

Glossary

- aboral – dorsal side of the animal, opposite of the peristome (mouth)
- acetabulum – basal pit on the proximal end of a spine with which it is sitting on the mamelon (rounded topmost part of a tubercle)
- adapical – towards the apical disc (→)
- adapical suture – suture on the side of a plate nearest to the apical disc (→)
- adoral – towards the peristome (→)
- adoral suture – suture on the side of a plate nearest to the peristome (→)
- adradial suture – vertical suture between ambulacral and interambulacral plates/columns
- ambitus – largest circumference of the test
- ambulacra (sing. ambulacrum) – five segments of (usually) biserially arranged plates bearing ambulacral pores, through which the water-vascular system extends; extending from the apical disc to the peristome and alternate with five interambulacra; designated by Roman numbers in the Lovénian system
- ambulacral plates – individual plate of an ambulacral column (→)
- ambulacral pore – paired (usually) perforations in the ambulacral plates (→) through which the vessels of the water-vascular system pass (→), outside of the test (→) a tube foot (→) is attached to the pore in the living animal (a terminology for the ambulacral pores was developed by SMITH, 1978, 1980c)
- amphisternous – type of plastron (→) in which the labrum (→) is followed by two similar sized sternal plates (→)
- ampullae – A) contractile organ of the water-vascular system (→) to operate tube feet (→) (*anat.*); B) internal swelling of a coronal plate (→) below an enlarged primary tubercle (e.g. in *Lovenia*) (*skeletal*)
- anal plates – A) plates on the membrane covering the periproct (→); B) paired plates of interambulacrum 5 which border the periproct (→)
- anterior paired petals – petals in ambulacra II and IV
- apex – highest part on the aboral (dorsal) surface of the test
- apical disc – group of plates at the terminal end of the ambulacral and interambulacral columns (→); usually on apex (→) of the test (→); consists of two types of plates [genital (→) and ocular plates (→)], but may incorporate one or more complementary plates in certain groups; in “regular” echinoids five plates of each type are present forming a single or double ring around the periproct (→); in other groups individual plates may be reduced or fused
- apophysis (pl. apophyses) – internal projections of the interambulacral basicoronal plates (→) for the attachment of the muscles supporting the lantern (→)
- areole – marked depression around each tubercle for attachment of the muscles of the spines
- Aristotle’s lantern – structure of (usually) 40 ossicles forming the jaw apparatus of the animal; (usually) consists of 10 demipyramids (→), 10 epiphyses (→), 5 rotulae (→), 5 teeth (→), 10 compass elements (→); in some groups completely reduced (e.g. spatangoids and holasteroids) in others partially (e.g. clypeasteroids)
- base (spine base) – specialised proximal part of a spine which it is attached to the tubercle (→) and the musculature in the living animal
- basicoronal plates – first formed plates of the ambulacral (→) and interambulacral columns (→); usually bordering the peristome (→), may be reduced, occluded or incorporated in the buccal membrane in some taxa; important in the classification in some groups (e.g. clypeasteroids)
- boss – part of a tubercle; cone shaped skeletal structure between areole (→) and mamelon (→)
- bourrelet – inflated adoral part of the interambulacra in the cassiduloids, lie between the phyllodes (→)
- camarodont – descriptive term for a lantern (→) with keeled teeth (→) and closed foramen magnum (→)
- camellae – internal swelling of a coronal plates (→) below an enlarged primary tubercle (e.g. in *Lovenia*)
- camellate – adj., see camellae
- collar – part of the spine base; between milled ring (→) and neck (→); may be smooth or finely striated
- column – vertical series of coronal plates (→), extending from apical disc (→) to peristome (→); both ambulacra (→) and interambulacra (→) usually consist of two columns each
- compass – element of the lantern (→ Aristotle’s lantern); slender, arched, radial rod in ambulacral position on to of the lantern; each rod consists of a simple proximal part and a bifurcating distal part
- compound plates – fused ambulacral plates (2 or more) united by a single large tubercle; the number of plates in a compound plate corresponds to the number of pore pairs on the compound plate; type of compounding (→ echinoid, diadematoid,...); important for classification
- confluent – descriptive term for weakly separated areoles (→) of adjacent tubercles (used mainly in cidaroids)
- conjugate pores – ambulacral pores (→) where the two individual pores of each pair are connected by a groove on the external surface of the test
- corona – principal skeleton of an echinoid excluding external appendages (e.g. spines), apical disc, lantern as well as all peristomal and periproctal elements; consists of all interambulacral and ambulacral plates; usually forms a more or less solid globular, cylindrical or disc-shaped structure [except in groups with imbricate (→) or weakly connected coronal plates; e.g. echinothurioids]
- coronal plate – either an ambulacral or interambulacral plate; see also *corona*
