MUHAMMAD AYAZ

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EDUCATION

2010 **PhD**, Chemistry, Leibniz Institute of Plant Biochemistry, Martin Luther University, Halle (Saale), Germany
Thesis: *Organocatalytic Asymmetric Synthesis of Amino Acid Precursors*

2004 **MSc**, Chemistry, Quaid-i-Azam University, Islamabad, Pakistan

PROFESSIONAL EXPERIENCE

2014 – Present **Research Specialist**, High-throughput Screening, Chemical Biology Core, Moffitt Cancer Center, Tampa, FL, USA

- Design and synthesis of inhibitors of BET bromodomains, a protein that plays key role in various cancers including breast and prostate cancers and melanoma. The efforts led to the discovery of molecules with single digit nano molar activity, with one molecule being the most potent inhibitor of bromodomain-4 ever synthesized; Synthesis of novel GSK3 inhibitors; Design and synthesis of new class of cereblon inhibitors
- Responsible for the maintenance and training of Bruker-500 MHz NMR, Agilent HPLCMS, Agilent High-Res. Mass Spectrometer and automated purification systems

2013 – 2014 **Assistant Research Scientist**, BIO5 Drug Discovery Center, University of Arizona, Tucson, AZ, USA

- Design and synthesis of novel dendrimer libraries as targeted drug delivery systems, exclusively based on the *de novo* MCR chemistry
- Synthesis of arrays of pharmacologically relevant scaffolds using new post-reaction modifications of Passerini, Ugi, Mannich, Groebke-Blackburn-Bienayme and related reactions
- Co-supervision of the research and training of graduate and undergraduate students

2010 – 2012 **Postdoctoral Research Associate**, BIO5 Drug Discovery Center, University of Arizona, Tucson, AZ, USA

- Post-condensation modifications of different variants of Ugi reaction leading to libraries of heterocycles such as quinoxaline, benzimidazol, benzodiazepine, and fused tetrazole
- Microwave-assisted synthesis of quinoxalines using novel post-reaction modification of the Petasis reaction
- Preparation and submission of automated libraries of compounds to NIH for screening against various biological targets

2006 – 2010 **PhD Research Associate**, Leibniz Institute of Plant Biochemistry, Martin Luther University, Halle, Germany

- Design and synthesis of organocatalysts for the stereoselective Mannich-, vinylogous Mannich-, and Michael-type reactions
- Successful employment of α-amidosulfones as imine equivalent in the high yielding enantioselective Mannich-type reactions
- Synthesis of Cinchona alkaloids based selective butyrylcholinesterase inhibitors

2004 – 2005 **Research Fellow**, International Center for Chemical Sciences (ICCS), University of Karachi, Pakistan

- Phytochemical investigations on the chemical constituents of the plant *Elaeagnus orientalis*
- Novel urease inhibiting coumarins from the plant *Daphne oleoides*

PUBLICATIONS

Published:

1. Ariza, M. G; Ayaz, M; Sue, A. Roberts; Rabanal-León, W. A; Arratia-Pérez, R; Hulme, C. (**2015**) 'The synthesis of stable, complex organocesium tetramic acids via the Ugi reaction and cesium carbonate promoted cascades' ***Angew. Chem. Int. Ed.*** **54**, 11672–11676.
2. Ariza, M. G; Ayaz, M; Medda, F; Hulme, C. (**2014**) 'Synthesis of diverse nitrogen-enriched heterocyclic scaffolds using a suite of tunable one-pot multicomponent reactions' ***J. Org. Chem.*** **79**, 5153–5162.
3. Xu, Z; Ayaz, M; Hulme, C. (**2014**) 'Expeditious routes to polycyclic molecular frameworks via one-pot, two-step Ugi-ring closing sequences' ***Synlett.*** **25**, 225–228.
4. Ayaz, M; Xu, Z; Hulme, C. **(2014). '**Novel succinct routes to quinoxalines and 2-benzimidazolylquinoxalines via the Ugi reaction' **Tetrahedron Lett. 55**, 3406–3409.
5. Ayaz, M; Ariza, M. G; Hulme, C. (**2014**) 'A Robust protocol for the synthesis of quinoxalines and 5*H*-benzo[*e*][1,4]diazepines via the acidless Ugi reaction' ***Synlett.*** **25**, 1680–1684.
6. Ariza, M. G; Ayaz, M; Hulme, C. (**2013**) 'A simple one-pot, 2-step *N*-1-alkylation of indoles with α-iminoketones toward the expeditious 3-step synthesis of *N*-1-quinoxaline-indoles' ***Tetrahedron Lett.*** **54**, 6719–6721.
7. Xu, Z; Ayaz, M; Cappelli, A. A; Hulme, C. (**2012**) 'General one-pot, two-step protocol accessing a range of novel polycyclic heterocycles with high skeletal diversity' ***ACS Comb. Sci.*** **14**, 460–464.
8. Gunawan, S; Ayaz, M; De Moliner, F; Frett, B; Kaiser, C; Patrick, N; Xu, Z; Hulme, C. (**2012**) 'Synthesis of tetrazolo-fused benzodiazepines and benzodiazepinones by a two-step protocol using an Ugi-azide reaction for initial diversity generation' ***Tetrahedron*** **68**, 5606–5611.
9. Ayaz, M; Dietrich, J; Hulme, C. (**2011**) 'A novel route to synthesize libraries of quinoxalines via Petasis methodology in two synthetic operations' ***Tetrahedron Lett.*** **52**, 4821–4823.

