STEPHEN P. DIGGLE, PH.D.
ASSOCIATE PROFESSOR
BIOLOGICAL SCIENCES
GEORGIA INSTITUTE OF TECHNOLOGY

I. EARNED DEGREES

1997 - 2001 University of Nottingham, U.K. Ph.D. **(**Advisor: Paul Williams)
1993 - 1997 University of Salford, U.K. BSc (Hons) Biological Sciences (1st Class)
1991 - 1993 University College Salford, U.K. BTEC (Distinction)

II. EMPLOYMENT HISTORY

2022 - Full Professor, Biology, Georgia Institute of Technology
2017 - 2022 Associate Professor, Biology, Georgia Institute of Technology
2013 - 2017 Associate Professor in Sociomicrobiology, University of Nottingham
2006 - 2014 Royal Society University Research Fellow, University of Nottingham
2004 - 2006 Postdoctoral Research Fellow, University of Nottingham
2001 - 2004 Postdoctoral Research Associate, University of Nottingham
1990 - 1993 Scientific Officer, Paterson Institute for Cancer Research
1989 - 1990 Medical Laboratory Assistant, Withington Hospital, Manchester
1987 - 1989 Laboratory Assistant, Manchester Comparative Reagents, Stockport

III. HONORS AND AWARDS

2020 Cullen-Peck Scholar Award - Georgia Tech
2010 Fleming Prize from the Microbiology Society for outstanding achievement
2006 Royal Society University Research Fellowship

IV. RESEARCH, SCHOLARSHIP, AND CREATIVE ACTIVITIES

Group website http://www.thedigglelab.com
Profiles [Google Scholar], [Orcid], [Twitter]
Citations Google Scholar: **13,900+** cites; h index: **53**
Authorship *****indicates Georgia Tech research *i.e.* work done partly or wholly at Georgia Tech. **Grad students**[G], or **undergrads**[UG] supervised by Diggle. [PD] indicates postdocs supervised by Diggle. First author normally denotes lead student/ postdoc author. Last authors are senior authors.

A. PUBLISHED BOOKS, BOOK CHAPTERS, AND EDITED VOLUMES

A1. Books

No data

A2. Refereed Book Chapters (Georgia Tech Research*)

*9. Thomas, J.[PD] & Diggle, S. P. (2019) The social evolution of bacterial quorum sensing. *Encyclopedia of Microbiology*, Academic Press. 423-427.

8. Goldstone, R., **Popat, R.**[G], Fletcher, M. P., Crusz, S. A. & Diggle, S. P. (2012) Quorum sensing and social interactions in microbial biofilms. In *Microbial Biofilms: current research, methods and applications* (ed. Gillian Lewis). Horizon Scientific Press.

7. Diggle, S. P. & Williams, P. (2012) Quorum sensing. In *Brenners Encyclopedia of Genetics* (ed. Maloy & Hughes).

6. Fletcher, M. P., Heeb, S., Chhabra, S. R., Diggle, S. P., Williams, P. & Camara, M. (2010) 2-alkyl-4-quinolone signalling in *Pseudomonas aeruginosa.* In *Pseudomonas vol VI: Molecular Microbiology, Infection & Biodiversity* (ed. Alain Filloux & Juan Ramos). Springer Press.

5. Diggle, S. P., West, S. A., Gardner, A. & Griffin, A. S. (2008) Communication in bacteria. In *Sociobiology of communication: An interdisciplinary perspective* (ed. David Hughes & Patrizia D'Ettorre): pp. 11-31. Oxford University Press.

4. Diggle, S. P., Heeb, S., Dubern, J. F., Fletcher, M. P., Crusz, S. A., Camara, M. & Williams, P. (2008) Quorum sensing in *Pseudomonas.* In *Pseudomonas: Model organism, pathogen, cell factory* (ed. Bernd Rehm): pp. 167-194. Wiley-VCH, Weinheim, Germany.

3. Holden, M. T. G., Diggle, S. P. & Williams, P. (2007) Quorum sensing. In *Encyclopedia of Life Sciences.* John Wiley & Sons.

2. Terrazas, G., Krasnogor, N., Georghe, M., Bernardini, F., Diggle, S. P. & Camara, M. (2005) An environment aware P-system model of quorum sensing. In: *New Computational Paradigms*. Book series: *Lecture Notes in Computer Science.* 3526: 479-485. Springer Berlin/Heidelberg.

