Felix Kaspar

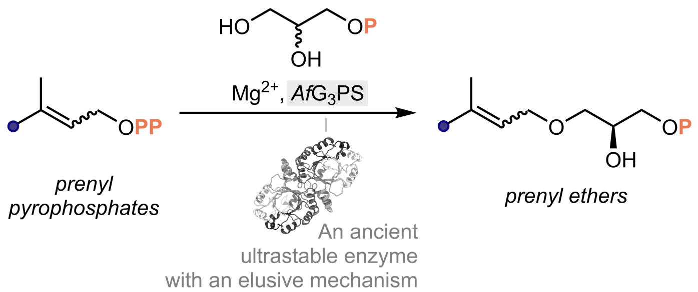
List of publications

*corresponding author, #joint first authors

Selected publications are featured with (graphical) abstracts. Links to open access versions of each paper are provided wherever possbile.

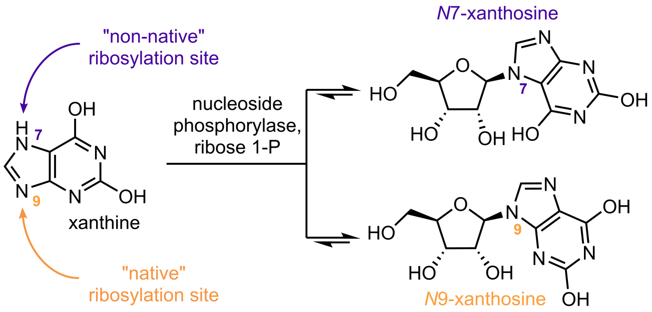
2025 [28] Staar, S., Estévez-Gay, M., **Kaspar, F.**, Osuna, S.*, Schallmey, A.* Engineering of conserved sequence motif 1 residues in halohydrin dehalogenase HheC simultaneously enhances activity, stability and enantioselectivity, *ACS Catal.* **2025**, 15, 5257–5272, https://doi.org/10.1021/acscatal.5c00819 (open access preprint at https://doi.org/10.26434/chemrxiv-2024-cw4cm)

2024 [27] **Kaspar, F.***, Eilert, L., Staar, S., Oung, S.W., Wolter, M., Ganskow, C.S.G., Kemper, S., Klahn, P., Jacob, C.R., Blankenfeld, W., Schallmey, A.* Biocatalytic Ether Lipid Synthesis by an Archaeal Glycerolprenylase, *Angew. Chem. Int. Ed.* **2024**, e202412597, https://doi.org/10.1002/anie.202412597



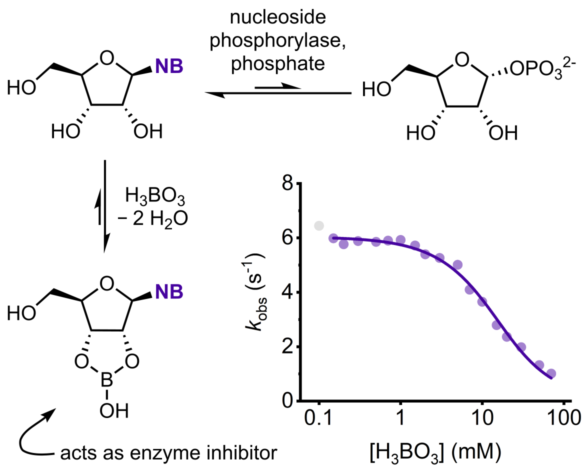
To expand the repertoire of well characterized ether synthases, we report on a promiscuous archaeal prenyltransferase from the scarcely researched family of geranylgeranylglyceryl phosphate synthases (GGGPSs or G_3PSs). We show that the ultrastable *Archaeoglobus fulgidus* G_3PS makes various (*E*)- and (*Z*)-configured prenyl glycerol ethers from the corresponding pyrophosphates, while exerting perfect control over the configuration at the glycerol unit. Based on experimental and computational data, we propose a mechanism for this enzyme which involves an intermediary prenyl carbocation equivalent.

