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SUPPLEMENTARY ONLINE MATERIAL FOR

**Conellae, enigmatic structures on cephalopod shells
—shapes, distribution, and formation**

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Supplementary Online Material:

Published data for conellae provided in stratigraphic order beginning with the uppermost.

No	Stratigraphy	Locality	Taxon	Position	Morphotype	Material	Explanation	Source
1	Upper Cretaceous	Richards Bay, KwaZulu-Natal, S-Africa	<i>Hauericeras gardeni</i>	on the siphuncle	aggregates	calcite	Conellae band	Klinger and Kennedy (1977, p. 80, fig. 8a)
2	Lower Maastrichtian	Pierre Shale Formation, Western Interior Seaway, USA	<i>Cataceramus? barabini</i>	Aperture / surface of internal mould	Polygonal-rounded, radial lines	?calcite	Discinid brachiopod: <i>Discinisca</i> (associated with true <i>Discinisca</i>)	Landman et al. (2016)
3	Campanian	Hanover (NW-Germany)	<i>Bostrychoceras polyplacum</i>	ventral outer whorl	single, aggregates	calcite	-	Rösner and Schneider (2011); Säbele and Schneider (2013)
4	Campanian	Teutonia Nord, Misburg, Germany	<i>Nostoceras (Bostrychoceras) polyplacum</i>		Polygonal-tetrahedral pyramids	Calcite	-	Rösner, Schneider 2011
5	Cenomanian	Wunstorf-Kolenfeld, Germany	<i>Austiniceras?</i>	surface of internal mould	polygonal-rounded, brown colour, aggregates	calcite	conellen	Frerichs (2007, fig. 3)
6	Middle Cenomanian	North Rhine-Westfalia (Germany)	<i>Austiniceras</i>	ribs	single, aggregates	calcite	dissolution features, recrystallized shell carbonate	Lehmann (1993)

7	Jurassic, Cretaceous	Germany	<i>Schlotheimia,</i> <i>Uptonia,</i> <i>Acanthopleuroceras,</i> <i>Deroceras,</i> <i>Phricodoceras,</i> <i>Androgynoceras,</i> <i>Platynoticeras,</i> <i>Liparoceras,</i> <i>Hammatoceras,</i> <i>Harpoceras,</i> <i>Stephanoceras,</i> <i>Perisphinctes,</i> <i>Divisosphinctes,</i> <i>Physodoceras,</i> <i>Crioceras</i>	at ribs on the side		calcite	biogenic feature	Hölder and Mosebach (1950, p. 410-411), Hölder (1973)
8	Jurassic	Germany	<i>Acanthopleuroceras,</i> <i>Tropidoceras,</i> <i>Harpoceras,</i> <i>Grammoceras,</i> <i>Hammatoceras,</i> <i>Sonninia, Witchellia,</i> <i>Ochetoceras,</i> <i>Streblites</i>	Conellae bands at the hollow keel		calcite	biogenic feature	Hölder and Mosebach (1950, p. 411)
9	Upper Jurassic	S-Germany	<i>Glochiceras</i>	along the siphuncular area	aggregates	calcite		Hölder (1954a)
10	Upper Jurassic	S-Germany	<i>Oppelia</i>	on patches along the ventral area	aggregates	calcite		Hölder (1952b)
11	Upper Jurassic	Germany	<i>Taramelliceras</i>	Median tubercles		Calcite	biogenic feature	Hölder and Mosebach (1950, p. 411)

12	Lower and Upper Jurassic	Germany	<i>Schlotheimia boucaultiana</i> , <i>Liparoceras striatum</i> , <i>Taramelliceras</i>	along the suture		calcite	biogenic	Hölder and Mosebach (1950, p. 399)
13	Upper or Middle Volgian	Moscow	ammonites indet.	Not shown	Not shown	?	Cirripedes: <i>Probalanus</i>	Bogolyubov (1926)
14	Lower Kimmeridgian	Franconian Alb, southern Germany	perisphinctids	Ventral side,, ribs and constrictions	Aggregate to rug-like	calcite	Relic shell remains	Schairer (1974)
15	Oxfordian	Sakaraha/ SW-Madagaskar	<i>Kranaosphinctes</i> sp.		Group of conellae	similar to surrounding sediment		Keupp (2012, Fig. 121)
16	Lower Callovian	Oka river, Elatma, Ryazan region, Russia	<i>Cadoceras elatmae</i>	Internal mould	isolated, polygonal, radial grooves	gray marlstone, similar to surrounding sediment	Cirripedes: <i>Probalanus</i>	Gerasimov (1955) B 6629
17	Lower Callovian	Unzha river, Kostroma region, Russia	<i>Cadoceras elatmae</i>	Body chamber	single	Sediment-filled		Keupp (2012, Fig. 227)
18	Bajocian	Mendoza, Argentina	<i>Sonninia zittel</i> , <i>S. espinazitensis</i>	Associated with the siphuncle	single	calcite	Shell is preserved	Westermann (1971, p. 11, fig. 4-5)
19	Bajocian	Franconia, S-Germany	<i>Stephanoceras</i> , SiO ₂ – internal mould	-	aggregates	SiO ₂	allochemical metasomatosis	Hölder (1973)

