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## Ansættelse

### Professor

Marine Biological Section

Københavns Universitet

Helsingør, Danmark

1 feb. 2015 → nu

## Publikationer

### **Hydrostatic pressure induces transformations in the organic matter and microbial community composition of marine snow particles**

Stief, P., Schauburger, C., Becker, K. W., Elvert, M., Balmonte, J. P., Franco-Cisterna, B., Middelboe, Mathias & Glud, R. N., 2023, I: *Communications Earth and Environment*. 4, 1, 14 s., 377.

### **Staying below the Radar: Unraveling a New Family of Ubiquitous "Cryptic" Non-Tailed Temperate Vibriophages and Implications for Their Bacterial Hosts**

Kalatzis, P. G., Mauritzen, Jesper Juel, Winther-Have, Caroline Sophie W, Michniewski, S., Millard, A., Tsertou, M. I., Katharios, P. & Middelboe, Mathias, 2023, I: *International Journal of Molecular Sciences*. 24, 4, 23 s., 3937.

### **Strain-specific quorum-sensing responses determine virulence properties in *Vibrio anguillarum***

Mauritzen, Jesper Juel, Søndberg, E., Kalatzis, Panagiotis, Roager, L., Gram, L., Svenningsen, Sine Lo & Middelboe, Mathias, 2023, I: *Environmental Microbiology*. 25, 7, 19 s.

### **In Vitro Evolution of Specific Phages Infecting the Fish Pathogen *Flavobacterium psychrophilum***

Castillo, D., Højsting, A. R., Roosvall, A., Smyrlis, G., Jørgensen, J. & Middelboe, Mathias, 2022, I: *PHAGE: Therapy, Applications, and Research*. 3, 1, s. 28-37 10 s.

### **On Single-Cell Enzyme Assays in Marine Microbial Ecology and Biogeochemistry**

Traving, Sachia Jo, Balmonte, J. P., Seale, D., Arnosti, C., Glud, R. N., Hallam, S. J. & Middelboe, Mathias, 2022, I: *Frontiers in Marine Science*. 9, 9 s., 846656.

### **Prevalence of genetically similar *Flavobacterium columnare* phages across aquaculture environments reveals a strong potential for pathogen control**

Runtuvuori-Salmela, A., Kunttu, H. M. T., Laanto, E., Almeida, G. M. F., Mäkelä, K., Middelboe, Mathias & Sundberg, L., 2022, I: *Environmental Microbiology*. 24, 5, s. 2404-2420 17 s.

### **Reversible mutations in gliding motility and virulence genes: A flexible and efficient phage defence mechanism in *Flavobacterium psychrophilum***

Jørgensen, J., Sundell, K., Castillo, D., Dramshøj, L. S., Jørgensen, N. B., Madsen, S. B., Landor, L., Wiklund, T., Donati, V. L., Madsen, L., Dalsgaard, I. & Middelboe, Mathias, 2022, I: *Environmental Microbiology*. 24, 10, s. 4915-4930

### **The Gut Microbiota of Healthy and *Flavobacterium psychrophilum*-Infected Rainbow Trout Fry Is Shaped by Antibiotics and Phage Therapies**

Donati, V. L., Madsen, L., Middelboe, Mathias, Strube, M. L. & Dalsgaard, I., 2022, I: *Frontiers in Microbiology*. 13, 21 s., 771296.

**Bacteriophage Resistance Affects *Flavobacterium columnare* Virulence Partly via Mutations in Genes Related to Gliding Motility and the Type IX Secretion System**

Kunttu, H. M. T., Runtuvuori-Salmela, A., Sundell, K., Wiklund, T., Middelboe, Mathias, Landor, L., Ashrafi, R., Hoikkala, V. & Sundberg, L., 2021, I: *Applied and Environmental Microbiology*. 87, 16, 19 s., e00812-21 .