1. Pritchard, D., Hooi, D., Watson, E., Chow, S., Telford, G., Bycroft, B., Chhabra, S. R., Harty, C., Camara, M., Diggle, S. P., & Williams, P. (2003) Bacterial quorum sensing signalling molecules as immune modulators. In *Bacterial evasion of host immune responses* (ed. B. Henderson & P. Oyston): pp. 201-221. Cambridge University Press.

A3. Edited Volumes
No data

B. Refereed Publications and Submitted Articles

B1. Published and Accepted Journal Articles (Georgia Tech Research*)

*81. Azimi, S.[PD], Thomas, J.[PD], **Cleland, S.[UG]**, Curtis, J. E., Goldberg, J. B. & Diggle, S. P. (2021) O-specific antigen-dependent surface hydrophobicity determines aggregate assembly type in *Pseudomonas aeruginosa*. mBio. 12: e00860-21.

*80. **Mei, M.[G]**, Thomas, J.[PD] & Diggle, S. P. (2021) Heterogenous susceptibility to R-pyocins in populations of *Pseudomonas aeruginosa* sourced from cystic fibrosis lungs. mBio. 12: e00458-21.

*79. **Vanderwoude, J.[G]**, Fleming, D., Azimi, S.[PD], Trivedi, U., Rumbaugh, K. P. & Diggle, S. P. (2020) The evolution of virulence in *Pseudomonas aeruginosa* during chronic wound infection. Proc. Soc. 287: 20202272.

*78. Azimi, S.[PD], Klementiev, A. D., Whiteley, M. & Diggle, S. P. (2020) Bacterial quorum sensing during infection. Annual Review of Microbiology. 74: 201-219.

*77. **Gurney, J.[G]**, Azimi, S.[PD], Brown, S. P. & Diggle, S. P. (2020) Combinatorial quorum sensing in *Pseudomonas aeruginosa* allows for novel cheating strategies. Microbiology. 166: 777-784.

*76. Azimi, S.[PD], Roberts, A. E. L.[PD], Peng, S., Weitz, J. S., McNally, A., Brown, S. P. & Diggle, S. P. (2020) Allelic polymorphism shapes community function in evolving *Pseudomonas aeruginosa* populations. ISME J. 14: 1929-1942.

*75. Diggle, S. P. & Whiteley, M. (2020) *Pseudomonas aeruginosa:* opportunistic pathogen and lab rat. Microbiology. 166: 30-33.

*74. Chiba, A., Bawaneh, A., Velazquez, C., Clear, K. Y., Wilson, A. S., Howard-McNatt, M., Levine, E. A., Levi-Polyachenko, N., Yates-Alston, S. A., Diggle, S. P., Soto-Pantoja, D. R. & Cook, K. L. (2020). Neoadjuvant chemotherapy shifts breast tumor microbiota populations to regulate drug responsiveness and the development of metastasis. Molecular Cancer Research. 18: 130-139.

*73. **Oluyombo, O.**[G], Penfold, C.N. & Diggle, S. P. (2019) Competition in biofilms between cystic fibrosis isolates of *Pseudomonas aeruginosa* is influenced by R-pyocins. mBio. 10: e01828-18.

*72. Fletcher M. P., Diggle S. P., Cámara M. & Williams P. (2018) Detection of 2-alkyl-4-quinolones using biosensors. Methods in Molecular Biology. 1673: 25-34.

*71. **Garge, S.**[G], Azimi, S.[PD] & Diggle, S. P. (2018) A simple mung bean infection model for studying the virulence of *Pseudomonas aeruginosa*. Microbiology. 164: 764-768.

*70. Whiteley, M., Diggle, S. P. & Greenberg, E. P. (2017) Progress in and promise of bacterial quorum sensing research. Nature. 551: 313-320.

69. Harrison, F.[PD], McNally, A., **Da Silva, A.**[G], Heeb, S. & Diggle, S. P. (2017) Optimised chronic infection models demonstrate that siderophore 'cheating' in *Pseudomonas aeruginosa* is context specific. ISME J. 11: 2942-2509.

68. Davies, S. K., Fearn, S., Allsopp, L. P., Harrison, F.[PD], Ware, E., Diggle, S. P., Filloux, A., McPhail, D. S. & Bundy, J. G. (2017) Visualizing Antimicrobials in Bacterial Biofilms: Three-Dimensional Biochemical Imaging Using TOF-SIMS. mSphere. 4: e00211-17.