[26] Westarp, S., Brandt, F., Neumair, L., Betz, C., Dagane, A., Kemper, S., Jacob, C.R., Neubauer, P., Kurreck, A.*, **Kaspar, F.*** Nucleoside Phosphorylases Make *N*7-Xanthosine, *Nat. Commun.* **2024**, 15, 3625, https://doi.org/10.1038/s41467-024-47287-4



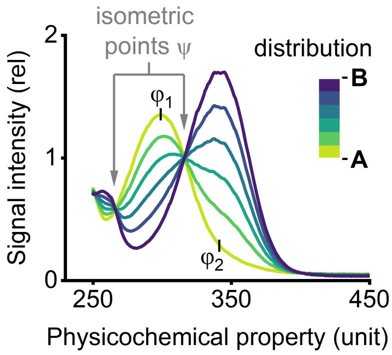
Modern, highly evolved nucleoside-processing enzymes are known to exhibit perfect regioselectivity over the glycosylation of purine nucleobases at N9. We herein report an exception to this paradigm. Wild-type nucleoside phosphorylases also furnish *N*7-xanthosine, a "non-native" ribosylation regioisomer of xanthosine.

2023 [25] **Kaspar, F.***#, Brandt, F.#, Westarp, S., Eilert, L., Kemper, S., Kurreck, A., Neubauer, P., Jacob, C., Schallmey, A. Biased Borate Esterification during Nucleoside Phosphorylase-Catalyzed Reactions: Apparent Equilibrium Shifts and Kinetic Implications, *Angew. Chem. Int. Ed.* **2023**, 135, e202218492, https://doi.org/10.1002/anie.202218492



Yields in biocatalytic nucleoside transglycosylations are generally determined exclusively by the innate thermodynamic properties of the nucleosides involved, hampering the access to many sought-after target nucleosides. We herein report an additional means for reaction engineering of these systems. We show how apparent equilibrium shifts in phosphorolysis and glycosylation reactions can be effected through entropically driven, biased esterification of nucleosides and ribosyl phosphates with inorganic borate.

[24] **Kaspar, F.*** Quality Data from Messy Spectra – How Isometric Points Increase Information Content in Highly Overlapping Spectra, *ChemBioChem* **2023**, 24, e202200744, https://doi.org/10.1002/cbic.202200744



Spectroscopic data are often messy, and it is challenging to extract reliable information from them without careful calibrations or internal standards. This short introductory review discusses how isometric points (points in a spectrum where the signal intensity remains constant throughout the progress of a chemical transformation) can be used to derive high-quality data from messy spectra. Such analyses are helpful in a variety of (bio-)chemical settings, as selected case studies demonstrate.

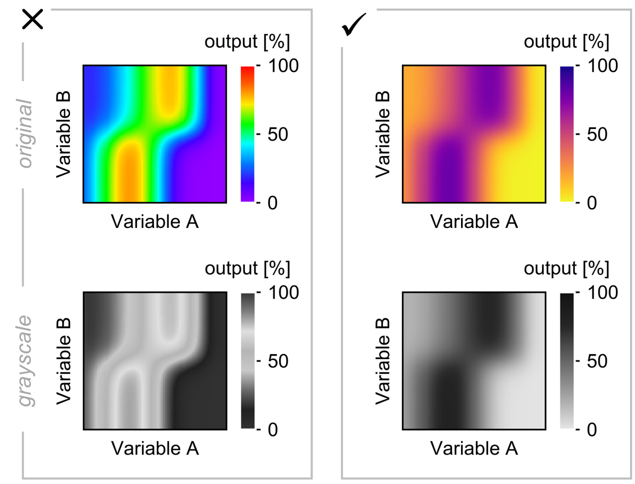
2022 [23] Westarp, S.,# **Kaspar, F.***#, Neubauer, P., Kurreck, A.* Industrial potential of the enzymatic synthesis of nucleoside analogs: Existing challenges and perspectives, *Curr. Opin. Biotechnol.* **2022**, 78, 102829, https://doi.org/10.1016/j.copbio.2022.102829 (open access preprint at https://doi.org/10.26434/chemrxiv-2022-x5hm9)

[22] Solarczek, J.,# **Kaspar, F.**#, Bauer, P., Schallmey, A.* G-type Halohydrin Dehalogenases Catalyze Ring Opening Reactions of Cyclic Epoxides with Diverse Anionic Nucleophiles, *Chem. Eur. J.* **2022**, 28, e202202343, https://doi.org/10.1002/chem.202202343

[21] **Kaspar, F.***, Schallmey, A.* Chemo-enzymatic Synthesis of Natural Products and their Analogues / Strategic Enzymatic Transformations in Modern Natural Product Synthesis, *Curr. Opin. Biotechnol.* **2022**, 77, 102759, https://doi.org/10.1016/j.copbio.2022.102759 (open access preprint at https://doi.org/10.26434/chemrxiv-2022-nvjkx)

