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## Employment

**Professor**

Marine Biology

Helsingør, Denmark

1 Feb 2015 → nu

## Research outputs

**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, In: Communications Earth and Environment. 4, 1, 14 p., 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, In: International Journal of Molecular Sciences. 24, 4, 23 p., 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, In: Environmental Microbiology. 25, 7, 19 p.

***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, In: PHAGE: Therapy, Applications, and Research. 3, 1, p. 28-37 10 p.

**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, In: Frontiers in Marine Science. 9, 9 p., 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, In: Environmental Microbiology. 24, 5, p. 2404-2420 17 p.

**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, In: Environmental Microbiology. 24, 10, p. 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, In: Frontiers in Microbiology. 13, 21 p., 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, In: Applied and Environmental Microbiology. 87, 16, 19 p., 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, In: Microorganisms. 9, 8, 15 p., 1658.

**Comparison of Delivery Methods in Phage Therapy against *Flavobacterium columnare* Infections in Rainbow Trout**

Kunttu, H. M. T., Runtuvuori-Salmela, A., Middelboe, Mathias, Clark, J. & Sundberg, L. R., 2021, In: Antibiotics. 10, 8, 19 p., 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, In: Environmental Microbiology. 23, 8, p. 4576-4594 19 p.

**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, In: Environmental Microbiology. 23, 8, p. 4185-4199 15 p.

**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, In: Microorganisms. 9, 6, 22 p., 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, In: Microorganisms. 9, 5, 31 p., 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, In: Viruses. 13, 12, 15 p., 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, In: Frontiers in Microbiology. 12, 16 p., 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, In: Limnology and Oceanography. 66, 6, p. 2095-2109 15 p.

**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, In: PHAGE: Therapy, Applications, and Research. 1, 2, p. 75-82 8 p.

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

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

**Beyond Cholera: Characterization of *zof*-Encoding Filamentous Phages in the Marine Fish Pathogen *Vibrio anguillarum***  
Mauritzen, Jesper Juel, Castillo, D., Tan, D., Svenningsen, Sine Lo & Middelboe, Mathias, 2020, In: Viruses. 12, 7, 17 p., 730.

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

Tan, D., Hansen, Mads Frederik, de Carvalho, L. N., Røder, Henriette Lyng, Burmølle, Mette, Middelboe, Mathias & Svenningsen, Sine Lo, 2020, In: The ISME Journal. 14, 7, p. 1731-1742 12 p.

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

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

***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, In: Pathogens and Disease. 77, 2, 11 p., ftz011.

**Big Impact of the Tiny: Bacteriophage–Bacteria Interactions in Biofilms**

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

**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, In: Limnology and Oceanography. 64, 3, p. 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, In: Aquaculture. 513, 7 p., 734415.

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

Kalatzis, Panagiotis, Carstens, A. B., Katharios, P., Castillo, D., Hansen, L. H. & Middelboe, Mathias, 2019, In: Microbiology resource announcements. 8, 15, p. 1-2 e00020-19.

**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., Huchaiah, V., Alneberg, J., Andersson, A. F., Sivonen, K., Middelboe, Mathias, Kisand, V. & Riemann, Lasse, 2019, In: F E M S Microbiology Ecology. 95, 9, 10 p., fiz123.

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

Castillo, D., Andersen, N., Kalatzis, Panagiotis & Middelboe, Mathias, 2019, In: Viruses. 11, 11, 15 p., 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, In: 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, In: Frontiers in Microbiology. 10, 14 p., 1711.

**Bacteriophage Interactions with Marine Pathogenic Vibrios: Implications for Phage Therapy**

Kalatzis, Panagiotis, Castillo Bermúdez, D. E., Katharios, P. & Middelboe, Mathias, 2018, In: Antibiotics. 7, 1, 23 p., 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, In: Environmental Microbiology. 20, 8, p. 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, In: Genome Announcements. 6, 10, p. 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, In: Antibiotics. 7, 2, 15 p., 42.