20	Bajocian	-	<i>Stephanoceras</i>	Flank-injury, temporarily	Not shown	?pyrite	Depending on shell composition	Bayer (1970)
21	Toarcian	Germany	<i>Harpoceras eseri</i>	Umbilical wall		calcite	biogenic feature	Hölder and Mosebach (1950, p. 411)
22	Lower Toarcian	Le Tournados, Aveyron, France	<i>Dactylioceras krumbecki</i>	Flank, injury	Rug-like, densely spaced pyramids	calcite		Guex (1967,1968)
23	Lower Toarcian	Posidonia Shales, S-Germany	indistinct ammonite (not shown)	crop/stomach	Not shown	-	-	Riegraf et al. (1984, p. 57)
24	Pliensbachian	Buttenheim, S-Germany	<i>Pleuroceras salebrosum</i> , <i>Pleuroceras spinatum</i>		Many conellae, Group of conellae	similar to surrounding sediment		Keupp (2012, Fig. 120, 122)
25	Pliensbachian	Southern Germany	<i>Liparoceras?</i>				<i>Patella</i> -like, angular cones	Quenstedt (1851)
26	Pliensbachian	Buttenheim, S-Germany	<i>Pleuroceras</i>	Injured keel, temporarily	Group of conellae	-	Not provided	Keupp (1976) B 1355
27	Pliensbachian	S-Germany	<i>Liparoceras</i>			calcite	small balanid-like parasites	Quenstedt (1885, p. 232)
28	Pliensbachian	S-Germany	<i>Liparoceras</i> , <i>Stephanoceras</i>	ribs or nodes	aggregate	calcite	?gastropods, <i>Conella</i> , problematic	Quenstedt (1884, p. 757, pl. 215, fig. 40)
29	Pliensbachian (Dörntener Schiefer)	Salzgitter / Dörnten, Germany	<i>Hammatoceras illustra</i> <i>Androgynoceras capricornus</i> (= <i>Ammonites planicosta</i>)	hollow keel	conellae band	calcite	diagenetic product of the shell	Denckmann (1887, pl. 9, fig. 16; pl. 10, fig. 4)

30	Lower Jurassic	Swabia, S-Germany	<i>Ammonites armatus</i>	hollow spines	aggregates	calcite	Product of the shell	Oppel (1853, p. 33)
31	Lower Jurassic	S-Germany	<i>Chitinobelus</i>	phragmocone	single	calcite		Engeser and Reitner (1983), Seilacher and Gishlick (2015, p. 334-335, pl. 20.2)
32	Lower Jurassic	S-Germany	<i>Arietites undaries</i>	umbilical shoulder to mid-flank	aggregates	calcite	Related to ribs	Hölder (1952a, p. 27, pl. 5, fig. 14-15)
33	Middle Triassic	Erfurt, Weimar, SE Germany	<i>Ceratites spinosus</i> , <i>Ceratites evolutus</i>	base of spines, flanks, venter	Single, aggregates, rug-like, needle-shaped	calcite	Relic shell remains	Rein and Krause (1994), Rein (2017, pl. 6Aa-d)
34	Middle Triassic	Erfurt, Weimar, SE Germany	<i>Ceratites robustus</i> , <i>Ceratites spinosus</i> , <i>Ceratites evolutus</i> , <i>Ceratites nodosus</i>	base of spines, flanks, venter	Single, aggregates, rug-like, needle-shaped	calcite	Relic shell remains	Rein (1993)
35	Middle Triassic (Muschelkalk)	SE-Germany	<i>Ceratites sublaevigatus</i>	Umbilical shoulder, venter	aggregates	-	Related to injuries (forma aegra aptychi)	Rein (1989, pl. 3)
36	Hauptmuschelkalk, middle Ceratites beds Middle Triassic	Grosser Berg, Hessisch-Lichtenau, Germany	<i>Ceratites</i>	?injury, mid-phragmocone	single		Gastropod, Patellacea	Busse (1976), Hölder (1980)