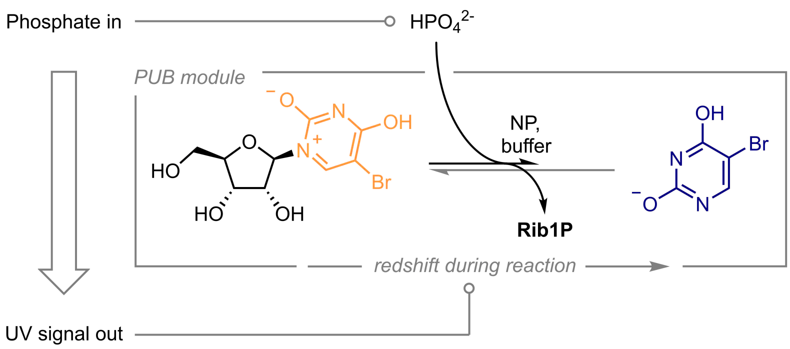
[20] **Kaspar, F.***, Ganskow, C.S.G., Eilert, L., Klahn, P., Schallmey, A. Alternative Assay Reagents for UV-Spectroscopic Detection of (Pyro-)Phosphate with the PUB Module, *Anal. Chem.* **2022**, 94, 8132–8135, https://doi.org/10.1021/acs.analchem.2c01404

[19] **Kaspar, F.***, Crameri, F.* Coloring Chemistry: How Mindful Color Choices Improve Chemical Communication, *Angew. Chem. Int. Ed.* **2022**, 61, e202114910, https://doi.org/10.1002/anie.202114910



Color is a central element to scientific communication, but its use comes with the responsibility to ensure universally accessible and accurate data presentation. This short Viewpoint Article aims to sensitize the chemical community to the importance of mindful color choices in scientific illustrations.

[18] Eilert, L., Schallmey, A., **Kaspar, F.*** UV-Spectroscopic Detection of (Pyro-)Phosphate with the PUB module, *Anal. Chem.* **2022**, 94, 3432–3435, https://doi.org/10.1021/acs.analchem.1c05356



We herein introduce PUB, a module for phosphate detection by continuous UV-spectroscopic monitoring of 5-bromouridine phosphorolysis. The PUB module uses cheaply available, bench-stable reagents and can be employed for continuous and discontinuous reaction monitoring in biochemical assays to detect (pyro-)phosphate concentrations spanning almost 4 orders of magnitude, as demonstrated with representative use cases.

2021 [17] Xiang, L., **Kaspar, F.**, Schallmey, A., Constantinou, I.* Two-Phase Biocatalysis in Microfluidic Droplets, *Biosensors* **2021**, 11, 407, https://doi.org/10.3390/bios11110407

[16] Kamel, S.#, Walczak, M.C.#, **Kaspar, F.**, Westarp, S., Neubauer, P., Kurreck, A.* Thermostable Adenosine 5'-Monophosphate Phosphorylase from *Thermococcus kodakarensis* forms catalytically active inclusion bodies, *Sci. Rep.* **2021**, 11, 16880, https://doi.org/10.1038/s41598-021-96073-5

[15] **Kaspar, F.***, Seeger, M., Westarp, S., Köllmann, C., Lehmann, A.P., Pausch, P., Kemper, S., Neubauer, P., Bange, G., Schallmey, A., Werz, D.B., Kurreck, A., Diversification of 4'-Methylated Nucleosides by Nucleoside Phosphorylases, *ACS Catal.* **2021**, 11, 10830–10835, https://doi.org/10.1021/acscatal.1c02589 (**highlighted by the ESRF**: https://shorturl.at/xIM49)

[14] **Kaspar, F.***, Wolff, D.S., Neubauer, P., Kurreck, A., Arcus, V. pH-Independent Heat Capacity Changes during Phosphorolysis Catalyzed by the Pyrimidine Nucleoside Phosphorylase from *Geobacillus thermoglucosidasius*, *Biochemistry* **2021**, 60, 1573–1577, https://doi.org/10.1021/acs.biochem.1c00156

[13] Hellendahl, K.F.#, **Kaspar, F.**#, Zhou, X., Huang, Z., Neubauer, P., Kurreck, A.* Optimized Biocatalytic Synthesis of 2-Seleno Pyrimidine Nucleosides via Transglycosylation, *ChemBioChem* **2021**, 22, 2002, https://doi.org/10.1002/cbic.202100067