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

Castillo, D., Kauffman, K., Hussain, F., Kalatzis, Panagiotis, Rørbo, N., Polz, M. F. & Middelboe, Mathias, 2018, In: Scientific Reports. 8, p. 1-9 9973.

**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, In: PLoS ONE. 12, 14 p., e0190083.

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

Middelboe, Mathias & Brussaard, C. P. D., Oct 2017, In: Viruses. 9, 10, 6 p., 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 May 2017, In: Viruses. 9, 5, 19 p., 122.

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

Castillo Bermúdez, D. E., Alvisé, P. D., Xu, R., Zhang, F., Middelboe, Mathias & Gram, L., 28 Feb 2017, In: mSystems. 2, 1, 14 p., 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, In: Frontiers in Marine Science. 4, 19 p., 176.

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

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

**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, In: Deep-Sea Research. Part 1: Oceanographic Research Papers. 116, p. 276-286 11 p.

**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, In: PLoS One. 11, 4, 18 p., e0152515.

**Effect of bacteriophages on the growth of *Flavobacterium psychrophilum* and development of phage-resistant strains**

Christiansen, R. H., Madsen, L., Dalsgaard, I., Castillo Bermúdez, D. E., Kalatzis, P. G. & Middelboe, Mathias, 2016, In: Microbial Ecology. 71, 4, p. 845-859 15 p.

**Genomic diversity of bacteriophages infecting the fish pathogen *Flavobacterium psychrophilum***

Castillo Bermúdez, D. E. & Middelboe, Mathias, 2016, In: F E M S Microbiology Letters. 363, 24, 6 p., fnw272.

**Predation and selection for antibiotic resistance in natural environments**

Leisner, Jørgen, Jørgensen, Niels O. G. & Middelboe, Mathias, 2016, In: Evolutionary Applications (Online). 9, 3, p. 427-434 8 p.

**Quantification of viral and prokaryotic production rates in benthic ecosystems: a methods comparison**

Rastelli, E., Dell'Anno, A., Corinaldesi, C., Middelboe, Mathias, Noble, R. T. & Danovaro, R., 2016, In: Frontiers in Microbiology. 7, 11 p., 1501.

**Re-examination of the relationship between marine virus and microbial cell abundances**

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, In: Nature Microbiology. 1, 8 p., 15024 .

**A multitrophic model to quantify the effects of marine viruses on microbial food webs and ecosystem processes**

Weitz, J. S., Stock, C. A., Wilhelm, S. W., Bourouiba, L., Coleman, M. L., Buchan, A., Follows, M. J., Fuhrman, J. A., Jover, L. F., Lennon, J. T., Middelboe, Mathias, Sonderegger, D. L., Suttle, C. A., Taylor, B. P., Frede Thingstad, T., Wilson, W. H. & Eric Wommack, K., 2015, In: ISME Journal. 9, p. 1352–1364 13 p.

**Autofluorescence imaging system to discriminate and quantify the distribution of benthic cyanobacteria and diatoms**

Carreira, C., Staal, M. J., Middelboe, Mathias & Brussaard, C. P. D., 2015, In: Limnology and Oceanography: Methods. 13, 4, p. 169-177 9 p.

**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, In: Applied and Environmental Microbiology. 81, 3, p. 1157-1167 11 p.

**Changes in the composition and bioavailability of dissolved organic matter during sea ice formation**

Jørgensen, L., Stedmon, C. A., Kaartokallio, H., Middelboe, Mathias & Thomas, D. N., 2015, In: Limnology and Oceanography. 60, 3, p. 817-830 14 p.

**Counting viruses and bacteria in photosynthetic microbial mats**

Carreira, C., Staal, M. J., Middelboe, Mathias & Brussaard, C. P. D., 2015, In: Applied and Environmental Microbiology. 81, 6, p. 2149-2155 7 p.

**Disruption of photoautotrophic intertidal mats by filamentous fungi**

Carreira, C., Staal, M. J., Falkoski, D., de Vries, R. P., Middelboe, Mathias & Brussaard, C. P. D., 2015, In: Environmental Microbiology. 17, 8, p. 2910-2921 12 p.