67. Irie, Y.[PD], Roberts, A. E. L.[PD], Kragh, K. N., Gordon, V. D., Hutchison, J., Allen, R. J., Melaugh, G., Bjarnsholt, T., West, S. A. & Diggle, S. P. (2017) The *Pseudomonas aeruginosa* PSL polysaccharide is a social but non-cheatable trait in biofilms. mBio. 8: e00374-17

66. **Pollitt, E. J. G.**[G] & Diggle, S. P. (2017) Defining motility in the Staphylococci. Cellular and Molecular Life Sciences. 74: 2943-2958.

65. **Mund, A.**[G], Diggle, S. P. & Harrison, F.[PD] (2017) The fitness of *Pseudomonas aeruginosa* quorum sensing signal cheats is influenced by the diffusivity of the environment. mBio. 8: e00353-17.

64. **Popat, R.**[G], Harrison, F.[PD], **Da Silva, A.**[G], **Easton, S.**[G], McNally, L., Williams, P. & Diggle, S. P. (2017) Environmental modification via a quorum sensing molecule influences the social landscape of siderophore production. Proc Soc. 284: 20170200.

63. Moreau, P., Diggle, S. P. & Friman, V. P. (2017) Bacterial cell-to-cell signalling promotes the evolution of resistance to parasitic bacteriophages. Ecology & Evolution. 7: 1936-1941.

62. Harrison, F.[PD] & Diggle, S. P. (2016) An *ex vivo* lung model to study bronchioles infected

with *Pseudomonas aeruginosa* biofilms. Microbiology. 162: 1755-1760.

61. Ruparell, A., Dubern, J. F., Ortori, C. A., Harrison, F.[PD], Halliday, N. M., Emtage, A., Laughton, C., Diggle, S. P., Williams, P., Barrett, D. A. & Hardie, K. R. (2016) The fitness burden imposed by synthesising quorum sensing signals. Scientific Reports. 6: 33101.

60. Kragh, K. N., Hutchison, J. B., Melaugh, G., Rodesney, C., Roberts, A. E. L.[PD], Irie, Y.[PD], Jensen, P. O., Diggle, S. P., Allen, R. J., Gordon, V. & Bjarnsholt, T. (2016) Role of multicellular aggregates in biofilm formation. mBio. 7: e00237-16.

59. Melaugh,G., Hutchison, J., Kragh, K., Irie, Y.[PD], Roberts, A.[PD], Bjarnsholt, T., Diggle, S. P., Gordon, V. & Allen, R. (2016) Shaping the growth behaviour of biofilms initiated from bacterial aggregates. PLOS ONE. 11: e0149683.

58. **Pollitt, E. J. G.[G]**, Crusz, S. A. & Diggle, S. P. (2015) *Staphylococcus aureus* forms spreading dendrites that have characteristics of active motility. Scientific Reports. 5: 17698.

57. Roberts, A. E. L.[PD], Kragh, K., Bjarnsholt, B. & Diggle, S. P. (2015) The limitations of *in vitro* experimentation in understanding biofilms and chronic infection. Journal of Molecular Biology. 427: 3646-3661.

56. **Popat, R.[G]**, **Pollitt, E. J. G.[G]**, Griffin, A. S., Williams, P., Brown, S. P., West, S. A. & Diggle, S. P. (2015) Conflict of interest and signal interference lead to the breakdown of honest signalling. Evolution. 69: 2371-2383.

55. Harrison, F.[PD], Roberts, A. E. L.[PD], Gabrilska, R., Rumbaugh, K. P., Lee, C. & Diggle, S. P. (2015) A 1000 year old antimicrobial remedy with anti-Staphylococcal activity. mBio. 6:e01129-15.

54. **Darch, S. E.[G]**, McNally, A., Harrison, F.[PD], Corander, J., Barr, H. L., Paszkiewicz, K., Holden, S., Fogarty, A., Crusz, S. A. & Diggle, S. P. (2015) Recombination is a key driver of genomic and phenotypic diversity in a *Pseudomonas aeruginosa* population during cystic fibrosis infection. Scientific Reports. 5: 7649.

53. Laabei, M., Jamieson, W. D., Diggle, S. P. & Jenkins, A. T. A. (2014) A new assay for rhamnolipid detection-important virulence factors of *Pseudomonas aeruginosa*. Applied Microbiology & Biotechnology. 98: 7199-7209.