**Comparative Genomic Analyses of *Flavobacterium psychrophilum* Isolates Reveals New Putative Genetic Determinants of Virulence Traits**

Castillo, D., Donati, V. L., Jørgensen, J., Sundell, K., Dalsgaard, I., Madsen, L., Wiklund, T. & Middelboe, Mathias, 2021, I: *Microorganisms*. 9, 8, 15 s., 1658.

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Kunttu, H. M. T., Runtuvuori-Salmela, A., Middelboe, Mathias, Clark, J. & Sundberg, L. R., 2021, I: *Antibiotics*. 10, 8, 19 s., 914.

**Dynamics of Baltic Sea phages driven by environmental changes**

Hoetzing, M., Nilsson, E., Arabi, R., Osbeck, C. M. G., Pontiller, B., Hutinet, G., Bayfield, O. W., Traving, S., Kisand, V., Lundin, D., Pinhassi, J., Middelboe, Mathias & Holmfeldt, K., 2021, I: *Environmental Microbiology*. 23, 8, s. 4576-4594 19 s.

**Genome-informed approach to identify genetic determinants of *Flavobacterium psychrophilum* phage susceptibility**

Castillo, D., Jørgensen, J., Sundell, K., Madsen, L., Dalsgaard, I., Wiklund, T. & Middelboe, Mathias, 2021, I: *Environmental Microbiology*. 23, 8, s. 4185-4199 15 s.

**Genomic Analysis of *Pasteurella atlantica* Provides Insight on Its Virulence Factors and Phylogeny and Highlights the Potential of Reverse Vaccinology in Aquaculture**

Ellul, R. M., Kalatzis, Panagiotis, Frantzen, C., Haugland, G. T., Gulla, S., Colquhoun, D. J., Middelboe, Mathias, Wergeland, H. I. & Rønneseth, A., 2021, I: *Microorganisms*. 9, 6, 22 s., 1215.

**Interactions between Rainbow Trout Eyed Eggs and *Flavobacterium* spp. Using a Bath Challenge Model: Preliminary Evaluation of Bacteriophages as Pathogen Control Agents**

Donati, V. L., Dalsgaard, I., Runtuvuori-Salmela, A., Kunttu, H., Jørgensen, J., Castillo, D., Sundberg, L., Middelboe, Mathias & Madsen, L., 2021, I: *Microorganisms*. 9, 5, 31 s., 971.

**Interactions between the Prophage 919TP and Its *Vibrio cholerae* Host: Implications of *gmd* Mutation for Phage Resistance, Cell Auto-Aggregation, and Motility**

Li, N., Zeng, Y., Hu, B., Zhu, T., Svenningsen, Sine Lo, Middelboe, Mathias & Tan, D., 2021, I: *Viruses*. 13, 12, 15 s., 2342.

**Phage-Mediated Control of *Flavobacterium psychrophilum* in Aquaculture: *In vivo* Experiments to Compare Delivery Methods**

Donati, V. L., Dalsgaard, I., Sundell, K., Castillo, D., Er-Rafik, M., Clark, J., Wiklund, T., Middelboe, Mathias & Madsen, L., 2021, I: *Frontiers in Microbiology*. 12, 16 s., 628309.

**Spatial variability of prokaryotic and viral abundances in the Kermadec and Atacama Trench regions**

Schauberger, C., Middelboe, Mathias, Larsen, M., Peoples, L. M., Bartlett, D. H., Kirpekar, F., Rowden, A. A., Wenzhöfer, F., Thamdrup, B. & Glud, R. N., 2021, I: *Limnology and Oceanography*. 66, 6, s. 2095-2109 15 s.

**Bacteriophages: Emerging Applications in Medicine, Food, and Biotechnology**

Sohail, H. A., Coffey, A., Debrowska, K., Meyer, I. M., Middelboe, Mathias, Sohail, M. & Clokie, M. R. J., 2020, I: *PHAGE: Therapy, Applications, and Research*. 1, 2, s. 75-82 8 s.

