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EDITORIAL

Bringing the diversity of Planctomycetes into the light: Introduction to papers from the special issue on novel taxa of *Planctomycetes*

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Planctomycetes are very intriguing bacteria that impassion, inspire and stimulate the scholars that study them. Discovered in the beginning of the last century, they were initially confused with 'floating fungus', hence the genus name *Planctomyces* (*planktos*, wandering, floating; Gr. masc. n. *mukês*, fungus; https://lpsn.dsmz.de/genus/planctomyces). However, it was only in the second half of the twentieth century that their diversity started to be unveiled (Devos and Ward 2014; Lage et al. 2019; Dedysh et al. 2020a). Together with *Chlamydiae*, *Verrucomicrobia* and other poorly described phyla, such as *Lentisphaerae*, *Kiritimatiellaeota* and other candidate phyla, they form the Planctomycetes-Verrucomicrobia-Chlamydiae (PVC) superphylum (Wagner and Horn 2006). Planctomycetes are distinctive bacteria and their divergent characteristics have confused both those scientists analysing them and also those considering them as interesting curiosities (Wiegand et al. 2018; Rivas-Marín and Devos 2018). For example, they have been mistakenly proposed to form a third cell type organisation, neither Gram-negative nor Gram-positive (Santarella-Mellwig et al. 2013; Devos 2014a, b; Boedeker et al. 2017). Indeed, they have even been called the 'nucleated' bacteria (Fuerst 2005). For a long time, they were thought to lack peptidoglycan, an anomaly considered as shared with the *Chlamydiae* but recently reappraised (Jeske et al. 2015; van Teeseling et al. 2015). These and other misconceptions have pervaded the PVC field for a long time. With the advances in genomics, molecular and microscopy techniques, combined with more sampling, Planctomycetes researchers have begun to fix some of the most obvious misconceptions in the field (reviewed in Devos 2014a, b; Wiegand et al. 2018; Rivas-Marín and Devos 2018; Lage et al. 2019). However, two of the real divergent features of Planctomycetes, also shared with *Chlamydiae*, are their asymmetrical division and their lack of the division protein FtsZ, unique in the free-living bacterial world (Rivas-Marín et al. 2016, 2020).

In the last 20 years, a great expansion of studies on the biology of Planctomycetes has occurred, showing the great importance and applied potential of these bacteria (Ward 2012; Devos et al. 2013; van Niftrik

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and Devos 2017; Lage and Devos 2018). Novel species began to be revealed but these were typically reported on an ad hoc basis.

We are now facing exciting times for exploring, discovering and comprehending these fascinating bacteria. Indeed, significant steps in exploring the diversity of Planctomycetes have been achieved recently. Among these, significant insights have been made by Dedysh and colleagues including the recognition of three new orders within the class *Planctomycetia* and novel insights into the first described Planctomycete, *Planctomyces bekefii* (Dedysh et al. 2020a, b). In addition, answering the appeal of Christian Jogler, many of the major scientists in the Planctomycetes field, joined forces to report the genome sequencing and analysis of 79 cultivated bacterial strains from all major taxonomic clades of the phylum *Planctomycetes*, most of them not yet described (Wiegand et al. 2020). This project has been a landmark in understanding the systematics of the *Planctomycetes* and has provided a platform for a significantly expanded taxonomic census of the phylum. Jogler, his team and collaborators have collected, cultivated, sequenced and characterized close to 100 species in order to provide a world-class reference study on one bacterial phylum (Wiegand et al. 2020). The main work described the broad classification, phylogeny and genome analyses of the strains, confirming most of the previous progress in correcting misconceptions about the phylum and also describing novel surprises in the molecular cell biology of these bacteria, providing the most up-to-date phylogeny.

Antonie van Leeuwenhoek Journal of Microbiology has for a long time supported the community of researchers studying PVC bacteria, with special issues and papers drawn from meetings of this group (Devos et al. 2013; Lage and Devos 2018). Continuing this relationship, in this special issue, with the publication of 21 articles, Jogler, his team and collaborators go a long way towards complementing their groundbreaking work enlarging the description of a number of species in the genera *Blastopirellula, Rhodopirellula, Rubinisphaera, Rubripirellula* and *Tautonia*. Furthermore, novel genera have been created to accommodate previously unclassified Planctomycetes, including *Alienimonas, Aureliella, Bremerella, Calycomorphotria, Crateriforma, Lignipirellula, Novipirellula, Polystyrenella*, *Symmachiella* and others. Many of these new taxa originated from diverse marine environments, different seas and oceans as well as habitats such as a hydrothermal vent system, active volcanic sites, marine sediments, natural or artificial marine surfaces, biofilms, kelp forest and other algae and a jellyfish, thus showcasing a huge variability in terms of their biology and ecology. The reports described in this Special Issue are fascinating and demonstrate the huge diversity of the *Planctomycetes* phylum. The diversity of morphological shapes and features is unequaled in microbiology.

