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Sponge functional growth forms as a means for classifying sponges without taxonomy

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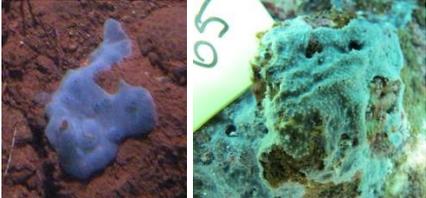
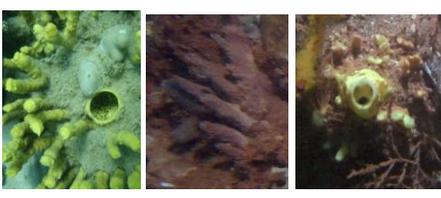


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Sponge functional growth forms (concept by Schönberg & Fromont). Categories can be used for quick classification by morphology and to generate (limited) information about environmental conditions. For general use you can distinguish morphologies by different prefixes (1-12, also distinguished by different colours), which reflect groups of similar environmental responses and functions. Be aware that all morphologies are steps in a continuum, depend on environmental conditions, can change over time, and that several morphologies can occur in the same species. Intermediate forms occur, e.g. crusts with erect portions (crustose-columnar).

I ENCRUSTING (EN)	2-4 MASSIVE (M)	5-7 CUP-LIKES (C)	8-12 ERECT (E)
<p>1.1 - creeping, ramose (EN-cg), branches follow ground, can have erect parts, multiple attachm., easy to detach</p>	<p>2 - simple-massive (M-s), bigger, lumpy sponges, inhalants and exhalants scattered across surface</p>	<p>5.1 – tables, discs or very shallow cups (C-tab), would easily be covered by sediments, can be unattached</p>	<p>8 - erect-laminar, spatulas, fans (E-lam), flat, but erect, 2-dimensional sponges, can have a slight stalk</p>
<p>1.2 - endolithic, bioeroding (EN-en), difficult to recognise if unfamiliar with group, but the function is very similar to truly ‘encrusting’</p>	<p>3 - balls (M-bl), typical in habitats of high sediment loads, also agglutinating or unattached forms, in- and exhalants can have patchy distribution</p>	<p>5.2 - incomplete cup, curled fan (C-inc), intermediate form to erect-laminar, but body curled to funnel, which can leave a small gap</p>	<p>9 - erect-palmate, hand-shaped, branching in 1 plane (E-pal), small base or stalk, with branches fanning out, branches can form lattice</p>
<p>1.3 - encrusting (EN-cr), Can be further subdivided into thickly (~0.5-2 mm) and thinly encrusting (<0.5 mm), often just a veneer on the substrate, showing substrate contours</p>	<p>4 - cryptic-massive (M-crp), more or less embedded in the sediment, usually with elevated fistules or cone-shaped portions, often with (hidden) anchoring structures</p>	<p>5.3 - wide cup or goblet (C-wd), clearly concave, catch sediment that is not easily washed out but normal water movement</p>	<p>10 - erect-branching (E-br), bush or irregularly branching in different planes, including special forms that function similarly, e.g. tiered (kebab-sponge), or complex fan-clusters</p>
		<p>6 - barrels (C-b), inhalants on the outside, usually one big, central-apical exhalant or exhalant cluster, body usually barrel- or cone-shaped</p>	<p>11 - simple-erect (E-s), single thin columns, rods, whips, but by function also crusts on whips; usually with pores in mixed arrangement, body should be +/- round in cross section</p>
<p style="text-align: center;">CHEAT</p>	<p style="text-align: center;">SHEET</p>	<p>7 - narrow cup, slim funnel or tube (C-nr), more narrow forms with elongated internal atrium, remain more easily sediment-free by exhaled flows ejected from the atrium</p>	<p>12 – with long stalk (E-st), special form, usually no pores on the stalk and separated in- and exhalant systems, typical for deep sea, or fine sediment environments; upper part any form</p>
<p><i>Body width significantly greater than height, extending across substrate surface. All encrusting forms usually have both pore types scattered over their surfaces. Typical for high-velocity flow regimes. Partly vulnerable against sedimentation. Unlike real crusts, creeping forms are often weedy, only loosely attached.</i></p>	<p><i>Body width and height roughly similar, various forms, can be irregular in outline. In- and exhalant pores usually on the same surfaces. Balls and cryptic-massive forms are often sediment specialists. These can occasionally separate their in- and exhalant streams and may develop polarity due to this.</i></p>	<p><i>Base usually slimmer than top (except in barrels, chimneys and tubes), flat, concave or hollow forms, often inhalants scattered over the exterior exhalants clustered on the inner surface. Often catch sediments on the upper or inner surfaces (except chimneys & tubes). Many photosynthetic forms in this group.</i></p>	<p><i>Body and branches higher than wide, solid in cross section. Whips, laminar and palmate forms often typical in strong, laminar flow, where they stand perpendicular to the flow direction to catch food. Minimal upper surface area to reduce sediment build-up. Long-stalked forms typical for deep sea & soft sediments.</i></p>

Examples. Photographs ©AIMS/WAM, with specimens from Great Barrier and Ningaloo Reef, the Kimberley and Onslow, NW Australia, 0-25 m (partly by towed underwater still photography, partly by hand-held camera). Information includes CAAB numbers (CSIRO Codes for Australian Aquatic Biota).

SPONGES (PORIFERA); CAAB 10 000000			
1 ENCRUSTING; CAAB 10 000901	2-4 MASSIVE; CAAB 10 000903	5-7 CUP-LIKES; CAAB 10 000909	8-12 ERECT; CAAB 10 000912
1.1 EN-cg; CAAB 10 000917	2 M-s; CAAB 10 000904	5 Cups; CAAB 10 000910	8 E-lam; CAAB 10 000913
			
1.2 EN-en; CAAB 10 000921	3 M-bl; CAAB 10 000905	5.2 C-inc; CAAB 10 000918	9 E-pal; CAAB 10 000914
			
1.3 EN-cr; CAAB 10 000902	4 M-crp; CAAB 10 000908	5.3 C-wd; CAAB 10 000919	10 E-br; CAAB 10 000915
			
			
		6 C-b; CAAB 10 000907	11 E-s; CAAB 10 000916
			
		7 C-nr; CAAB 10 000911	12 E-st; CAAB 10 000906
			
CHEAT		SHEET	