**Bacteriophages as Biocontrol Agents for *Flavobacterium psychrophilum* Biofilms and Rainbow Trout Infections**

Sundell, K., Landor, L., Castillo, D., Middelboe, Mathias & Wiklund, T., 2020, I: PHAGE: Therapy, Applications, and Research. 1, 4, s. 198-204 7 s.

**Beyond Cholera: Characterization of *zot*-Encoding Filamentous Phages in the Marine Fish Pathogen *Vibrio anguillarum***

Mauritzen, Jesper Juel, Castillo, D., Tan, D., Svenningsen, Sine Lo & Middelboe, Mathias, 2020, I: Viruses. 12, 7, 17 s., 730.

**High cell densities favor lysogeny: induction of an H2O prophage is repressed by quorum sensing and enhances biofilm formation in *Vibrio anguillarum***

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**Sharp contrasts between freshwater and marine microbial enzymatic capabilities, community composition, and DOM pools in a NE Greenland fjord**

Balmonde, J. P., Hasler-Sheetal, H., Glud, R. N., Andersen, Thorbjørn Joest, Sejr, M. K., Middelboe, Mathias, Teske, A. & Arnosti, C., 2020, I: Limnology and Oceanography. 65, 1, s. 77-95 19 s.

***P. aeruginosa* flow-cell biofilms are enhanced by repeated phage treatments but can be eradicated by phage-ciprofloxacin combination: —monitoring the phage–*P. aeruginosa* biofilms interactions**

Henriksen, K., Rørbo, N., Rybtke, Morten Levin, Martinet, M. G., Tolker-Nielsen, Tim, Høiby, Niels, Middelboe, Mathias & Ciofu, Oana, 2019, I: Pathogens and Disease. 77, 2, 11 s., ftz011.

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Hansen, Mads Frederik, Svenningsen, Sine Lo, Røder, Henriette Lyng, Middelboe, Mathias & Burmølle, Mette, 2019, I: Trends in Microbiology. 27, 9, s. 739-752 14 s.

**Biological transformation of Arctic dissolved organic matter in a NE Greenland fjord**

Paulsen, M. L., Müller, O., Larsen, A., Møller, E. F., Middelboe, Mathias, Sejr, M. K. & Stedmon, C., 2019, I: Limnology and Oceanography. 64, 3, s. 1014-1033

**Combining probiotic *Phaeobacter inhibens* DSM17395 and broad-host-range vibriophage KVP40 against fish pathogenic vibrios**

Rasmussen, B. B., Kalatzis, Panagiotis, Middelboe, Mathias & Gram, L., 2019, I: Aquaculture. 513, 7 s., 734415.

**Complete Genome Sequence of *Vibrio anguillarum* Nontailed Bacteriophage NO16**

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**Effects of allochthonous dissolved organic matter input on microbial composition and nitrogen-cycling genes at two contrasting estuarine sites**

Happel, E. M., Markussen, T. M., Teikari, J. E., Huchaiiah, V., Alneberg, J., Andersson, A. F., Sivonen, K., Middelboe, Mathias, Kisand, V. & Riemann, Lasse, 2019, I: F E M S Microbiology Ecology. 95, 9, 10 s., fiz123.

**Large Phenotypic and Genetic Diversity of Prophages Induced from the Fish Pathogen *Vibrio anguillarum***

Castillo, D., Andersen, N., Kalatzis, Panagiotis & Middelboe, Mathias, 2019, I: Viruses. 11, 11, 15 s., 983.

**Phage defense mechanisms and their genomic and phenotypic implications in the fish pathogen *Vibrio anguillarum***

Castillo, D., Rørbo, N., Jørgensen, J., Lange, J., Tan, D., Kalatzis, Panagiotis, Svenningsen, Sine Lo & Middelboe, Mathias, 2019, I: FEMS Microbiology Ecology. 95, 3, fiz004.