Jogler and his team are world-wide recognised experts in advanced microscopy and this is obvious when looking at the figures accompanying the articles. The diversity of methods and quality of the pictures is stunning. The micrographs, including light, phase contrast (Phaco), scanning electron microscopy (SEM) and transmission electron microscopy (TEM), are beautiful and expose the diversity revealed from the genomic data. Some of the characteristics of these planctomycetes are given in Table 1. Species described in these articles have a genome size from 5 to almost 10 Mb, with a G + C content from 55 to 71%, and pH range for growth from 5.5 to 10 (Table 1). They also include species with special features such as irregular shapes and consecutive budding (*Alienimonas californiensis*), or strains containing conspicuous subcellular filamentous structures, possibly related to cytoskeletal elements (e.g. *Calycomorphotria hydatis*). This work is also important for its contribution to the phylogenetic description of the phylum. In one article, the authors emend the description of the genus *Rubripirellula*, in another they split the current genus *Rhodopirellula* into a more strictly defined genus, while in yet another, they reclassify strains.

In conclusion, the work by Jogler, his team and collaborators is striking in its depth, size, and number of novel species described. The isolation and description of these novel Planctomycetes opens the possibility for many future studies of young scientists that will unveil many still unknown features of these unique bacteria. There is no doubt that this is only the preliminary characterisation of these strains and that much great microbiology will be extracted from this great collection in the future.

We are thankful to Christian Jogler for his vision and efforts, resulting in this great contribution and amazing work.

Table 1 Summary of the properties of the novel taxa described in this Special Issue

Article_title	Order	Family	Genus	Novel Genus?	Species	Optimal Growth Temp (°C)	Optimal growth pH	Generation time (h)	Physiology
Rubinisphaera italica sp. nov. isolated from a hydrothermal area in the Tyrrhenian Sea close to the volcanic island Panarea	Planctomycetales	Planctomycetaceae	*Rubinisphaera*	No	*Rubinisphaera italica* sp. nov.	26	9	18	Aerobic, chemoheterotrophs
*Rhodopirellula heiligendammens*is sp. nov., *Rhodopirellula pilleata* sp. nov., and *Rhodopirellula solitaria* sp. nov. isolated from natural or artificial marine surfaces in Northern Germany and California, USA, and emended description of the genus Rhodopirellula	Pirellulales	Pirellulaceae	*Rhodopirellula*	No	*Rhodopirellula heiligendammens*is sp. nov., *Rhodopirellula pilleata* sp. nov., and *Rhodopirellula solitaria* sp. nov.	Mesophilic	Neutrophilic	11, 21	Aerobic, chemoheterotrophs
Alienimonas californiensis gen. nov. sp. nov., a novel Planctomycete isolated from the kelp forest in Monterey Bay	Planctomycetales	Planctomycetaceae	*Alienimonas* gen. nov.	Yes	*Alienimonas californiensis* sp. nov.	27	7.5	11	Aerobic, chemoheterotrophs
Three novel *Rubripirellula* species isolated from plastic particles submerged in the Baltic Sea and the estuary of the river Warnow in northern Germany	Pirellulales	Pirellulaceae	*Rubripirellula*	No	*Rubripirellula amarantea* sp. nov., *Rubripirellula tenax* sp. nov. and *Rubripirellula reticaptiva* sp. nov.	Mesophilic	Neutrophilic	10–25	chemoheterotrophs
Description of three bacterial strains belonging to the new genus *Novipirellula* gen. nov., reclassificiation of *Rhodopirellula* rosea and *Rhodopirellula* caenicola and readjustment of the genus threshold of the phylogenetic marker rpoB for Planctomycetaceae	Pirellulales	Pirellulaceae	*Novipirellula* gen. nov.	Yes	*Novipirellula artificiosorum* sp. Nov., *Naureliaeovipirellula* sp. nov. and *Novipirellula galeiformi*s sp. nov	27 - 30	Neutrophilic	9-39	Aerobic, chemoheterotrophs