**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, In: Genome Announcements. 3, 4, 2 p., e00731-15.

**Draft genome sequences of *Vibrio alginolyticus* strains V1 and V2, opportunistic marine pathogens**

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

**Draft genome sequences of the fish pathogen *Vibrio harveyi* strains VH2 and VH5**

Castillo Bermúdez, D. E., D'Alvise, P., Middelboe, Mathias, Gram, L., Liu, S., Kalatzis, Panagiotis, Kokkari, C. & Katharios, P., 2015, In: Genome Announcements. 3, 5, 2 p., e01062-15.

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

Carreira, C., Piel, T., Staal, M. J., Stuu, J. W., Middelboe, Mathias & Brussaard, C. P. D., 2015, In: SpringerPlus. 4, 11 p., 239.

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

Visser, A. W., Nielsen, T. G., Middelboe, Mathias, Høyer, J. L. & Markager, S., 2015, In: Journal of Plankton Research. 37, 3, p. 571-583 13 p.

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

Tan, D., Svenningsen, Sine Lo & Middelboe, Mathias, 2015, In: mBio. 6, 3, 10 p., e00627-15.

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

Tan, D., Dahl, A. & Middelboe, Mathias, 2015, In: Applied and Environmental Microbiology. 81, 13, p. 4489-4497 9 p.

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

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

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

Romero, J., Higuera, G., Gajardo, F., Castillo Bermúdez, D. E., Middelboe, Mathias, García, K., Ramírez, C. & Espejo, R. T., 2014, In: Genome Announcements. 2, 4, 2 p.

**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, In: Applied and Environmental Microbiology. 80, 24, p. 7683-7693 11 p.

**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, In: Aquatic Microbial Ecology. 73, 3, p. 235-243 9 p.

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

Castillo Bermúdez, D. E., Christiansen, R. H., Espejo, R. & Middelboe, Mathias, 2014, In: Microbial Ecology. 67, 4, p. 748-757 10 p.

**Genomic structure of bacteriophage 6H and its distribution as prophage in *Flavobacterium psychrophilum* strains**

Castillo Bermúdez, D. E., Espejo, R. & Middelboe, Mathias, 2014, In: FEMS Microbiology Letters. 351, 1, p. 51-58 8 p.

**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, In: F E M S Microbiology Ecology. 87, 1, p. 133-141 9 p.

**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, In: Biogeosciences. 11, p. 5349-5363 15 p.

**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, In: Deep-Sea Research Part I: Oceanographic Research Papers. 90, p. 125-138 14 p.

**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, In: Limnology and Oceanography. 59, 5, p. 1764-1778 15 p.

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

Jørgensen, L., Stedmon, C. A., Granskog, M. A. & Middelboe, Mathias, 2014, In: Geophysical Research Letters. 41, 7, p. 2481-2488 8 p.

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

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

**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, In: Applied and Environmental Microbiology. 79, 16, p. 4853-4861 9 p.

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

Carreira, C., Larsen, M., Glud, R. N., Brussaard, C. P. D. & Middelboe, Mathias, 2013, In: Aquatic Microbial Ecology. 69, 3, p. 183-192 10 p.

**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, In: Nature Geoscience. 6, p. 284-288 5 p.

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

Wrobel, B., Filippini, M., Piwowarczyk, J., Kedra, M., Kulinski, K. & Middelboe, Mathias, 2013, In: International Microbiology. 16, p. 45-52 8 p.

**Viral lysis of *Micromonas pusilla*: impacts on dissolved organic matter production and composition**

Lonborg, C., Middelboe, Mathias & Brussaard, C. P. D., 2013, In: Biogeochemistry. 116, 1-3, p. 231-240 10 p.

**Bacterial carbon cycling in a subarctic fjord: a seasonal study on microbial activity, growth efficiency, and virus-induced mortality in Kobbefjord, Greenland**

Middelboe, Mathias, Glud, R. N. & Sejr, M. K., 2012, In: Limnology and Oceanography. 57, 6, p. 1732-1742 11 p.