**Phenotypic and Genetic Predictors of Pathogenicity and Virulence in *Flavobacterium psychrophilum***

Sundell, K., Landor, L., Nicolas, P., Jørgensen, J., Castillo, D., Middelboe, Mathias, Dalsgaard, I., Donati, V. L., Madsen, L. & Wiklund, T., 2019, I: Frontiers in Microbiology. 10, 14 s., 1711.

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Kalatzis, Panagiotis, Castillo Bermúdez, D. E., Katharios, P. & Middelboe, Mathias, 2018, I: *Antibiotics*. 7, 1, 23 s., 15.

**Coupling biogeochemical process rates and metagenomic blueprints of coastal bacterial assemblages in the context of environmental change**

Markussen, T. M., Happel, E. M., Teikari, J. E., Huchaiah, V., Alneberg, J., Andersson, A. F., Sivonen, K., Riemann, Lasse, Middelboe, Mathias & Kisand, V., 2018, I: *Environmental Microbiology*. 20, 8, s. 3083-3099

**Draft Genome Sequences of Six *Vibrio diazotrophicus* Strains Isolated from Deep Subsurface Sediments of the Baltic Sea**

Castillo, D., Vandieken, V., Engelen, B., Engelhardt, T. & Middelboe, Mathias, 2018, I: *Genome Announcements*. 6, 10, s. 1-2 e00081-18.

**Exploring the Effect of Phage Therapy in Preventing *Vibrio anguillarum* Infections in Cod and Turbot Larvae**

Rørbo, N. I., Rønneseth, A., Kalatzis, Panagiotis, Rasmussen, B. B., Engell-Sørensen, K., Kleppen, H. P., Wergeland, H. I., Gram, L. & Middelboe, Mathias, 2018, I: *Antibiotics*. 7, 2, 15 s., 42.

**Widespread distribution of prophage-encoded virulence factors in marine *Vibrio* communities**

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**Isolation and characterization of a N4-like lytic bacteriophage infecting *Vibrio splendidus*, a pathogen of fish and bivalves**

Katharios, P., Kalatzis, Panagiotis, Kokkari, C., Sarropoulou, E. & Middelboe, Mathias, 28 dec. 2017, I: *PLoS ONE*. 12, 12, 14 s., e0190083.

**Marine viruses: key players in marine ecosystems**

Middelboe, Mathias & Brussaard, C. P. D., okt. 2017, I: *Viruses*. 9, 10, 6 s., 302.

**Stumbling across the same phage: comparative genomics of widespread temperate phages infecting the fish pathogen *Vibrio anguillarum***

Kalatzis, Panagiotis, Rørbo, N. I., Castillo Bermúdez, D. E., Mauritzen, Jesper Juel, Jørgensen, J., Kokkari, C., Zhang, F., Katharios, P. & Middelboe, Mathias, 20 maj 2017, I: *Viruses*. 9, 5, 19 s., 122.

**Comparative genome analyses of *Vibrio anguillarum* strains reveal a link with pathogenicity traits**

Castillo Bermúdez, D. E., Alvise, P. D., Xu, R., Zhang, F., Middelboe, Mathias & Gram, L., 28 feb. 2017, I: *mSystems*. 2, 1, 14 s., e00001-17.

**Carbon bioavailability in a high arctic fjord influenced by glacial meltwater, NE Greenland**

Paulsen, M. L., Nielsen, S. E. B., Müller, O., Møller, E. F., Stedmon, C. A., Juul-Pedersen, T., Markager, S., Sejr, M. K., Delgado Huertas, A., Larsen, A. & Middelboe, Mathias, 2017, I: *Frontiers in Marine Science*. 4, 19 s., 176.

**Global occurrence and heterogeneity of the *Roseobacter*-clade species *Ruegeria mobilis***

Sonnenschein, E. C., Nielsen, K. F., D'Alvise, P., Porsby, C. H., Melchiorson, J., Heilmann, J., Kalatzis, Panagiotis, López-Pérez, M., Bunk, B., Spröer, C., Middelboe, Mathias & Gram, L., 2017, I: *The ISME Journal*. 11, s. 569-583 15 s.