- cortex – dense external layer of cidaroid spines; bearing ornamentation; contains no living tissue in mature spines
- crenulate – descriptive term for a tubercle (→) or acetabulum (→) with ribbed/strongly structured periphery
- demiplate – term for individual ambulacral plates united in a compound (→) or pseudocompound (→) plate; may be occluded from perradial (→), adradial (→) or both sutures (→)
- demipyramid – element of the lantern; one of 10 paired elements supporting the teeth; largest element of the lantern
- diadematoid compound plate – compound plate with three similar sized demiplates, non of which is occluded from the adradial or perradial suture (characteristic for diadematoids)

- dicyclic – descriptive term for a condition in the apical disc of “regular” echinoids where all ocular plates (→) are exsert (→); i.e. only the genital plates (→) form the margin of the periproct (→)
- disjunct – interrupted plate column [may occur both in ambulacra and interambulacra; occurs commonly in the plastron of some groups (→)]
- echinoid compound plate – compound plate with three or more sized demiplates of markedly different size; usually only the adapical most and adoral most of the demiplate are in contact with both adradial and perradial suture, the others are in contact with the adradial suture only; the adoral most demiplate is the largest (characteristic for the order Echinoida and some Temnopleuroida)
- epiphysis – element of the lantern; one of 10 paired elements sitting on top of the demipyramids (→)
- episternal plates – paired plates in adoral interambulacrum 5 following the sternal plates in spatangoids
- ethmolytic – descriptive term for a condition in the apical disc in spatangoids where genital plate 2 separates genital plates 3 and 4, as well as ocular plates I and V
- ethmophract – descriptive term for a condition in the apical disc in spatangoids where genital plate 2 is not elongate; genital plates 3 and 4, as well as ocular plates I and V are in contact with each other
- exsert – descriptive term for ocular plates in the apical disc of “regular” echinoids which are not in contact with the periproct
- fasciole – specialised band of minute tubercles in holasteroids and spatangoids (for the types see NÉRAUDEAU et al. 1998b)
- floscelle – star-shaped area around the peristome (→) in casiduloids, formed by bourrelets (→) and phylloides (→)
- food grooves – sunken grooves in the ambulacra on the oral surface of most clypeasteroids; specialised system for transport of food particles from the site of collection (e.g. margin of the test) to the peristome; bottom of the groove is perforated by numerous microunipores
- foramen magnum – space between the upper ends of the joined demipyramids in the lantern
- frontal petal – odd petal in ambulacrum III
- genital plates – primordial interradiating plate in the apical disc perforate by one or more genital pores (→)
- genital pores – opening in the test connected to the gonads (reproductive organs) which allows passage of the sperm or eggs
- gill slits – or *buccal slits*, indentations in the peristomal margin, allowing passage of compensation or expansion sacs of peripharyngeal tissue; associated with volume control necessary for a active protrusible lantern, not with gaseous exchange (as believed earlier)
- gonopores – see *genital pores*
- heel – inflated protrusion below the periproct
- hemicyclic – descriptive term for a condition in the apical disc of “regular” echinoids where some ocular plates (→) are insert (→) and some exsert (→); i.e. only some ocular plates are in contact with the margin of the periproct (→)
- hemilytic – descriptive term for a condition in the apical disc in spatangoids where genital plate 2 separates genital plates 3 and 4, but not ocular plates I and V
- holamphisternous – amphisternous (→) plastron (→) with symmetrical sternal plates (→) and symmetrical but otherwise undifferentiated episternal plates (→)
- hydropores – perforations in the apical disc providing access to the water-vascular system (→)
- imbricate – descriptive term for overlapping coronal plates (like roof tiles; occurs in echinothurioids)
- infundibulum – sunken area around the peristome in clypeasteroids
- insert – descriptive term for ocular plates in the apical disc of “regular” echinoids which form part of the periproctal margin
- interambulacra (sing. interambulacrum) – five columns of (usually) biserially arranged plates extending from the apical disc to the peristome; alternating with the five ambulacral columns; designated by Arabic numbers in the Lovénian system
- ambulacral plates – individual plate of an ambulacral column (→)
- internal ampullae – see *camellae*
- internal fasciole – type of fasciole running around the apical disc and crossing all ambulacra
- interporiferous zone – space between the poriferous zones (→) in the petals (→)
- interporal partition – ridge of stereom (→) separating the two pores of a pore pair (→)
- interradial suture – vertical suture (→) between the two plate columns in an interambulacrum (→)
- keel – raised ridge-like area of the corona (→); also used for the ridge on the internal side of the teeth
