



# SFI-funded Q-Exactive Mass Spectrometry Facility: 12/RI/2346(3)

Maynooth University; (June 2014 – 20 February 2020)

## 67 Peer-Reviewed Publications

Principal Investigators: Bayram, Carolan, Dowling, Doyle, Fitzpatrick, Griffin, Jones, Kavanagh, Ohlendieck, Owens, Stephens.

### 2014 (n = 2)

**1.** Dolan, S.K., **Owens, R.A.**, O'Keeffe, G., Hammel, S., **Fitzpatrick, D.A.**, Jones G.W. and **Doyle, S.** (2014) Regulation of Non-ribosomal Peptide Synthesis: Bis-thiomethylation Attenuates Gliotoxin Biosynthesis in *Aspergillus fumigatus*. *Chemistry & Biology*. 21(8):999–1012. doi: 10.1016/j.chembiol.2014.07.006

O' Keeffe G., Hammel, S., Owens, R.A., Keane, T.M., **Fitzpatrick D.A.**, Jones G.W. and **Doyle S.** (2014) RNAseq Reveals the Pan-Transcriptomic Impact of Attenuating the Gliotoxin Self-Protection Mechanism in *Aspergillus fumigatus*. *BMC Genomics*. 15:894. doi: 10.1186/1471-2164-15-894

### 2015 (n = 6)

Murphy S, Henry M, Meleady P, Zweyer M, Mundegar RR, Swandulla D, **Ohlendieck K.** (2015) Simultaneous Pathoproteomic Evaluation of the Dystrophin-Glycoprotein Complex and Secondary Changes in the mdx-4cv Mouse Model of Duchenne Muscular Dystrophy. *Biology (Basel)*. 4(2):397-423. doi: 10.3390/biology4020397

Murphy S, Zweyer M, Mundegar RR, Henry M, Meleady P, Swandulla D, **Ohlendieck K.** (2015) Concurrent Label-Free Mass Spectrometric Analysis of Dystrophin Isoform Dp427 and the Myofibrosis Marker Collagen in Crude Extracts from mdx-4cv Skeletal Muscles. *Proteomes*. 3(3):298-327. doi:10.3390/proteomes3030298

**5.** Fagan, S., Murphy, R., Connolly, C., Ward, P., **Owens, R.A.** and **Doyle S.** (2015) Biochemical comparison of commercial Selenium yeast preparations. *Biological Trace Element Research*. 166(2):245-259. doi: 10.1007/s12011-015-0242-6

Delgado, J., **Owens, R.A.**, **Doyle, S.**, Asensio, M.A. and Núñez, F. (2015) Impact of the antifungal protein PgAFP from *Penicillium chrysogenum* on the protein profile in *A. flavus*

and assessment of the derived detrimental effects. *Applied Microbiology and Biotechnology*. 99(20):8701-8715. doi: 10.1007/s00253-015-6731-x

**Owens R.A.**, O'Keeffe G., Smith, E.B., Dolan, S.K., Hammel S., Sheridan K.J., **Fitzpatrick, D.A.**, Keane, T.M., Jones G.W. and **Doyle S.** (2015) Interplay between gliotoxin resistance, secretion and the methyl/methionine cycle in *Aspergillus fumigatus*. *Eukaryotic Cell*. 14(9):941-957. doi: 10.1128/EC.00055-15.

Browne N., Surlis C., Maher A., Gallagher C., **Carolan J.C.**, Clynes M., **Kavanagh K.** (2015) Prolonged pre-incubation increases the susceptibility of *Galleria mellonella* larvae to bacterial and fungal infection. *Virulence*. 6(5):458-465. doi: 10.1080/21505594.2015.1021540

## 2016 (n = 7)

Surlis., C., **Carolan J.C.**, Coffey M.F. and **Kavanagh K.** (2016) Proteomic analysis of Bayvarol® resistance mechanisms in the honey bee parasite *Varroa destructor*. *Journal of Apicultural Research*. 55(1):49-64. doi: 10.1080/00218839.2016.1196015

**10.** Manzanares-Miralles L., Sarikaya-Bayram, Ö., Smith E.B., Dolan S.K, **Bayram, Ö.**, Jones G.W. and **Doyle S.** (2016) Quantitative proteomics reveals the mechanism and consequence of gliotoxin-mediated dysregulation of the methionine cycle in *Aspergillus niger*. *Journal of Proteomics*. 131:149-162. doi: 10.1016/j.jprot.2015.10.024