**Benthic carbon mineralization in hadal trenches: assessment by in situ O<sub>2</sub> microprofile measurements**

Wenzhöfer, F., Oguri, K., Middelboe, Mathias, Turnewitsch, R., Toyofuku, T., Kitazato, H. & Glud, R. N., 2016, I: *Deep-Sea Research. Part 1: Oceanographic Research Papers*. 116, s. 276-286 11 s.

**Comparative genome analysis provides Insights into the pathogenicity of *Flavobacterium psychrophilum***

Castillo Bermúdez, D. E., Christiansen, R. H., Dalsgaard, I., Madsen, L., Espejo, R. & Middelboe, Mathias, 2016, I: *PLoS One*. 11, 4, 18 s., e0152515.

**Effect of bacteriophages on the growth of *Favobacterium psychrophilum* and development of phage-resistant strains**  
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**Genomic diversity of bacteriophages infecting the fish pathogen *Flavobacterium psychrophilum***  
Castillo Bermúdez, D. E. & Middelboe, Mathias, 2016, I: F E M S Microbiology Letters. 363, 24, 6 s., fnw272.

**Predation and selection for antibiotic resistance in natural environments**  
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**Quantification of viral and prokaryotic production rates in benthic ecosystems: a methods comparison**  
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Wigington, C. H., Sonderegger, D., Brussaard, C. P. D., Buchan, A., Finke, J. F., Fuhrman, J. A., Lennon, J. T., Middelboe, Mathias, Suttle, C. A., Wilson, W. H., Wommack, K. E., Wilhelm, S. W. & Weitz, J. S., 2016, I: Nature Microbiology. 1, 8 s., 15024 .

**A multitrophic model to quantify the effects of marine viruses on microbial food webs and ecosystem processes**  
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**Autofluorescence imaging system to discriminate and quantify the distribution of benthic cyanobacteria and diatoms**  
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**Bacteriophage resistance mechanisms in the fish pathogen *Flavobacterium psychrophilum*: linking genomic mutations to changes in bacterial virulence factors**  
Castillo Bermúdez, D. E., Christiansen, R. H., Dalsgaard, I., Madsen, L. & Middelboe, Mathias, 2015, I: Applied and Environmental Microbiology. 81, 3, s. 1157-1167 11 s.

**Changes in the composition and bioavailability of dissolved organic matter during sea ice formation**  
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**Counting viruses and bacteria in photosynthetic microbial mats**  
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**Disruption of photoautotrophic intertidal mats by filamentous fungi**  
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**Draft genome sequence of *Vibrio parahaemolyticus* VH3, isolated from an Aquaculture environment in Greece**  
Castillo Bermúdez, D. E., Jun, J. W., D'Alvise, P., Middelboe, Mathias, Gram, L., Liu, S. & Katharios, P., 2015, I: Genome Announcements. 3, 4, 2 s., e00731-15.

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Castillo Bermúdez, D. E., D'Alvise, P., Kalatzis, Panagiotis, Kokkari, C., Middelboe, Mathias, Gram, L., Liu, S. & Katharios, P., 2015, I: Genome Announcements. 3, 4, 2 s., e00729-15.

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**Microscale spatial distributions of microbes and viruses in intertidal photosynthetic microbial mats**

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**Oceanography and the base of the pelagic food web in the southern Indian Ocean**

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**Quorum sensing determines the choice of antiphage defense strategy in *Vibrio anguillarum***

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**Vibriophages differentially influence biofilm formation by *Vibrio anguillarum* strains**

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**Antagonistic coevolution of marine planktonic viruses and their hosts**

Martiny, J. B. H., Riemann, Lasse, Marston, M. F. & Middelboe, Mathias, 2014, I: Annual Review of Marine Science. 6, s. 393-414 22 s.

