae</a>
Polychaeta-Limicola and larvae,	Inverse pigment-cup ocelli	Diverticular	Villous	<a href="http://en.wikipedia.org/wiki/Polychaeta">http://en.wikipedia.org/wiki/Polychaeta</a>
Polychaeta-Opheliidae	Segmental inverse ocelli	Diverticular	Villous	<a href="http://en.wikipedia.org/wiki/Polychaeta">http://en.wikipedia.org/wiki/Polychaeta</a>
Polychaeta-Phyllocomorpha	Segmental sub epithelial eyespots, posterior body	?	?	<a href="http://en.wikipedia.org/wiki/Polychaeta">http://en.wikipedia.org/wiki/Polychaeta</a>
Polychaeta-Sabellidae	Subepithelial eyespots at the pygidium	?	?	<a href="http://en.wikipedia.org/wiki/Eunicidae">http://en.wikipedia.org/wiki/Eunicidae</a>
Polychaeta-Serpulimorpha	Everse compound eyes at branchial filaments	Ciliary	Sacs	<a href="http://en.wikipedia.org/wiki/Serpula">http://en.wikipedia.org/wiki/Serpula</a>
Porifera larvae	Sub epithelial unicellular lements	?	?	<a href="http://en.wikipedia.org/wiki/Porifera">http://en.wikipedia.org/wiki/Porifera</a>
Rotatoria	Epithelial frontal eyespots (unicellular)	?	?	<a href="http://en.wikipedia.org/wiki/Rotatoria">http://en.wikipedia.org/wiki/Rotatoria</a>
Rotatoria	Inverse cerebral ocelli	Diverticular	Lamellous	<a href="http://en.wikipedia.org/wiki/Rotatoria">http://en.wikipedia.org/wiki/Rotatoria</a>
Scyphozoa (in general)	Epithelial to everse ocelli and lens eye	Ciliary	Villi	<a href="http://en.wikipedia.org/wiki/Scyphozoa">http://en.wikipedia.org/wiki/Scyphozoa</a>
Scyphozoa Aurelia	Inverse ocellar cups entodermal pigment	Ciliary	Villi	<a href="http://en.wikipedia.org/wiki/Aurelia_(genus)">http://en.wikipedia.org/wiki/Aurelia_(genus)</a>
Sipunculida	Epithelial eyespots at tentacles	?	?	<a href="http://en.wikipedia.org/wiki/Sipunculida">http://en.wikipedia.org/wiki/Sipunculida</a>
Sipunculida	Everse cerebral tubes	Rhabdomeric	Distal	<a href="http://en.wikipedia.org/wiki/Sipunculida">http://en.wikipedia.org/wiki/Sipunculida</a>
Sipunculida larvae	Inverse pigment-cup ocelli	Diverticular	Villous	<a href="http://en.wikipedia.org/wiki/Sipunculida">http://en.wikipedia.org/wiki/Sipunculida</a>
Tardigrada	Inverse pigment-cup ocelli	Diverticular	Villous	<a href="http://en.wikipedia.org/wiki/Tardigrada">http://en.wikipedia.org/wiki/Tardigrada</a>
Trematoda	Inverse pigment-cup ocelli	Diverticular	Villous	<a href="http://en.wikipedia.org/wiki/Trematoda">http://en.wikipedia.org/wiki/Trematoda</a>
Tunicata-Thaliacea	Inverse pigment-cup eyes	Diverticular	Villous	<a href="http://en.wikipedia.org/wiki/Tunicata">http://en.wikipedia.org/wiki/Tunicata</a>
Turbellaria	Epithelial ocellar patches	?	?	<a href="http://en.wikipedia.org/wiki/Turbellaria">http://en.wikipedia.org/wiki/Turbellaria</a>
Turbellaria	Inverse pigment-cup ocelli	Diverticular	Villous	<a href="http://en.wikipedia.org/wiki/Turbellaria">http://en.wikipedia.org/wiki/Turbellaria</a>
Turbellaria larvae	First pair of sub epithelial eye spots	?	?	<a href="http://en.wikipedia.org/wiki/Turbellaria">http://en.wikipedia.org/wiki/Turbellaria</a>
Vertebrata	Inverse lateral and everse dorsal eye	Ciliary	Rods And Cones	<a href="http://en.wikipedia.org/wiki/Vertebrata">http://en.wikipedia.org/wiki/Vertebrata</a>