Murphy S., Dowling P., Zweyer M., Mundegar R.R., Henry M., Meleady P., Swandulla D. and **Ohlendieck K.** (2016) Proteomic analysis of dystrophin deficiency and associated changes in the aged mdx-4cv heart model of dystrophinopathy-related cardiomyopathy. *Journal of Proteomics*. 145:24-36. doi: 10.1016/j.jprot.2016.03.011

Delgado, J., **Owens, R.A.**, **Doyle, S.**, Asensio, M.A. and Núñez, F. (2016) Increased chitin biosynthesis contributes to the resistance of *Penicillium polonicum* against the antifungal protein PgAFP. *Applied Microbiology and Biotechnology*. 100(1):371-83. doi: 10.1007/s00253-015-7020-4

Sheridan K.J., Lechner B.E., O'Keeffe G., Keller M.A., Werner E.R., Lindner H., **Jones G. W.**, Haas H. and **Doyle S.** (2016). Ergothioneine Biosynthesis and Functionality in the Opportunistic Fungal Pathogen, *Aspergillus fumigatus*. *Scientific Reports*. 6:35306. doi: 10.1038/srep35306

Alves de Castro P., Fernanda dos Reis, T., Dolan S.K., Oliveira Manfiolli A., Brown N.A., Jones, G.W., **Doyle S.**, Riaño Pachón D.M., Márcio Squina F., Caldana C., Singh A., Del Poeta M., Hagiwara D. and Goldman G.H. (2016) The *Aspergillus fumigatus* SchASCH9 kinase modulates SakAHOG1 MAP kinase activity and it is essential for virulence. *Molecular Microbiology*. 102(4):642-671. doi: 10.1111/mmi.13484

**15.** Deslyper G, Colgan TJ, Cooper AJ, Holland CV, **Carolan JC.** (2016) A Proteomic Investigation of Hepatic Resistance to *Ascaris* in a Murine Model. *PLoS Neglected Tropical Diseases*. 10(8):e0004837. doi: 10.1371/journal.pntd.0004837

## 2017 (n = 18)

Dolan S.K, Bock, T., Hering, V., **Owens, R.A.**, Jones, G.W., Blankenfeldt W., **Doyle S.** (2017) Structural, mechanistic and functional insight into gliotoxin bis-thiomethylation in *Aspergillus fumigatus*. *Open Biology*. 7:160292. doi: 10.1098/rsob.160292

Hmmier A, O'Brien ME, Lynch V, Clynes M, Morgan R, **Dowling P.** (2017) Proteomic analysis of bronchoalveolar lavage fluid (BALF) from lung cancer patients using label-free mass spectrometry. *BBA Clin.* 7:97-104. doi: 10.1016/j.bbacli.2017.03.001.

Maguire R, Kunc M, Hyrsl P, **Kavanagh K.** (2017) Analysis of the acute response of *Galleria mellonella* larvae to potassium nitrate. *Comp Biochem Physiol C Toxicol Pharmacol.* 195:44-51. doi: 10.1016/j.cbpc.2017.02.007.

Mulvihill ED, Moloney NM, Owens RA, Dolan SK, Russell L, **Doyle S.** (2017) Functional Investigation of Iron-Responsive Microsomal Proteins, including MirC, in *Aspergillus fumigatus*. *Front Microbiol.* 8:418. doi: 10.3389/fmicb.2017.00418.

**20.** Delgado, J., **Owens, R.A., Doyle, S.,** Nunez, F., Asensio M.A. (2017) Quantitative proteomics reveals new insights into calcium-mediated resistance mechanisms in *Aspergillus flavus* against the antifungal protein PgAFP in cheese. *Food Microbiol.* 66: 1-10.

Murphy S, **Dowling P,** Zweyer M, Henry M, Meleady P, Mundegar RR, Swandulla D, **Ohlendieck K.** (2017) Proteomic profiling of mdx-4cv serum reveals highly elevated levels of the inflammation-induced plasma marker haptoglobin in muscular dystrophy. *Int J Mol Med.* doi: 10.3892/ijmm.2017.2952.