10. Nawaz, S. A; Ayaz, M; Brandt, W; Wessjohann, L. A; Westermann, B. (**2011**) 'Cation–π and π–π stacking interactions allow selective inhibition of butyrylcholinesterase by modified quinine and cinchonidine alkaloids' ***Biochem. Biophys. Res. Commun.*** **404**, 935–940.
11. Westermann, B; Ayaz, M; van Berkel, S. S. (**2010**) 'Enantiodivergent organocascade reactions' ***Angew. Chem. Int. Ed.*** **49**, 846–849. German version: (**2010**) 'Enantiodivergente organokaskadenreaktionen' ***Angewandte Chemie*** **122**, 858–861.
12. Ayaz, M; Westermann, B. (**2010**) 'Enantioenriched naphthoquinone Mannich bases by organocatalyzed nucleophilic additions to *in situ* formed imines' ***Synlett.*** **10**, 1489–1492.
13. Ayaz, M; Malik, A; Ahmad, E; Fatima, I; Lodhi, M. A; Chaudhary, M. I. (**2009**) 'Elaeagnoside, chymotrypsin inhibiting steroidal glucoside from *Elaeagnus orientalis'* ***Nat. Prod. Res.*** **23**, 409–414.
14. Ayaz, M; Lodhi, M. A; Haq, A; Malik, A; Chaudhary, M. I. (**2006**) 'Novel urease inhibitors from *Daphne oleoids'* ***J. Enzyme Inhib. Med. Chem.*** **21**, 527–529.
15. Mughal, E; Ayaz, M; Hussain, Z; Hasan, A; Sadiq, A; Malik, A; Hussain, S; Choudhary, M. I. (**2006**) 'Synthesis and antibacterial activity of substituted flavones, 4-thioflavone and 4-iminoflavones' ***Bioorg. Med. Chem.*** **14**, 4704–4711.

Manuscripts in preparation/submitted:

16. Ayaz, M; Gunawan, S; Ember, S; Zhu, J. Y; Jacobsen, R; Berndt, N; Lambert, Q. T; Reuther, G. W; Lawrence, H. W; Schonbrunn, E; Lawrence, N. J. **(2017)** 'Development of single agents that potently inhibit BET bromodomains and kinases for cancer therapy' ***Nature Chemical Biology***, submitted.
17. Van Berkel, S. S; Schaapman, M; Wijdeven, M; Ayaz, M; Westermann, B; Rutjes, F. (**2017**) 'Asymmetric organocascade reactions; beyond proline catalysis' ***Chemical Science,*** manuscript in preparation.
18. Ayaz, M; Hulme, C. **(2017)** 'A novel 7-component reaction for the synthesis of new classes of dendrimers' ***Angew. Chem. Int. Ed.,*** manuscript in preparation.
19. Ayaz, M; et.al **(2017)**, 'Pyrimdine based potent inhibitors of CD4' ***J. Med. Chem.,*** manuscript in preparation.
20. Kazi, A; Xiang, S; Yang, H; Jiang, R; Delitto, D; Ayaz, M; Trevino, J; Kennedy, P; and Sebti, S. M. **(2017)** 'GSK3 Suppression and β-Catenin/c-Myc Activation: a Kiss of Death for Mutant KRas-Dependent Human Tumors' ***Science***, manuscript in preparation.
21. Beaty, M. S; Alontaga, A; Ayaz, M; Gunawan, S; Burnette, P. K; Lawrence, H; Lawrence, N. J. **(2017)** 'Design, synthesis and screening of novel cereblon inhibitors and studies on their induced BRD-4 degradation using PROTACs' ***Nature Chemical Biology***, manuscript in preparation.