- labrum – differentiated basicoronal plate of interambulacrum 5 in the holasteroids and spatangoids
- lamellae – area of radially arranged stereom (→) meshwork between the cortex (→) and the medulla (→) in cidaroid spines
- lantern – see Aristotle’s lantern
- latero-anal fasciole – type of fasciole co-occurring with a peripetalous fasciole (→) in some groups; branching off the peripetalous fasciole behind the anterior paired petals and running towards the posterior end where it crosses interambulacrum 5 below the periproct
- Lovénian system (or LOVÉN’S rule) – numbering system for the ambulacra (Roman numbers) and interambulacra (Arabic numbers) developed by LOVÉN (1874); often used to elucidate plate architecture and homologies in echinoids; when an “irregular” (bilaterally symmetrical) echinoid is viewed from the oral side the ambulacra are counted clockwise starting with the first ambulacrum clockwise of the periproct; interambulacra are numbered in the same fashion; as each ambulacrum comprises two plate columns LOVÉN named the first column encountered in the clockwise sequence “a” and the second “b”, again the same may be done in the interambulacra; in the pentamerous (five-fold symmetrical) “regular” echinoids genital plate 2 is by convention the madreporite (see DAVID et al., 1995 for the ontogenetic basis of LOVÉN’S rule and potential trap when using it to identify homologous structures)
- lunule – natural perforation of the test connecting aboral and oral surface; occurs in some clypeasteroid groups; two types: ambulacral lunules (at the perradial suture) and interambulacral lunules (at the interradiating suture)
- madreporite – plate (usually genital plate 2) of the apical disc perforated by hydropores which provide access to the water-vascular system (→)
- mamelon – rounded, topmost part of the tubercles on which the acetabulum (→) articulates
- marginal fasciole – type of fasciole (→) surrounding the test at or near the ambitus
- medulla – central part of a cidaroid spine, made up of coarse stereom meshwork
- mesamphisternous – amphisternous (→) plastron (→) with near-symmetrical sternal plates (→) and biserially offset episternal plates (→)
- microcanal system – system of canals within the plates for the passage of the secondary branches of the water-vascular

- system (→) leading to accessory tube feet; known only in clypeasteroids
- microunipore – minute unipore (→)
- miliary spine/tubercle – very small, non-primary spine, respectively the corresponding tubercle
- milled ring – widened part of the base of a spine acting as attachment point for the musculature moving the spine
- monobasal – type of apical disc with apparently fused genital plates
- monocyclic – descriptive term for a condition in the apical disc of “regular” echinoids where all ocular plates (→) are inserted (→); i.e. all genital (→) and all ocular (→) plates are in contact with the margin of the periproct (→)
- neck – smooth, cylindrical portion of a primary spine, between collar and shaft
- neural canal – small notch in the margin of the perradial pore of each pore pair for the passage of the nerve cords into the tube feet
- non-conjugate (pore) – opposite of conjugate (→)
- non-crenulate (tubercle) – opposite of crenulate (→)
- non-perforate (tubercle) – opposite of perforate (→)
- non-petaloid – descriptive term for ambulacra without adaptively differentiated petal (→)
- occluded – descriptive term for the a condition in which a coronal plate (usually an ambulacral plate) does not reach one or both of the two vertical sutures (→) that border it usually
- ocular plates – primordial, radial plate of the apical disc, terminating the ambulacra; perforated by a single ocular pore (→)
- ocular pore – perforation in the ocular plate (→), for the passage of the water-vascular system (→) into the terminal tentacle (a tube foot)
- oral – ventral side of the animal which bears the peristome (→)
- orthofasciole – descriptive term for a fasciole (→) band which is well differentiated from the remaining surface tuberculation and does not include primary tubercles (see NÉRAUDEAU et al. 1998b)
- parapet – part of a tubercle; slope of the boss (→)
- pedicellaria (pl. pedicellariae) – minute pincer-like skeletal structures on thin stalks on the surface of the animal between the spines; function ranges from sanitary to defensive; important in the classification of some extant groups, yet rarely preserved in fossils (for a terminology the reader is referred to MELVILLE & DURHAM, 1966, as it is not employed here)
- perforate (tubercle) – descriptive term for tubercles which show a central pit for ligaments connecting spine and tubercle (not present in all groups)
- peripetalous fasciole – type of fasciole that surrounds the petalodium (→)
- peri-plastron areas – oral portions of ambulacra I and V next to the plastron (→), usually with differentiated tuberculation (in spatangoids and holasteroids)
- periporal area – area of differentiated stereom for the attachment of the soft tissue of the tube feet (→)
- periproct – anus
- peristome – mouth
- perradial suture – vertical suture (→) between the two plate columns in an ambulacrum (→)
- petal – differentiated adapical part of an ambulacrum (→) with enlarged/specialised ambulacral pores facilitating tube feet (→) adapted for respiration