52. Harrison, F.[PD], **Muruli, A.[G]**, Higgins, S. & Diggle, S. P. (2014) Development of an *ex vivo* porcine lung model for studying growth, virulence and signalling in *Pseudomonas aeruginosa* populations. Infection & Immunity. 82: 3312-3323.

51. Scott-Phillips, T., **Gurney, J.[G]**, Ivens, A. Diggle, S. P. & **Popat, R.[G]** (2014) Combinatorial communication in bacteria: Implications for the origins of linguistic generativity. PLOS ONE. 9: e95929.

50. Cornforth, D. M., **Popat, R.[G]**, McNally, L., **Gurney, J.[G]**, Scott-Phillips, T., Diggle, S. P. & Brown, S. P. (2014) Combinatorial quorum sensing allows bacteria to resolve their social and physical environment. Proceedings of the National Academy of Sciences USA. 111: 4280-4284.

49. Allen, R. C., **Popat, R.**[G], Diggle, S. P. & Brown, S. P. (2014) Targeting virulence: Can we make evolution-proof drugs? Nature Reviews Microbiology. 12: 300-308.

48. Ghoul, M., West, S. A., Diggle, S. P. & Griffin, A. S. (2014) An experimental test of whether cheating is context-dependent. Journal of Evolutionary Biology. 27: 551-556.

47. **Pollitt, E. J. G.**[G], West, S. A., Crusz, S. A., Burton-Chellew, M. N. & Diggle, S. P. (2014) Cooperation, quorum sensing and the evolution of virulence in *Staphylococcus aureus*. Infection & Immunity. 82: 1045-1051.

46. Jiricny, N., Molin, S., Foster, K., Diggle, S. P., Scanlan, P. D., Ghoul, M., Santorelli, L., **Popat, R.**[G], West, S. A. & Griffin, A. S. (2014) Loss of social behaviours in populations of *Pseudomonas aeruginosa* infecting lungs of patients with cystic fibrosis. PLOS ONE. 9: e83124.

45. Schuster, M., Sexton, D. J., Diggle, S. P. & Greenberg, E. P. (2013) Acyl-homoserine lactone quorum sensing: From evolution to application. Annual Review of Microbiology. 67: 43-63.

44. Friman, V.P., Diggle, S. P. & Buckling, A. (2013) Protist predation can favour cooperation within bacterial species. Biology Letters. 9: 20130548.

43. West, S. A., Winzer, K., Gardner, A. & Diggle, S. P. (2012) Quorum sensing and the confusion about diffusion. Trends in Microbiology. 20: 586-594.

42. **Popat, R.**[G], Crusz, S. A., Messina, M., Williams, P., West, S. A. & Diggle, S. P. (2012) Quorum sensing and cheating in bacterial biofilms. Proceedings of the Royal Society B. 279: 4765-4771.

41. Crusz. S. A., Popat, R.[G], Rybtke, M. T., Camara, M., Givskov, M., Nielsen, T. T., Diggle, S. P. & Williams, P. (2012) Bursting the bubble on bacterial biofilms: a flow cell methodology. Biofouling. 28: 835-842.

40. Youle, M., Rohwer, F., Whiteley, M., Steel, B. C., Delalez, N. J., Nord, A. L., Berry, R. M., Armitage, J. P., Kamoun, S., Hogenhout, S., Diggle, S. P., **Gurney, J.**[G], **Pollitt, E. J. G.**[G], Boetius, A. and Cary, S. C. (2012) The pathogen relay. In Microbial Olympics, Nature Reviews Microbiology. 10: 583-588.

39. Rumbaugh, K. P., Trivedi, U., Watters, C., Burton-Chellew, M., Diggle, S. P. & West, S. A. (2012) Kin selection, quorum sensing and virulence in pathogenic bacteria. Proceedings of the Royal Society B. 279: 3584-2588.

38. **Darch, S. E.**[G], West, S. A., Winzer, K. & Diggle, S. P. (2012) Density-dependent fitness benefits in quorum sensing bacterial populations. Proceedings of the National Academy of Sciences USA. 109: 8259-8263.

37. Stacy, A. R., Diggle, S. P. & Whiteley, M. (2012) Rules of engagement: defining bacterial communication. Current Opinion in Microbiology. 15: 155-161.