[12] **Kaspar, F.***, Neubauer, P., Kurreck, A.* The Peculiar Case of the Hyperthermostable Pyrimidine Nucleoside Phosphorylase from *Thermus thermophilus*, *ChemBioChem* **2021**, 22, 1385, https://doi.org/10.1002/cbic.202000679

[11] **Kaspar, F.***, Neubauer, P., Kurreck, A.* Kinetic Analysis of the Hydrolysis of Pentose-1-Phosphates through Apparent Nucleoside Phosphorolysis Equilibrium Shifts, *ChemPhysChem* **2021**, 22, 283, https://doi.org/10.1002/cphc.202000901 (**invited for the front cover**)

2020 [10] **Kaspar, F.***, Stone, M.R.L., Neubauer, P., Kurreck, A. Route Efficiency Assessment and Review of the Synthesis of β-Nucleosides via *N*-Glycosylation of Nucleobases, *Green Chem.* **2021**, 23, 35–50, https://doi.org/10.1039/D0GC02665D (selected as **2020 Green Chemistry Hot Article**)

[9] Fehlau, M., **Kaspar, F.**, Hellendahl, K.F., Schollmeyer, J., Neubauer, P., Kurreck, A.* Modular enzymatic cascade synthesis of nucleotides using a (d)ATP regeneration system, *Front. Bioeng. Biotechnol.* **2020**, 8, 854, https://doi.org/10.3389/fbioe.2020.00854

[8] **Kaspar, F.***, Giessmann, R.T., Westarp, S., Hellendahl, K.F., Krausch, N., Thiele, I., Walczak, M.C., Neubauer, P., Kurreck, A.* Spectral Unmixing-Based Reaction Monitoring of Transformations Between Nucleosides and Nucleobases, *ChemBioChem* **2020**, 21, 2604, https://doi.org/10.1002/cbic.202000204 (**featured on the front cover**, https://doi.org/10.1002/cbic.202000569)

[7] Yehia, H.#, Westarp, S.#, Röhrs, V., **Kaspar, F.**, Giessmann, R.T., Klare, H.F.T., Paulick, K., Neubauer, P., Kurreck, J., Kurreck, A.* Efficient Biocatalytic Synthesis of Dihalogenated Purine Nucleoside Analogs Applying Thermodynamic Calculations, *Molecules* **2020**, 25, 934, https://doi.org/10.3390/molecules25040934

[6] **Kaspar, F.***#, Giessmann, R.T.#, Hellendahl, K., Neubauer, P., Kurreck, A.*, Gimpel, M. General Principles of Yield Optimization of Nucleoside Phosphorylase-Catalyzed Transglycosylations, *ChemBioChem* **2020**, 21, 1428–1432, https://doi.org/10.1002/cbic.201900740

[5] **Kaspar**, F.#, Giessmann, R.T.#, Neubauer, P., Kurreck, A.*, Gimpel, M. Thermodynamic Reaction Control of Nucleoside Phosphorolysis, *Adv. Synth. Catal.* **2020**, 362, 867-876, https://doi.org/10.1002/adsc.201901230

2019 [4] **Kaspar, F.**#, Giessmann, R. T.#, Krausch, N., Neubauer, P., Kurreck, A.*, Gimpel, M. A UV/Vis Spectroscopy-Based Assay for Monitoring of Transformations Between Nucleosides and Nucleobases, *Methods Protoc.* **2019**, 2, 60, https://doi.org/10.3390/mps2030060

[3] Giessmann, R. T.*#, Krausch, N.#, **Kaspar F.**, Cruz Bournazou, M. N., Wanger, A., Neubauer, P., Gimpel, M. Dynamic Modelling of Phosphorolytic Cleavage Catalyzed by Pyrimidine-Nucleoside Phosphorylase, *Processes* **2019**, 7, 380, https://doi.org/10.3390/pr7060380

[2] **Kaspar, F.***, Neubauer, P., Gimpel, M. Bioactive Secondary Metabolites from *Bacillus subtilis*: A Comprehensive Review, *J. Nat. Prod.* **2019**, 82, 7, 2038–2053, https://doi.org/10.1021/acs.jnatprod.9b00110

2016 [1] **Kaspar, F.**, Jelinek, H. F.*, Perkins, S., Al-Aubaidy, H. A., deJong, B. and Butkowski, E. Acute-Phase Inflammatory Response to Single-Bout HIIT and Endurance Training: A Comparative Study, *Mediators of Inflammation* **2016**, vol. 2016, https://doi.org/10.1155/2016/5474837