- petaloid – descriptive term for ambulacra with adaptively differentiated petal (→)
- petalodium – all five (or four if ambulacrum III nonpetaloid) petals (→)
- phyllode – differentiated adoral part of the ambulacra (→) with tube feet (→) adapted for handling food particles
- pillar – internal support structure in clypeasteroids
- plastron – differentiated adoral part of interambulacrum 5 in spatangoids and holasteroids; structure important for classification
- platform – part of a tubercle; flattened part of the boss (→), just below the mamelon (→)
- polyporous – descriptive term for compound plates (→) with numerous ambulacral pores (→)
- pore pair – ambulacral pore partitioned by a wall of stereom (usual condition), leading to a single tube foot (→)
- postbasiconal plates – plates following the basiconal plates (→)
- posterior paired petals – petals in ambulacra I and V
- preanal plates – paired plates between the episternal (→) and anal plates (→) in interambulacrum 5
- primary spine/tubercle – largest spines, usually first to appear during growth; one per plate in “regular” echinoids
- pseudocompound plates – group of united ambulacral plates not bound together by a single large tubercle
- quinquegeminate – descriptive term for compound plates (→) with five ambulacral pores (→)
- rostrate – descriptive term for a pointed posterior end of a spatangoid or holasteroid
- rostrum – pointed posterior part of interambulacrum 5 in a spatangoid or holasteroid
- rotula (pl. rotulae) – element of the lantern; one of 5 ossicles sitting between the paired epiphyses (→)
- scrobicular tubercles – circle enlarged tubercles arranged around the areole (→) in cidaroids
- secondary spine/tubercle – intermediate sized spine, occurring later during growth than primary spines
- shaft – main part of the spine between base and tip
- sphaeridia – minute spherically modified spines on short stalks commonly situated adorally in pits near the perradial suture; sometimes completely enclosed within the plates (in sand dollars); function as balance organ
- sphaeridial pit – pit in which the sphaeridia (→) are situated
- spine – moveable calcareous rods attached to special structures (→ tubercles) on the coronal plates by muscles and ligaments; mainly defensive and/or locomotory in function (depending on group), but fulfil also numerous other tasks
- stereom – three-dimensional meshwork of high-Mg calcite of which all skeletal elements are composed; strongly differentiated according to the type of skeletal element, the position within that element and its function (see SMITH, 1980 for details and a terminology)
- sternal plates – first pair of postbasiconal plates [following the labrum (→)] of interambulacrum 5 in spatangoids and holasteroids
- sternum – see *sternal plates*
- stirodont – descriptive term for a lantern (→) with keeled teeth (→) and open foramen magnum (→)
- subanal fasciole – type of fasciole lying below the periproct; usually ovate or bilobed
- subequal tubercles – in some “regular” echinoids the secondary spines/tubercles (→) may become as large as the primary spines/tubercles at ambital coronal plates, obscuring the differentiation in primary and secondary spines (e.g. *Schizechinus*, *Toxopneustes*, *Tripneustes*...)
- suture – narrow zone marking the contact between adjacent plates; usually represented by a thin line on surface of the test (may be made visible by wetting the test with alcohol or glycerine in extant material, respectively by wetting, weathering, etching or grinding in fossil specimens)
- test – collective term for the corona and the plates of the apical disc, as well as any periproctal or peristomal ossicles

tetrabasal – type of apical disc with four separate genital plates (genital plate 5 not present)
tetrageminate – descriptive term for compound plates (→) with four ambulacral pores (→)
tooth – element of the lantern; one of 5 ossicles used for mastication; complex microstructure (useful in classification), growing continuously at the upper end
trigeminate – descriptive term for compound plates (→) with three ambulacral pores (→)
tube foot – external extension of the water-vascular system (→); usually specialised for certain tasks according to the position on the test; functions as locomotory, feeding, respiratory, sanitary, adhesive,... organs or any combination
tubercle – specialised structure on the surface of a coronal plate on which the spines (→) articulate (for a terminology see SMITH, 1980b)

ultrampisternous – ampisternous (→) plastron (→) with symmetrical sternal plates (→) followed by symmetrical plate pairs of markedly dissimilar size and shape (e.g. large triangular episternal, followed by strongly differently shaped preanal and anal plates); often disjunct (→) or markedly narrowed
unipore – ambulacral pore (→) which consists only of a single perforation
water-vascular system – system of internal, radially arranged vessels, which contain water; arranged below the ambulacra and extending through the ambulacral pores into the tube feet (→); used to operate the tube feet through regulation of the water pressure inside the vessels by contractile organs (ampullae)