**Cultivated single stranded DNA phages that infect marine *Bacteroidetes* prove difficult to detect with DNA binding stains**

Holmfeldt, K., Odic, D., Sullivan, M. B., Middelboe, Mathias & Riemann, Lasse, 2012, In: Applied and Environmental Microbiology. 78, 3, p. 892-894

**Diversity of *Flavobacterium psychrophilum* and the potential use of its phages for protection against bacterial cold water disease in salmonids**

Castillo, D., Higuera, G., Villa, M., Middelboe, Mathias, Dalsgaard, I., Madsen, L. & Espejo, R. T., 2012, In: Journal of Fish Diseases Online. 35, 3, p. 193-201 9 p.

**Proteinase production in *Pseudomonas fluorescens* ON2 is affected by carbon sources and allows surface-attached but not planktonic cells to utilize protein for growth in lake water**

Nicolaisen, Mette Haubjerg, Worm, J., Jørgensen, Niels O. G., Middelboe, Mathias & Nybroe, O., 2012, In: F E M S Microbiology Ecology. 80, 1, p. 168-178 11 p.

**Virus-driven nitrogen cycling enhances phytoplankton growth**

Shelford, E. J., Middelboe, Mathias, Møller, E. F. & Suttle, C. A., 2012, In: Aquatic Microbial Ecology. 66, 1, p. 41-46 6 p.

**Global trends in the fluorescence characteristics and distribution of marine dissolved organic matter**

Jørgensen, L., Stedmon, C., Kragh, T., Markager, S., Middelboe, Mathias & Søndergaard, M., 2011, In: Marine Chemistry. 126, 1-4, p. 139-148 10 p.

**Viral abundance and activity in the deep sub-seafloor biosphere**

Middelboe, Mathias, Glud, R. N. & Filippini, M., 2011, In: Aquatic Microbial Ecology. 63, 1, p. 1-8

**Microbial disease in the sea: Effects of viruses on carbon and nutrient cycling**

Middelboe, Mathias, 16 Dec 2010, *Infectious Disease Ecology: Effects of Ecosystems on Disease and of Disease on Ecosystems*. Princeton University Press, p. 242-259 18 p.

**Isolation and life cycle characterization of lytic viruses infecting heterotrophic bacteria and cyanobacteria**

Middelboe, Mathias, Chan, A. & Bertelsen, S. K., 2010, *Manual of aquatic viral ecology*. Wilhelm, S. W., Weinbauer, M. G. & Suttle, C. A. (eds.). Waco, Tex: American Society of Limnology and Oceanography, Inc., p. 118-33 16 p.

**Separation of free virus from sediments in aquatic systems**

Danovaro, R. & Middelboe, Mathias, 2010, *Manual of Aquatic Viral Ecology*. Wilhelm, S. W., Weinbauer, M. G. & Suttle, C. A. (eds.). ASLO, p. 74-81 8 p.

**Bacteriophages drive strain diversification in a marine *Flavobacterium*: implications for phage resistance and physiological properties**

Middelboe, Mathias, Holmfeldt, K., Riemann, Lasse, Nybroe, O. & Haaber, J. B. B., 2009, In: Environmental Microbiology. 11, 8, p. 1971-1982 12 p.

**Viral lysis of *Phaeocystis pouchetii*: implications for algal population dynamics and heterotrophic C, N and P cycling**

Haaber, J. B. B. & Middelboe, Mathias, 2009, In: ISME Journal. 3, 4, p. 430-441 12 p.