McNamara L, **Carolan J.C., Griffin C.T., Fitzpatrick D., Kavanagh K.** (2017) The effect of entomopathogenic fungal culture filtrate on the immune response of the greater wax moth, *Galleria mellonella*. *J Insect Physiol.* 2017 May 22. pii: S0022-1910(17)30073-2. doi: 10.1016/j.jinsphys.2017.05.009.

Valsecchi I, Sarikaya Bayram Ö, Wong Sak Hoi J, Muszkietta L, Gibbons J, Prevost MC, Mallet A, Krijnse-Locker J, Ibrahim-Granet O, Mouyna I, Carr P, Bromley M, Aimanianda V, Yu YJ, Rokas A, Braus G, Saveanu C, **Bayram Ö,** Latgé J-P. (2017) MybA, a transcription factor involved in conidiation and conidial viability of the human pathogen *Aspergillus fumigatus*. *Mol Microbiol.* doi: 10.1111/mmi.13744.

Murphy, S., **Ohlendieck, K.** (2017) Mass spectrometric identification of dystrophin, the protein product of the Duchenne muscular dystrophy gene, in distinct muscle surface membranes. *International Journal of Molecular Medicine* 0, no. 0 (1899): 0-0. <https://doi.org/10.3892/ijmm.2017.3082>.

**25.** Manfiolli AO, de Castro PA, Dos Reis TF, Dolan S, **Doyle S,** Jones G, Riaño Pachón DM, Ulaş M, Noble LM, Mattern DJ, Brakhage AA, Valiante V, Silva-Rocha R, **Bayram O,** Goldman GH. (2017) *Aspergillus fumigatus* protein phosphatase PpzA is involved in iron assimilation, secondary metabolite production, and virulence. *Cell Microbiol.* 2017 Jul 28. doi: 10.1111/cmi.12770.

Murphy S., Brinkmeier H., Krautwald M., Henry M., Meleady P. and **Ohlendieck K.** (2017) Proteomic profiling of the dystrophin complex and membrane fraction from dystrophic mdx muscle reveals decreases in the cytolinker desmoglein and increases in the extracellular matrix stabilizers biglycan and fibronectin. *J Muscle Res Cell Motil.* doi: 10.1007/s10974-017-9478-4.

Sheehan G, **Kavanagh K.** (2017) Analysis of the early cellular and humoral responses of *Galleria mellonella* larvae to infection by *Candida albicans*. *Virulence.* doi: 10.1080/21505594.2017.1370174.

Collins C., Hurley R., Almutlaqah N., O'Keeffe G., Keane T.M., **Fitzpatrick D.A.** and **Owens R.A.** (2017) Proteomic characterization of *Armillaria mellea* reveals oxidative stress response mechanisms and altered secondary metabolism profiles. *Microorganisms*. 5(3). pii:E60. doi: 10.3390/microorganisms5030060

Sipos G., Prasanna A.N., Walter M.C., O'Connor E., Balint B., Krizsan K., Kiss B., Hess J., Varga T., Slot J., Riley R., Boka B., Rigling D., Barry K., Lee J., Mihaltcheva S., LaButti K., Lipzen A., Waldron R., Moloney N.M, Sperisen C., Kredics L., Vagvolgyi C., Patrignani A., **Fitzpatrick D.**, Nagy I., **Doyle S.**, Anderson J., Grigoriev I.V., Guldener U., Münsterkötter M. and Nagy L.G. (2017) Genome expansion and lineage-specific genetic innovations in the forest pathogenic fungi *Armillaria*. *Nature Ecology & Evolution*. 1(12):1931-1941. doi: 10.1038/s41559-017-0347-8

**30.** Kavanagh E.L., Lindsay S., Halasz M., Gubbins L.C., Weiner-Gorzel K., Guang M.H.Z., McGoldrick A., Collins E., Henry M., Blanco-Fernández A., Gorman P.O., Fitzpatrick P., Higgins M.J., **Dowling P.**, McCann A. (2017) Protein and chemotherapy profiling of extracellular vesicles harvested from therapeutic induced senescent triple negative breast cancer cells. *Oncogenesis*. 6(10):e388. doi: 10.1038/oncsis.2017.82.

Maguire R., Kunc M., Hyrsi P., **Kavanagh K.** (2017) Caffeine administration alters the behaviour and development of *Galleria mellonella* larvae. *Neurotoxicol Teratol*. pii: S0892-0362(17)30146-0. doi: 10.1016/j.ntt.2017.10.002. [Epub ahead of print].