BOOK CHAPTERS

1. Hulme, C; Ayaz, M; *Ariza, G. M; Medda, F; Shaw, A.* (**2015) '**Recent Advances in Multicomponent Reaction Chemistry', in Small molecule medicinal chemistry: Strategies

and technologies (eds W. Czechtizky and P. Hamley). pp. 145–188; John Wiley & Sons, Inc, Hoboken, NJ., ISBN 9781118771600.

2. Ayaz, M; De Moliner, F; Hulme, C. **(2014)** 'Strecker and Strecker-Type Reactions', in Science of synthesis. pp. 99–122; Thieme Connect, ISBN 9783131728616.
3. Ayaz, M; De Moliner, F; Dietrich, J; Hulme, C. **(2012)** 'Application of isocyanides in IMCRs for the rapid generation of molecular diversity', in Isocyanide chemistry: Applications in synthesis and material science. pp. 335–384; Nenajdenko, V. G. (Ed.); Wiley-VCH, Weinheim, ISBN 9783527330430.

AWARDS AND HONORS

2012	Publication of the second most read article during the third quarter of 2012, *ACS Combinatorial Science* with the article featured as the Journal cover (August 13, 2012, Volume 14, Issue 8)
2010	Graded "*Magna cum Laude*" in PhD
2006-2010	PhD Research Fellowship, Deutsche Forschungsgemeinshaft
2004-2005	Junior Research Fellowship, ICCS, University of Karachi, Pakistan

PROFESSIONAL ACTIVITIES

- International Editorial Member, Asian Journal of Chemistry
- Member, American Chemical Society
- Member, Canadian Society for Chemistry
- Member, International Union of Pure and Applied Chemistry
- Reviewer, International Journal of Chemistry
- Reviewer, Heterocyclic Communications
- Reviewer, Cogent Chemistry
- Reviewer, Asian Journal of Organic & Medicinal Chemistry

CONFERENCE POSTERS AND PRESENTATIONS

2015	Lambert, Q. T; Ember, S. W; Ayaz, M; Harshani R. Lawrence, Berndt, N; Gunawan, S; Lawrence, N. J; Schönbrunn, E; Reuther, G. W. **'**Single molecule Dual Jak2-BET inhibition as an MPN therapeutic' **57th ASH Annual Meeting & Exposition Orlando, FL**, Dec 5-8, 2015 (Poster)
2015	Gunawan, S; Ayaz, M; Ember, S. W; Zhu, J. Y; Jacobsen, R. A; Berndt, N; Lambert, Q. T; Reuther, G. W; Lawrence, H. R; Schönbrunn, E; Lawrence, N. J. 'Targeting the acetyl-lysine binding site of BRD4 with dual nanomolar BET-JAK2 inhibitors: A new anticancer therapeutic strategy' **AACR Annual Meeting Philadelphia, PA** April 18-22, 2015. (Poster)
2014	Ariza, G. M; Ayaz, M; Medda, F; Hulme, C. 'Diversity-enabling multicomponent

reactions of 2-hydrazino-azines for the synthesis of nitrogen-enriched bicyclic heterocycles' **248th ACS National Meeting**, **San Francisco, CA,** August 10-l 4, 2014. (Poster)

2013 Ayaz, M. 'From heterocycles to macromolecules: applications of an isocyanide based three-component reaction' **Sanofi-Aventis Research Center, Tucson, AZ** September 19, 2013. (Invited talk)

2012 Ayaz, M. 'Towards the synthesis of benzimidazoles: iteration of a multi-component process' **ACS National Medicinal Chemistry Symposium, Tucson, AZ** May 20-23, 2012. (Poster)

2011 Ayaz, M; Hulme, C. 'Remarkable two-step, operationally friendly methodology to produce arrays of pharmacologically relevant quinoxalines via a convertible carboxylic acid strategy' **ACS National Medicinal Chemistry Symposium, Anaheim, CA**, March 27-31, 2011. (Poster)

2010 Singh, D; Ayaz, M; Braga, A. L; Westermann, B. 'Towards asymmetric catalytic Ugi reaction' **ORCHEM, GDCh-Fachgruppe Liebig-Vereinigung für Organic Chemie, Weimer, Germany** 13-15 September 2010. (Poster)

2008 Ayaz, M; Westermann, B. 'Microwave-assisted, organocatalytic Mannich-type reactions' **ORCHEM, GDCh-Fachgruppe Liebig-Vereinigung für Organic Chemie, Weimer, Germany** 1-3 September 2008. (Poster)

2008 Ayaz, M; Westermann, B. 'Stereoselective Mannich and vinylogous Mannich reactions' **Third German–Hungarian Workshop on Chemistry, Paderborn, Germany** 15-17 May 2008. (Oral Presentation)

REFERENCES

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