**Bacterial and viral dynamics during a mass coral spawning period on the Great Barrier Reef**

Patten, N. L., Mitchell, J. G., Middelboe, Mathias, Eyre, B. D., Seuront, L., Harrison, P. L. & Glud, R. N., 2008, In: Aquatic Microbial Ecology. 50, p. 209-220

**Global-scale processes with a nanoscale drive - the role of marine viruses**

Brussard, C. P. D., Wilhelm, S. W., Thinhstad, T. F., Weinbauer, T. F., Bratbak, M. G., Heldal, M., Kimmance, S. A., Middelboe, Mathias, Nagasaki, K., Paul, J. H., Schroeder, D. C., Suttle, C. A., Vaque, D. & Wommack, K. E., 2008, In: ISME Journal. 2, p. 575-578

**Isolation and characterization of bacteriophages infecting the fish pathogen *Flavobacterium psychrophilum***

Stenholm, A. R., Dalsgaard, I. & Middelboe, Mathias, 2008, In: Applied and Environmental Microbiology. 74, 13, p. 4070-4078

**Marine Viruses: Community Dynamics, Diversity and Impact on Microbial Processes**

Breitbart, M., Middelboe, Mathias & Rohwer, F., 2008, *Microbial Ecology of the Oceans*. Second Edition ed. IEEE Computer Society Press, p. 443-479

**Microbial Disease in the Sea: Effects of Viruses on Marine Carbon and Nutrient Cycling**

Middelboe, Mathias, 2008, *Infectious Disease Ecology*. Princeton University Press, p. 242-260

**Struktur og funktion af plankton fødekæden i det Indiske Ocean fra Cape Town til Broome i Australien. Dansk Ekspeditionsfond 2008**

Nielsen, T. G., Visser, A., Jonasdottir, S., Friis Møller, E., Andersen, M., Larsen, L., Søborg, B., Satapoomin, S., Jaspers, C., Markager, S., Middelboe, M., Martinsen, W., Berendt, A., Hansen, O. S., Hansen, P. J., Woraporn, T., Daugbjerg, N., Hansen, G., Hastrup Jensen, M., Jakobsen, H. H. & 4 others, Henriksen, P., Schlüter, L., Hilligsøe, K. M. & Olesen, Michael, 2008.



**Viral dynamics in a coastal sediment: seasonal pattern, controlling factors and relations to the pelagic-benthic coupling**  
Siem-Jørgensen, M., Glud, R. N. & Middelboe, Mathias, 2008, In: Marine Biology Research. 4, 3, p. 165-179

**Viruses in freshwater ecosystems: An introduction to the exploration of viruses in new aquatic habitats**  
Middelboe, Mathias, Jacquet, S. & Weinbauer, M., 2008, In: Freshwater Biology. 53, 6, p. 1069-1075

**First Record of Viral Abundance in Coliumo Bay and the Continental Shelf off Central Chile**  
Chiang, O. E., Middelboe, Mathias & Quiñones, R. A., 2007, In: Gayana. 71, 1, p. 124-131

**Large variabilities in host strain susceptibility and phage host range govern interactions between lytic marine phages and their *Flavobacterium* hosts**

Holmfeldt, K., Middelboe, Mathias, Nybroe, O. & Riemann, L., 2007, In: Applied and Environmental Microbiology. 73, 21, p. 6730-6739 10 p.

**Ny viden om virus' betydning for Jordens kulstofomsætning.**

Drejet, L. & Middelboe, Mathias, 2007, In: Dansk Kemi. 88, 2, p. 11-13

**Primer Registro de Abundancia Viral en Bahía Coliumo y Plataforma Continental Frente a Chile Central: First Record of Viral Abundance in Coliumo Bay and the Continental Shelf off Central Chile.**

Chiang, O. E., Middelboe, Mathias & Quiñones, R. A., 2007, In: Gayana. 71, 1, p. 124-131

**Viral abundance and genome size distribution in the sediment and water column of marine and freshwater ecosystems**

Filippini, M. & Middelboe, Mathias, 2007, In: FEMS Microbiology Ecology. 60, p. 397-410

**Viral activity along a trophic gradient in continental margin sediments off central Chile**

Middelboe, Mathias & Glud, R. N., Mar 2006, In: Marine Biology Research. 2, 1, p. 41-51 11 p.