Murphy S. and **Ohlendieck K.** (2017) Proteomic profiling of large myofibrillar proteins from dried and long-term stored polyacrylamide gels. *Anal Biochem*. pii: S0003-2697(17)30488-8. doi: 10.1016/j.ab.2017.11.022. [Epub ahead of print]

Surlis., C., **Carolán J.C.**, Coffey M.F. and **Kavanagh K.** (2017) Quantitative proteomics reveals divergent responses in *Apis mellifera* worker and drone pupae to parasitization by *Varroa destructor*. *J. Insect Physiol.* Online 19 December 2017. <https://doi.org/10.1016/j.jinsphys.2017.12.004>

## 2018 (n = 17)

**Doyle S.**, Jones G.W and Dolan S.K. (2018) Dysregulated Gliotoxin Biosynthesis Attenuates the Production of Unrelated Biosynthetic Gene Cluster-Encoded Metabolites in *Aspergillus fumigatus*. *Fungal Biology*. 122(4): 214-221.

**35.** Murphy S, Zweyer M, Henry M, Meleady P, Mundegar RR, Swandulla D, **Ohlendieck K.** (2018) Proteomic analysis of the sarcolemma-enriched fraction from dystrophic mdx-4cv skeletal muscle. *J Proteomics*. doi: 10.1016/j.jprot.2018.01.015. [Epub ahead of print].

Heavey S., **Dowling P.**, Moore G., Barr M.P., Kelly N., Maher S.G., Cuffe S., Finn S.P., O'Byrne K.J. and Gately K. (2018) Development and characterisation of a panel of phosphatidylinositide 3-kinase - mammalian target of rapamycin inhibitor resistant lung cancer cell lines. *Sci Rep*. 8(1):1652. doi: 10.1038/s41598-018-19688-1.

Maher A, Staunton K and **Kavanagh K.** (2018) Analysis of the effect of temperature on protein abundance in Demodex-associated *Bacillus oleronius*. *Pathog Dis*. doi: 10.1093/femspd/fty032. [Epub ahead of print].

Murphy S., Zweyer M., Mundegar R.R., Swandulla, D. and **Ohlendieck K.** (2018) Comparative gel-based proteomic analysis of chemically crosslinked complexes in

dystrophic skeletal muscle. Electrophoresis. doi: 10.1002/elps.201800028. [Epub ahead of print]

Sheehan, G., Bergsson, G., McElvaney, N.G., Reeves, E.P. and **Kavanagh K.** (2018) The human cathelicidin antimicrobial peptide LL-37 promotes the growth of the pulmonary pathogen *Aspergillus fumigatus*. Infect. Immun. Online 30 April 2018. doi:10.1128/IAI.00097-18

**40.** Boulain H, Legeai F, Guy E, Morlière S, Douglas NE, Oh J, Murugan M, Smith M, Jaquiéry J, Peccoud J, White FF, **Carolan JC**, Simon JC, Sugio A. (2018) Fast Evolution and Lineage-Specific Gene Family Expansions of Aphid Salivary Effectors Driven by Interactions with Host-Plants. Genome Biol Evol. In press. doi: 10.1093/gbe/evy097

Saleh, A.A., Jones, G.W., Tinley, F.C., Delaney, S.F., Alabbadi, S., Fenlon K., **Doyle, S.\*** and **Owens, R.A.\*** (2018) Systems Impact of Zinc Chelation by the Epipolythiodioxopiperazine Dithiol Gliotoxin in *Aspergillus fumigatus*: A New Direction in Natural Product Functionality. Metallomics. 10:854-866. doi: 10.1039/C8MT00052B \* joint corresponding authors.

Murphy S, Zweyer M, Henry M, Meleady P, Mundegar RR, Swandulla D, **Ohlendieck K.** (2018) Subproteomic profiling of sarcolemma from dystrophic *mdx-4cv* skeletal muscle. Data Brief. 17:980-993. doi: 10.1016/j.dib.2018.02.020.