Table 1 continued

Article_title	Order	Family	Genus	Novel Genus?	Species	Optimal Growth Temp (°C)	Optimal growth pH	Generation time (h)	Physiology
Three marine strains constitute the novel genus and species *Crateriforma conspicua* in the phylum Planctomycetes	Pirellulales	Pirellulaceae	*Crateriforma* gen. nov	Yes	*Crateriforma conspicua* sp. nov.	Mesophilic	Neutrophilic to alkaliphilic	8-25	chemoheterotrophic
Blastopirellula retiformator sp. nov. isolated from the shallow-sea hydrothermal vent system close to Panarea Island	Pirellulales	Pirellulaceae	*Blastopirellula*	No	*Blastopirellula retiformator* sp. nov.	30	7	No data available	NaCl concentrations from 100 to 1200 mM (optimum 350–700 mM)
Description of the novel planctomycetal genus Bremerella, containing *Bremerella volcania* sp. nov., isolated from an active volcanic site, and reclassification of Blastopirellula cremea as Bremerella cremea comb. nov.	Pirellulales	Pirellulaceae	*Bremerella* gen. nov	Yes	*Bremerella volcania* sp. nov.	36	7	9	No data available
Aureliella helgolandensis gen. nov., sp. nov., a novel Planctomycete isolated from a jellyfish at the shore of the island Helgoland	Pirellulales	Pirellulaceae	*Aureliella* gen. nov	Yes	*Aureliella helgolandensis* sp. nov.	27	7.5	41	Aerobic and heterotrophic
Description of *Polystyrenella longa* gen. nov., sp. nov., isolated from polystyrene particles incubated in the Baltic Sea	Planctomycetales	Planctomycetaceae	*Polystyrenella* gen. nov.	Yes	*Polystyrenella longa* sp. nov.	24	7.5	21	Strictly aerobic and chemo-organotrophic
Lignipirellula cremea gen. nov., sp. nov., a planctomycete isolated from wood particles in a brackish river estuary	Pirellulales	Pirellulaceae	*Lignipirellula* gen. nov.	Yes	*Lignipirellula cremea* sp. nov.	26	7.5	26	Aerobic and chemoheterotrophic
Calycomorphotria hydatis gen. nov., sp. nov., a novel species in the family Planctomycetaceae with conspicuous subcellular structures	Planctomycetales	Planctomycetaceae	*Calycomorphotria* gen. nov.	Yes	*Calycomorphotria hydatis* sp. nov.	30	8.5	10	Aerobic and chemoheterotrophic

Table 1 continued

Article_title	Order	Family	Genus	Novel Genus?	Species	Optimal Growth Temp (°C)	Optimal growth pH	Generation time (h)	Physiology
Tautonia plasticadhaerens sp. nov., a novel species in the family Isosphaeraceae isolated from an alga in a hydrothermal area of the Eolian Archipelago	Isosphaerales	Isosphaeraceae	*Tautonia*	No	*Tautonia plasticadhaerens* sp. nov.	30	7.5	29	Aerobic; Heterotrophic
Maioricimonas rarisocia gen. nov., sp. nov., a novel planctomycete isolated from marine sediments close to Mallorca Island	Planctomycetales	Planctomycetaceae	*Maioricimonas* gen. nov.	Yes	*Maioricimonas rarisocia*	31	7.5	17	Aerobic; Heterotrophic
Thalassoglobus polymorphus sp. nov., a novel Planctomycete isolated close to a public beach of Mallorca Island	Planctomycetales	Planctomycetaceae	*Thalassoglobus*	No	*Thalassoglobus polymorphus* sp. nov.	30	7.0–7.5	29	Aerobic; Heterotrophic
Caulifigura coniformis gen. nov., sp. nov., a novel member of the family Planctomycetaceae isolated from a red biofilm sampled in a hydrothermal area	Planctomycetales	Planctomycetaceae	*Caulifigura* gen. nov.	Yes	*Caulifigura coniformis* sp. nov	26	8	32	Aerobic; Heterotrophic
Rosistilla oblonga gen. nov., sp. nov. and Rosistilla carotiformis sp. nov., isolated from biotic or abiotic surfaces in Northern Germany, Mallorca, Spain and California, USA	Pirellulales	Pirellulaceae	*Rosistilla* gen. nov.	Yes	*Rosistilla carotiformis* sp. nov. and *Rosistilla oblonga* sp. nov.	30–33	7.5	9–11	Aerobic; Heterotrophic
Stieleria varia sp. nov., isolated from wood particles in the Baltic Sea, constitutes a novel species in the family Pirellulaceae within the phylum Planctomycetes	Pirellulales	Pirellulaceae	*Stieleria*	No	*Stieleria varia* sp. nov.	33	7.5	11	Aerobic; Heterotrophic