**De frie vandmassers stofomsætning**

Middelboe, Mathias & Olesen, Michael, 2006, *HAVET: Naturen i Danmark*. Fenchel, T. (ed.). Gyldendal, p. 351-369

**Havbunden - et levested for vigtige aktører i havets husholdning**

Glud, R. N. & Middelboe, Mathias, 2006, In: Naturens Verden. 11/12, p. 2-9

**Occurrence and bacterial cycling of D amino acid isomers in an estuarine environment**

Jørgensen, Niels O. G. & Middelboe, Mathias, 2006, In: Biogeochemistry. 81, 1, p. 77-94 18 p.

**Spatial distribution and activity of viruses in the deep-sea sediments of Sagami Bay, Japan**

Middelboe, Mathias, Glud, R. N., Wenzhöfer, F., Oguri, K. & Kitazato, H., 2006, In: Deep-Sea Res. I. 53, p. 1-13

**Viral lysis of bacteria: an important source of dissolved amino acids and cell wall compounds**

Middelboe, Mathias & Jørgensen, Niels O. G., 2006, In: Journal of the Marine Biological Association of the United Kingdom. 86, 3, p. 605-612 8 p.

**Virus - havbundens mindste beboere**

Middelboe, Mathias & Glud, R. N., 2006, In: Naturens Verden. 4, p. 32-40

**Distribution of oxygen in surface sediments from central Sagami Bay, Japan: In situ measurements by microelectrodes and planar optodes**

Glud, R. N., Wenzhöfer, F., Tengberg, A., Middelboe, Mathias, Oguri, K. & Kitazato, H., 2005, In: Deep Sea Research - Part I - Oceanographic Research Papers. Part I (52), p. 1974-1987

**Virus and bacteria dynamics of a coastal sediment: Implication for benthic carbon cycling.**

Glud, R. N. & Middelboe, Mathias, 2004, In: Limnology and Oceanography. 49(6), p. 2073-2081

**Distribution of viruses and bacteria in relation to diagenetic activity in an estuarine sediment**

Middelboe, Mathias, Glud, R. N. & Finster, K., 2003, In: Limnology and Oceanography. 48(4), p. 1447-1456

**Microbial activity in the Greenland Sea: role of DOC lability, mineral nutrients and temperature.**

Middelboe, Mathias & Lundsgaard, C., 2003, In: Aquatic Microbial Ecology. 32, p. 151-163

**Virus - de mindste biologiske strukturer i havet.**

Middelboe, Mathias, 2003, In: Carlsbergfondets Årsskrift. IV, p. 28-35

**Virus-induced transfer of organic carbon between marine bacteria in a model community.**

Middelboe, Mathias, Riemann, Lasse, Steward, G. F., Hansen, V. & Nybroe, O., 2003, In: Aquatic Microbial Ecology. 33, 1, p. 1-10 10 p.

**Influence of bacterial uptake on deep-ocean dissolved organic carbon**

Bendtsen, J., Lundsgaard, C., Middelboe, Mathias & Archer, D., 2002, In: Global Biogeochemical Cycles. vol. 16(0), p. 1-13

**Regeneration of dissolved organic matter by viral lysis in marine microbial communities**

Middelboe, Mathias & Lyck, P. G., 2002, In: Aquatic Microbial Ecology. 27, p. 187-194

**Stability of bacterial and viral community compositions in Danish coastal waters as depicted by DNA fingerprinting techniques**

Riemann, Lasse & Middelboe, Mathias, 2002, In: Aquatic Microbial Ecology. 27, p. 219-232

**Utilization of marine sedimentary dissolved organic nitrogen by native anaerobic bacteria**

Guldberg, L. B., Finster, K., Jørgensen, Niels O. G., Middelboe, Mathias & Lomstein, B. A., 2002, In: Limnology and Oceanography. 47, 6, p. 1712-1722 11 p.