Rochford, G., Molphy, Z., Browne, N., Surlis, C., Devereux, M., McCann, M., Kellett, A., Howe, O. and **Kavanagh K.** (2018) In-vivo evaluation of the response of *Galleria mellonella* larvae to novel copper(II) phenanthroline-phenazine complexes. J Inorg Biochem. 186:135-146. doi: 10.1016/j.jinorgbio.2018.05.020.

de Assis, L.J., Ulas, M., Ries, L.N.A., El Ramli, N.A.M., Sarikaya-Bayram, O., Braus, G.H., **Bayram, O.**, Goldman, G.H. (2018) Regulation of *Aspergillus nidulans* CreA-Mediated Catabolite Repression by the F-Box Proteins Fbx23 and Fbx47. MBio.9(3). pii: e00840-18. doi: 10.1128/mBio.00840-18.

**45.** Sheehan, G., Clarke, G. and **Kavanagh K.** (2018) Characterisation of the cellular and proteomic response of *Galleria mellonella* larvae to the development of invasive aspergillosis. BMC Microbiol. 18(1):63. doi: 10.1186/s12866-018-1208-6.

MacNamara LM, **Griffin CT**, **Fitzpatrick D**, **Kavanagh K**, **Carolan JC.** (2018) The effect of entomopathogenic fungal culture filtrate on the immune response and haemolymph proteome of the large pine weevil, *Hylobius abietis*. Insect Biochem Mol Biol. doi: 10.1016/j.ibmb.2018.07.001. [Epub ahead of print]

Frawley D., Karahoda B., Sarikaya-Bayram Ö & **Bayram Ö.** (2018) The HamE scaffold positively regulates MpkB phosphorylation to promote development and secondary metabolism in *Aspergillus nidulans*. Scientific Reports. **8**, 16588.

Murphy S, Zweyer M, Mundegar RR, Swandulla D, **Ohlendieck K.** (2018) Dataset on the comparative proteomic profiling of mouse saliva and serum from wild type versus the dystrophic *mdx-4cv* mouse model of dystrophinopathy. Data Brief. 21:1236-1245. doi: 10.1016/j.dib.2018.10.082.

Green DS, Colgan TJ, Thompson RC, **Carolan JC.** (2018) Exposure to microplastics reduces attachment strength and alters the haemolymph proteome of blue mussels (*Mytilus edulis*). Environ Pollut. 246:423-434.

**50.** Murphy S, Zweyer M, Mundegar RR, Swandulla D, **Ohlendieck K.** (2018) Proteomic identification of elevated saliva kallikrein levels in the *mdx-4cv* mouse model of Duchenne muscular dystrophy. *Biochem Biophys Rep.* 18:100541. <https://doi.org/10.1016/j.bbrep.2018.05.006>

**2019 (n = 14)**

Sheehan, G. and **Kavanagh K.** (2019) Proteomic Analysis of the Responses of *Candida albicans* during Infection of *Galleria mellonella* Larvae. *J. Fungi* 5(1), 7; <https://doi.org/10.3390/jof5010007>

Morrin S.T, **Owens R.A.**, LeBerre M., Gerlach J.Q., Joshi L., Bode L., Irwin J.A., and Hickey R.M. (2019) Interrogation of Milk-driven Changes to the Proteome of Intestinal Epithelial Cells by Integrated Proteomics and Glycomics. *J. Agric. Food Chem.* DOI: 10.1021/acs.jafc.8b06484

McNamara L., Dolan S.K., Walsh J.M.D., **Stephens J.C.**, Glare T.R., **Kavanagh K.** and **Griffin C.T.** (2019) Oosporein, an abundant metabolite in *Beauveria caledonica*, with a feedback induction mechanism and a role in insect virulence. *Fungal Biology*. In press. <https://doi.org/10.1016/j.funbio.2019.01.004>

Eramli N, Karahoda B, Sarikaya-Bayram Ö, Frawley D, Ulas M, Oakley CE, Oakley BR, Seiler S, **Bayram Ö.** (2019) Assembly of a heptameric STRIPAK complex is required for coordination of light-dependent multicellular fungal development with secondary metabolism in *Aspergillus nidulans*. *PLoS Genet.* 15(3):e1008053. doi: 10.1371/journal.pgen.1008053.