Table 1 continued

Article_title	Order	Family	Genus	Novel Genus?	Species	Optimal Growth Temp (°C)	Optimal growth pH	Generation time (h)	Physiology
Three Planctomycetes isolated from biotic surfaces in the Mediterranean Sea and the Pacific Ocean constitute the novel species *Symmachiella dynata* gen. nov., sp. nov. and *Symmachiella macrocystis* sp. nov	Planctomycetales	Planctomycetaceae	*Symmachiella* gen. nov.	No	*Symmachiella dynata* sp. nov. and *Symmachiella macrocystis* sp. nov.	22-24	7.5	70–140	Aerobic; Heterotrophic
Additions to the genus Gimesia: Description of *Gimesia alba* sp. nov., *Gimesia algae* sp. nov., *Gimesia aquarii* sp. nov., *Gimesia aquatilis* sp. nov., *Gimesia fumaroli* sp. nov. and *Gimesia panareensis* sp. nov., isolated from aquatic habitats of the Northern Hemisphere	Planctomycetales	Planctomycetaceae	*Gimesia*	No	*Gimesia alba* sp. nov., *Gimesia algae* sp. nov., *Gimesia aquarii* sp. nov., *Gimesia aquatilis* sp. nov., *Gimesia fumaroli* sp. Nov. and *Gimesia panareensis* sp. nov.,	26-33	6.5-8.5	12-32	Aerobic; Heterotrophic
Updates to the recently introduced family Lacipirellulaceae in the phylum Planctomycetes: isolation of strains belonging to the novel genera Aeoliella, Botrimarina, Pirellulimonas and Pseudobythopirellula and the novel species *Bythopirellula polymerisocia* and *Posidoniimonas corsicana*	Pirellulales	Lacipirellulaceae	*Aeoliella*, *Botrimarina*, *Pirellulimonas* and *Pseudobythopirellula* (all gen. nov.);	Nes	*Botrimarina mediterranea*, *Botrimarina colliarenosi*, *Botrimarina hoheduenensis*, *Pseudobythopirellula maris*, *Posidoniimonas polymericola*, *Pirellulimonas nuda*, *Aeoliella mucimassa*, *Bythopirellula polymerisocia* (all sp. nov.)	24-30	6.5-8.5	17-94	Aerobic; Heterotrophic

Table 1 continued

article_title	Colour	Genome Size (Mb)	G+C content (%)	Plasmid	Substrate for isolation	Location of isolation source	Division	Aggregates	crateriform structures	fimbriae	stalk
Rubinisphaera italica sp. nov. isolated from a hydrothermal area in the Tyrrhenian Sea close to the volcanic island Panarea	White	6.7	48.8	No	Algal surface	Algal surface in a hydrothermal vent near Tyrrhenian Sea close to the volcanic island of Panarea	Polar budding	Yes	Yes	Yes	Yes
*Rhodopirellula heiligendammen*sis sp. nov., *Rhodopirellula pilleata* sp. nov., and *Rhodopirellula solitaria* sp. nov. isolated from natural or artificial marine surfaces in Northern Germany and California, USA, and emended description of the genus Rhodopirellula	Pink , pink, cream	7.2, 8.5, 6.8	56.5, 55.8, 58	No	Kelp forest or plastic surfaces	Kelp forest on the California Coastline at Monterey Bay; from plastic surfaces submerged in the Baltic Sea Heiligendamm pier, Northern Germany; and the estuary of the river Warnow in the northeast of Germany	Polar budding	Aggregates, aggregates and single	No	Yes	No
Alienimonas californiensis gen. nov. sp. nov., a novel Planctomycete isolated from the kelp forest in Monterey Bay	pink	5.5	70.1	No	Giant bladder kelp (Macrocystis pyrifera)	Monterey Bay, California, USA	"consecutive budding"	Yes, aggregates	Yes	Yes	No
Three novel Rubripirellula species isolated from plastic particles submerged in the Baltic Sea and the estuary of the river Warnow in northern Germany	pink	6.95, 7.98, 7.85	53.7, 56.2, 54.8	No	Plastic particles	Warnow river estuary close to a wastewater treatment plant near Rostock, Germany; plastic particles submerged in the Baltic Sea Sea below the pier of Heiligendamm, Germany;	Budding	Rosettes	Yes	Yes	No

