

Dr Nicholas J Westwood
Reader in Chemistry

e-mail: njw3@st-andrews.ac.uk

tel: 01334 463816

Research Interests: Synthetic chemistry, natural products, chemical genetics, interdisciplinary research, diversity-oriented synthesis



Chemical and Interdisciplinary Research

The main aim of my research group is to apply high level methods in organic synthesis to problems in the chemical and biomedical sciences. In chemistry, we apply our skills in natural product and diversity-oriented synthesis. In the biomedical sciences, we aim to advance understanding of biological processes through the development of chemical tools (chemical genetics).

Research in Natural Product and Diversity-oriented Synthesis

We have recently completed the first synthesis of a family of natural products known as the *iso-seco*-tanaparthalides.¹ Our focus has now turned to applying our recently developed methodology to the first asymmetric synthesis of the natural product perophoramidine.² In addition, we are interested in the synthesis of medium-sized ring containing compounds using oxidative fragmentation approaches. This work requires the development of short and robust reaction sequences that generate relatively complex structures. We have discovered that the products from the oxidative fragmentation of some heterocyclic systems are useful starting points in diversity-oriented synthesis.

Research in Chemical Biology

As a result of our excellent collaboration with Professor Sir David Lane and Dr Sonia Lain, we have recently developed a series of novel sirtuin inhibitors.^{3,4} Sirtuins deacetylate a range of proteins implicating them in multiple important biological processes. We bring skills in high-throughput synthesis, purification, compound design and protein chemistry to this project. A second successful collaboration with Professor Gary Ward at the University of Vermont uses the chemical genetic approach⁵ to study the mechanism by which a parasite (*Toxoplasma gondii*) moves and invades host cells.⁶

We are supported by The Royal Society, BBSRC, EPSRC and the MRC as well as the NIH in the US. We also have financial support from Industry.

SELECTED RECENT PUBLICATIONS

1. *Iso-seco*-tanaparthalides: Isolation, Synthesis and Biological Evaluation. Makiyi, E.F., Frade, R.F.M., Lebl, T., Jaffray, E.G., Harvey, A.L., Slawin, A.M.Z., Hay, R.T., **Westwood, N.J.***, (2009), *EJOC*, 33, 5711-5715.
2. Studies on the Claisen Rearrangements in the Indolo[2,3-*b*]quinoline System. Voûte, N., Philp, D., Slawin, A.M.Z., **Westwood, N.J.***, (2010) *Organic & Biomolecular Chemistry*, 8(2), 442-450.
3. Novel Cambinol Analogs as Sirtuin Inhibitors: Synthesis, Biological Evaluation, and Rationalization of Activity. Medda, F., Russell, R.J.M., Higgins, M., McCarthy, A.R., Campbell, J., Slawin, A.M.Z., Lane, D.P., Lain, S., **Westwood, N.J.***, (2009), *Journal of Medicinal Chemistry*, 52(9), 2673-2682.
4. Discovery, *in vivo* activity and mechanism of action of a small-molecule p53 activator. Lain S., Hollick J.J., Campbell J., Staples O.D., Higgins M., Aoubala M., McCarthy A., Appleyard V., Murray K.E., Baker L., Thompson A., Mathers J., Holland S.J., Stark M.J.R., Pass G., Woods J., Lane D.P. and **Westwood N.J.**, *Cancer Cell*, (2008), 13(5), 454-463.
5. Chemical Genetics – How does it function? **Westwood N.J.*** (2004) *Phil. Trans. R. Soc. Lond. A*, **362**, 2761-2774.
6. For our most recent paper on this project see: Optimisation of Conoidin A, a peroxiredoxin inhibitor. Liu, G., Botting, C.H., Evans, K.M., Walton, J.G.A., Xu, G., Slawin, A.M.Z., **Westwood, N.J.***, (2010) *ChemMedChem*, 5(1), 41-45.