**55.** Waldron, R., McGowan, J., Gordon, N., McCarthy, C., Mitchell, E.B. and **Fitzpatrick, D.A.** (2019) PLoS One. Proteome and allergenome of the European house dust mite *Dermatophagoides pteronyssinus*. 14(5): e0216171. <https://doi.org/10.1371/journal.pone.0216171>

Sarikaya-Bayram, Ö., Dettmann, A., Karahoda, B., Moloney, N., Ormsby, T., McGowan, J., Cea-Sánchez, S., Miralles-Durán, A., Brancini, G., Luque, E., **Fitzpatrick, D.**, Canovas, D., Corrochano, L., **Doyle, S.**, Selker, E., Seiler, S. and **Bayram, Ö.** (2019) Control of Development, Secondary Metabolism and Light-Dependent Carotenoid Biosynthesis by the Velvet Complex of *Neurospora crassa*. *Genetics.* 212(3):691-710.

Sheehan, G., Dixon, A., **Kavanagh, K.** (2019) Utilization of *Galleria mellonella* larvae to characterize the development of *Staphylococcus aureus* infection. *Microbiology*. doi: 10.1099/mic.0.000813. [Epub ahead of print]

Delgado, J., Núñez, F., Asensio, M. and **Owens R.A.** (2019) Quantitative proteomic profiling of ochratoxin A repression in *Penicillium nordicum* by protective cultures. *Int. J. Food Microbiol.* [doi.org/10.1016/j.ijfoodmicro.2019.108243](https://doi.org/10.1016/j.ijfoodmicro.2019.108243)

Deslyper, G., Holland, C.V., Colgan T.J. & **Carolán J.C** (2019) The liver proteome in a mouse model for *Ascaris suum* resistance and susceptibility: evidence for an altered innate immune response. *Parasites & Vectors*, 12(1): 402. doi: 10.1186/s13071-019-3655-9

**60.** Ajdidi A, Sheehan G, Abu Elteen K, **Kavanagh K.** (2019) Assessment of the *in vitro* and *in vivo* activity of atorvastatin against *Candida albicans*. *J Med Microbiol.* doi: 10.1099/jmm.0.001065.

Waldron, R., McGowan J., Gordon, N., Mitchell E.B., **Fitzpatrick, D.A.** and **Doyle, S.** (2019) Characterisation of three Novel  $\beta$ -1,3 glucanases from the Medically Important House Dust Mite *Dermatophagoides pteronyssinus* (airmid). Insect Biochemistry and Molecular Biology. [doi.org/10.1016/j.ibmb.2019.103242](https://doi.org/10.1016/j.ibmb.2019.103242)

Hartley, C.J., Lillis, P.E., **Owens, R.A.**, and **Griffin, C.T.** (2019) Infective juveniles of entomopathogenic nematodes (*Steinernema* and *Heterorhabditis*) secrete ascarosides and respond to interspecific dispersal signals. J Invertebr Pathol. 107257. doi: 10.1016/j.jip.2019.107257.

Margalit, A., **Kavanagh, K.** and **Carolan J.C.** (2019) Characterization of the proteomic response of A549 cells following sequential exposure to *Aspergillus fumigatus* and *Pseudomonas aeruginosa*. J. Proteome Research. <https://doi.org/10.1021/acs.jproteome.9b00520>

Eitle, M.W., **Carolan, J.C.**, Griesser, M. and Forneck A (2019) The salivary gland proteome of root-galling grape phylloxera (*Daktulosphaira vitifoliae* Fitch) feeding on *Vitis* spp. PLoS One. 14(12):e0225881. doi: 10.1371/journal.pone.0225881

### 2020 (n = 3, to date)

**65.** Sheehan, G., Tully, L., and **Kavanagh K.A.** (2020) *Candida albicans* increases the pathogenicity of *Staphylococcus aureus* during polymicrobial infection of *Galleria mellonella* larvae. Microbiology. doi: 10.1099/mic.0.000892. [Epub ahead of print].

Frawley, D., Greco, C., Oakley, B., Alhussain, M.M., Fleming, A.B., Keller, N.P., **Bayram Ö.** (2020) The tetrameric pheromone module SteC-MkkB-MpkB-SteD regulates asexual sporulation, sclerotia formation and aflatoxin production in *Aspergillus flavus*. Cell Microbiol. doi: 10.1111/cmi.13192. [Epub ahead of print]

**67.** O'Connor, E., **Owens, R.**, **Doyle, S.**, Amini, A., Grogan, H. and **Fitzpatrick, D.A.** (2020) Proteomic investigation of interhyphal interactions between strains of *Agaricus bisporus*. Fungal Biology. Accepted. MS: FUNBIO-D-19-00250R2.

**Professor Sean DOYLE**  
**Updated 20 February 2020**