Table 1 continued

article_title	Colour	Genome Size (Mb)	G+C content (%)	Plasmid	Substrate for isolation	Location of isolation source	Division	Aggregates	crateriform structures	fimbriae	stalk
Description of three bacterial strains belonging to the new genus Novipirellula gen. nov., reclassificiation of *Rhodopirellula rosea* and *Rhodopirellula caenicola* and readjustment of the genus threshold of the phylogenetic marker rpoB for Planctomycetaceae	white to light pink	9.20, 7.27 and 7.40	55.3, 52.9 and 55.8	No	Polystyrene particles, Jellyfish Aurelia aurita and Wood	Biotic and abiotic surfaces in Heiligendamm in the Baltic Sea, and from the shore of the island of Heligoland in the North Sea	Budding	Small rosettes and aggregates	Yes	No data available	No data available
Three marine strains constitute the novel genus and species *Crateriforma conspicua* in the phylum Planctomycetes	pink	7.18	57.8	No	Red biofilm	A red biofilm at a hydrothermal vent in the Mediterranean Sea, from sediment in a salt-water fish tank, and from the surface of algae at the coast of the Balearic island Mallorca	Budding	Yes/rosettes	Yes	Yes	no
Blastopirellula retiformator sp. nov. isolated from the shallow-sea hydrothermal vent system close to Panarea Island	white	6.2	59.2	No	Marine biotic surface	Marine biotic surface in the seawater close to the shallow-sea hydrothermal vent system in the Thyrrhenian Sea off Panarea Island, Italy	Polar budding	Yes/rosettes	Yes	Yes	No
Description of the novel planctomycetal genus Bremerella, containing *Bremerella volcania* sp. nov., isolated from an active volcanic site, and reclassification of *Blastopirellula cremea* as *Bremerella cremea* comb. nov.	white to cream	6.5	56.2	No	Red biofilm	Biofilm at a volcanic site close to the Italian island Panarea in the Thyrrhenian Sea	Budding	Yes/ rosettes and aggregates	Yes	Yes	No

Table 1 continued

article_title	Colour	Genome Size (Mb)	G+C content (%)	Plasmid	Substrate for isolation	Location of isolation source	Division	Aggregates	crateriform structures	fimbriae	stalk
Aureliella helgolandensis gen. nov., sp. nov., a novel Planctomycete isolated from a jellyfish at the shore of the island Helgoland	lucid white	8.44	55.3	No	Jellyfish Aurelia aurita	Shore of Helgoland Isalnd in the North Sea	Budding	rosettes	yes	Yes	extracellular matrix or fibre and a holdfast structure
Description of *Polystyrenella longa* gen. nov., sp. nov., isolated from polystyrene particles incubated in the Baltic Sea	Yes	6.13	50.3	No	Polystyrene particles	Polystyrene particles incubated in the Baltic Sea near Heiligendamm in the Baltic Sea (Germany)	Budding	yes/rosettes	Yes	Yes	Yes
Lignipirellula cremea gen. nov., sp. nov., a planctomycete isolated from wood particles in a brackish river estuary	cream	9.56	61.4	No	Wood particles	Submerged wood pellets suspended near the discharge of a wastewater treatment plant, Estuary of Warnow river next to the city Rostock (Germany)	Budding	Yes/rosettes	Absent or difficult to observe	Yes	No
Calycomorphotria hydatis gen. nov., sp. nov., a novel species in the family Planctomycetaceae with conspicuous subcellular structures	pink	5.16	54.9	No	Water and sediment of a seawater fish tank	Seawater fish tank in Braunschweig, Germany	Budding	Rosettes	Yes	Yes	Yes
*Tautonia plasticadhaeren*s sp. nov., a novel species in the family Isosphaeraceae isolated from an alga in a hydrothermal area of the Eolian Archipelago	pink	9.4	71.1	5 plasmids (0.28, 0.14, 0.12, 0.09 and 0.09 Mb)	Alga from a shallow hydrothermal vent system	Alga from a shallow hydrothermal vent system close to Panarea Island in the Tyrrhenian Sea	budding	small aggregates	yes	yes	No