**Viral Lysis of Marine Bacterioplankton: Implications for Organic Matter Cycling and Bacterial Clonal Composition**

Riemann, Lasse & Middelboe, Mathias, 2002, In: Marine Biology Research. 56(2), p. 57-68

**Viral and bacterial production in the North Water: *in situ* measurements, batch-culture experiments and characterization and distribution of a virus-host system**

Middelboe, Mathias, Nielsen, T. G. & Bjørnsen, P. K., 2002, In: Deep Sea Research - Part II - Topical Studies in Oceanography. 49, p. 5063-5079

**Effects of Bacteriophages on the Population Dynamics of Four Strains of Pelagic Marine Bacteria**

Middelboe, Mathias, Hagström, Å., Blackburn, N., Sinn, B., Fischer, U., Borch, N. H., Pinhassi, J., Simu, K. & Lorenz, M. G., 2001, In: Microbial Ecology. 42, p. 395-406

**Bacterial Growth Rate and Marine Virus-Host Dynamics**

Middelboe, Mathias, 2000, In: Microbial Ecology. 40, p. 114-124

**Virus i havet**

Riemann, L. & Middelboe, Mathias, 2000, In: Vand og Jord. 4, p. 156-158

**Effects of viral enrichment on the mortality and growth of heterotrophic bacterioplankton**

Noble, R. T., Middelboe, Mathias & Fuhrman, J. A., 1999, In: Aquatic Microbial Ecology. 18, p. 1-13

**Influence of sediment on pelagic carbon and nitrogen turnover in a shallow Danish estuary**

Middelboe, Mathias, Kroer, Niels, Jørgensen, N. O. G. & Pakulski, D., 1998, In: Microbial Ecology. 14, p. 81-90

**Effects of viruses on nutrient turnover and growth efficiency of noninfected marine bacterioplankton**

Middelboe, Mathias, Jørgensen, Niels O. G. & Kroer, Niels, 1996, In: Applied and Environmental Microbiology. 62, 6, p. 1991-1997 7 p.

**Attached and free-living bacteria: Production and polymer hydrolysis during a diatom bloom**

Middelboe, Mathias, Søndergaard, M., Letarte, Y. & Borch, N. H., 1 May 1995, In: Microbial Ecology. 29, 3, p. 231-248 18 p.

**Concentration and bacterial utilization of sub-micron particles and dissolved organic carbon in lakes and a coastal area**

Middelboe, Mathias & Søndergaard, M., 1 Jan 1995, In: Archiv fur Hydrobiologie. 133, 2, p. 129-147 19 p.

**A cross-system analysis of labile dissolved organic carbon**

Søndergaard, M. & Middelboe, Mathias, 1995, In: Marine Ecology - Progress Series. 118, p. 283-294

**Attached and freeliving bacteria: Production and polymer hydrolysis during a diatom bloom**

Middelboe, Mathias, Søndergaard, M., Letarte, Y. & Borch, N. H., 1995, In: Microbial Ecology. 29, p. 231-248

**Bacterial utilization of dissolved free amino acids, dissolved combined amino acids and ammonium in the Delaware Bay estuary: effects of carbon and nitrogen limitation**

Middelboe, Mathias, Borch, N. H. & Kirchman, D. L., 1995, In: Marine Ecology - Progress Series. 128, p. 109-120 12 p.

**Concentration and bacterial utilization of submicron particles and dissolved organic carbon in lakes and a coastal area**

Middelboe, Mathias & Søndergaard, M., 1995, In: Polskie Archiwum Hydrobiologii. 133 (2), p. 129-147

**Bacterioplankton growth yield: Seasonal variations and coupling to substrate lability and \*GB\*-glucosidase activity**

Middelboe, Mathias & Søndergaard, M., 1993, In: Applied and Environmental Microbiology. 59, p. 3916-3921

**Measurements of particulate organic carbon: a note on the use of glass fiber (GF/F) and Anodisc R filters**

Søndergaard, M. & Middelboe, Mathias, 1993, In: Polskie Archiwum Hydrobiologii. 127, p. 73-85

**Bacterial utilization of dissolved organic carbon (DOC) in coastal waters - determination of growth yield.**

Middelboe, Mathias, Nielsen, B. & Søndergaard, M., 1992, In: Arch. Hydrobiol. Beih.. 37, p. 51-61

**Nye studier af bakterieplanktonets økologi**

Middelboe, Mathias, Nielsen, B. & Søndergaard, M., 1992, In: Vand og miljø. 4, p. 115-118