**Complete genome sequence of *Vibrio anguillarum* phage CHOED successfully used for phage therapy in aquaculture**

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**Detection and quantification of *Flavobacterium psychrophilum*-specific bacteriophages *In Vivo* in rainbow trout upon oral administration: implications for disease control in aquaculture**

Christiansen, R. H., Dalsgaard, I., Middelboe, Mathias, Lauritsen, A. H. & Madsen, L., 2014, I: Applied and Environmental Microbiology. 80, 24, s. 7683-7693 11 s.

**Dissecting the role of viruses in marine nutrient cycling: bacterial uptake of D- and L-amino acids released by viral lysis**

Shelford, E. J., Jørgensen, Niels O. G., Rasmussen, S., Suttle, C. A. & Middelboe, Mathias, 2014, I: Aquatic Microbial Ecology. 73, 3, s. 235-243 9 s.

**Diversity and geographical distribution of *Flavobacterium psychrophilum* isolates and their phages: patterns of susceptibility to phage infection and phage host range**

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**Increased acidification has a profound effect on the interactions between the cyanobacterium *Synechococcus* sp. WH7803 and its viruses**

Traving, Sachia Jo, Clokie, M. R. J. & Middelboe, Mathias, 2014, I: F E M S Microbiology Ecology. 87, 1, s. 133-141 9 s.

**Production and transformation of dissolved neutral sugars and amino acids by bacteria in seawater**

Jørgensen, L., Lechtenfeld, O. J., Benner, R., Middelboe, Mathias & Stedmon, C. A., 2014, I: Biogeosciences. 11, s. 5349-5363 15 s.

**Recent sediment dynamics in hadal trenches: evidence for the influence of higher-frequency (tidal, near-inertial) fluid dynamics**

Turnewitsch, R., Falahat, S., Stehlikova, J., Oguri, K., Glud, R. N., Middelboe, Mathias, Kitazato, H., Wenzhoefer, F., Ando, K., Fujio, S. & Yanagimoto, D., 2014, I: Deep-Sea Research Part I: Oceanographic Research Papers. 90, s. 125-138 14 s.

**Seasonal dynamics of autotrophic and heterotrophic plankton metabolism and  $P_{CO_2}$  in a subarctic Greenland fjord**

Sejr, M. K., Krause-Jensen, D., Dalsgaard, T., Ruiz-Halpern, S., Duarte, C. M., Middelboe, Mathias, Glud, R. N., Bendtsen, J., Balsby, T. J. S. & Rysgaard, S., 2014, I: *Limnology and Oceanography*. 59, 5, s. 1764-1778 15 s.

**Tracing the long-term microbial production of recalcitrant fluorescent dissolved organic matter in seawater**

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**Vibriophages and their interactions with the fish pathogen *Vibrio anguillarum***

Tan, D., Gram, L. & Middelboe, Mathias, 2014, I: *Applied and Environmental Microbiology*. 80, 10, s. 3128-3140 13 s.

**Dispersal and survival of *Flavobacterium psychrophilum* phages *In Vivo* in rainbow trout and *In Vitro* under laboratory conditions: implications for their use in phage therapy**

Madsen, L., Bertelsen, S. K., Dalsgaard, I. & Middelboe, Mathias, 2013, I: *Applied and Environmental Microbiology*. 79, 16, s. 4853-4861 9 s.

**Heterogeneous distribution of prokaryotes and viruses at the microscale in a tidal sediment**

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**High rates of microbial carbon turnover in sediments in the deepest oceanic trench on Earth**

Glud, R. N., Wenzhöfer, F., Middelboe, Mathias, Oguri, K., Turnewitsch, R., Canfield, D. E. & Kitazato, H., 2013, I: *Nature Geoscience*. 6, s. 284-288 5 s.

**Low virus to prokaryote ratios in the cold: benthic viruses and prokaryotes in a subpolar marine ecosystem (Hornsund, Svalbard)**

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