Table 1 continued

article_title	Colour	Genome Size (Mb)	G+C content (%)	Plasmid	Substrate for isolation	Location of isolation source	Division	Aggregates	crateriform structures	fimbriae	stalk
Maioricimonas rarisocia gen. nov., sp. nov., a novel planctomycete isolated from marine sediments close to Mallorca Island	Orange	7.74	63.4	no	Sediments	Marine sediments on the Coast of S'Arenal close to Palma de Mallorca (Spain)	budding	Aggregates	yes	yes	Yes
Thalassoglobus polymorphus sp. nov., a novel Planctomycete isolated close to a public beach of Mallorca Island	Beige	6.36	50.3	no	Algae	Coast of S'Arenal close to Palma de Mallorca (Spain	polar budding	Aggregates	No	yes	yes
Caulifigura coniformis gen. nov., sp. nov., a novel member of the family Planctomycetaceae isolated from a red biofilm sampled in a hydrothermal area	white	6.76	63.2	no	Red biofilm	Red biofilm in a hydrothermal area on the Island of Panarea in the Tyrrhenian Sea (Italy)	budding	Rosettes	No	yes	yes
Rosistilla oblonga gen. nov., sp. nov. and *Rosistilla carotiformis* sp. nov., isolated from biotic or abiotic surfaces in Northern Germany, Mallorca, Spain and California, USA	pink, unpigmented	7.25–7.51	57.7–58.2	no	Polyethylene particles and Leaves of the giant bladder kelp (Macrocystis pyrifera)	Polyethylene particles from sea below the pier of Heiligendamm, Germany and and Leaves of the giant bladder kelp (*Macrocystis pyrifera*) on the Californian coastline close to Monterey Bay, CA, USA	budding	rosettes	yes	yes	no
Stieleria varia sp. nov., isolated from wood particles in the Baltic Sea, constitutes a novel species in the family Pirellulaceae within the phylum Planctomycetes	light orange	9.59	56	no	Wood particles	Wood particles from Heiligendamm, Germany	polar budding	rosettes	yes	yes	no

Table 1 continued

article_title	Colour	Genome Size (Mb)	G+C content (%)	Plasmid	Substrate for isolation	Location of isolation source	Division	Aggregates	crateriform structures	fimbriae	stalk
Three Planctomycetes isolated from biotic surfaces in the Mediterranean Sea and the Pacific Ocean constitute the novel species *Symmachiella dynata* gen. nov., sp. nov. and *Symmachiella macrocystis* sp. nov	White	7.77 and 7.57	55.3 and 55.2	no	Macroalgae and Macrocystis pyrifera kelp forest	Coasts of the islands of Mallorca (Spain) and Panarea (Italy), and from Monterey Bay, CA, USA	polar budding	strong	Yes and No	yes	No
Additions to the genus Gimesia: Description of *Gimesia alba* sp. nov., *Gimesia algae* sp. nov., *Gimesia aquarii* sp. nov., *Gimesia aquatilis* sp. nov., *Gimesia fumaroli* sp. nov. and *Gimesia panareensis* sp. nov., isolated from aquatic habitats of the Northern Hemisphere	White - cream	7.22-8.29	45.1-53.7	no	Sediments or biofilms	Monterey Bay kelp forest, hydrothermal vent system offshore of Panarea Island, public beach at Mallorca Island, rocky tideland at Helgoland Island and seawater ornamental fish tank	budding	yes/rosettes	yes	yes	yes
Updates to the recently introduced family Lacipirellulaceae in the phylum Planctomycetes: isolation of strains belonging to the novel genera Aeoliella, Botrimarina, Pirellulimonas and Pseudobythopirellula and the novel species *Bythopirellula polymerisocia* and *Posidoniimonas corsicana*	White – hot pink to red	4.33-6.62	52.9-66.5	No	water or biofilm, wood or polyethylene particles	hydrothermal vent area offshore of Panarea island, algae from a public beach at Mallorca island and seawater from the Costa Brava, Spain	Budding	Loose aggregates	Yes	Yes	Yes

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