36. Johansson, E. M. V., Kadam, R. U., Rispoli, G., Crusz, S. A., Bartels, K., Diggle, S. P., Cámara, M.,

Williams, P., Jaeger, K. E., Darbre, T. & Reymond, J. L. (2011) Inhibition of *Pseudomonas aeruginosa* biofilms with a glycopeptide dendrimer containing D-amino acids. Medicinal Chemistry Communications. 5: 418-420.

35. Wilder, C. N., Diggle, S. P. & Schuster, M. (2011) Cooperation and cheating in *Pseudomonas aeruginosa*: the roles of the *las, rhl* and *pqs* quorum-sensing systems. ISME J. 5: 1332-1343.

34. Liu, X., Jia, J., **Popat, R.**[G], Ortori, C. A., Li, J., Diggle, S. P., Cámara, M. & Gao, K. (2011) Characterisation of two quorum sensing systems in the endophytic *Serratia plymuthica* strain G3: differential control of motility and biofilm formation according to life-style. BMC Microbiology. 11: 26.

33. Heeb, S., Fletcher, M. P., Chhabra, S. R., Diggle, S. P., Williams, P. & Camara, M. (2011) Quinolones: from antibiotics to autoinducers. FEMS Microbiology Reviews. 35: 247-274.

32. Diggle, S. P., Fletcher, M. P., Camara, M. & Williams, P. (2011) Detection of 2-alkyl-4-quinolones using biosensors. Methods in Molecular Biology. 692: 21-30.

31. Diggle, S. P. (2010) Microbial communication and virulence: lessons from evolutionary theory. Microbiology. 156: 3503-3512.

30. Jiricny, N., Diggle, S. P., West, S. A., Evans, B. A., Ballantyne, G., Ross-Gillespie, A. & Griffin, A. S. (2010) Fitness correlates with the extent of cheating in a bacterium. Journal of Evolutionary Biology. 23: 738-747.

29. Brown, S. P., West, S. A., Diggle, S. P., Griffin, A. S. (2009) Social evolution in microorganisms and a trojan horse approach to medical intervention strategies. Philosophical Transactions of the Royal Society B. 364: 3157-3168.

28. Zaborin, A., Long, J., Holbrook, C. Gerdes, S., Diggle, S. P., Rhigetti, K., Lepine, F., Wilke, A., Morozova, I., Liu, D. C., Zaborina, O. & Alverdy, J. C. (2009) Red death in *Caenorhabditis elegans* caused by *Pseudomonas aeruginosa* PAO1. Proceedings of the National Academy of Sciences USA. 106: 6327-6332.

27. Skindersoe, M. E., Zeuthen, L. H., Brix, S., Fink, L. N., Lazenby, J., Whittall, C., Williams, P., Diggle, S. P., Froekiaer, H., Cooley, M. & Givskov, M. (2009) *Pseudomonas aeruginosa* quorum sensing signal molecules interfere with dendritic cell induced T cell proliferation. FEMS Immunology and Medical Microbiology. 55: 335-345.

26. Rumbaugh, K. P., Diggle, S. P., Watters, C., Ross-Gillespie, A., Griffin, A. S., & West, S. A. (2009) Quorum sensing and the social evolution of bacterial virulence. Current Biology. 19: 341-345.

25. Johansson, E., Crusz, S. A., Kolomiets, E., Buts, L., Kadam, R. U., Cacciarini, M., Bartels, K. M., Diggle, S. P., Camara, M., Williams, P., Loris, R., Nativi, C., Rosenau, F., Jaeger, K. E., Dabre, T. & Reymond, J. L. (2008) Inhibition and dispersion of *Pseudomonas aeruginosa* biofilms by glycopeptide dendrimers targeting the fucose-specific lectin LecB. Chemistry and Biology. 15: 1249-1257.

24. Popat, R.[G], Crusz, S. A. & Diggle, S. P. (2008) The social behaviours of bacterial pathogens. British

Medical Bulletin. 87: 63-75.

23. Dubern, J. F. & Diggle, S. P. (2008) Quorum sensing signaling by 2-alkyl-4-quinolones in *Pseudomonas aeruginosa* and other bacterial species. Molecular Biosystems. 4: 882-888.

22. von Bodman, S. B., Willey, J. M. & Diggle, S. P. (2008) Cell-to-cell communication in bacteria: united we stand. Journal of Bacteriology. 190: 4377-4391. (Review on the 3rd cell-to-cell communication in bacteria meeting held in Austin Texas in 2007).

21. Romero, M., Diggle, S. P., Heeb, S., Camara, M. & Otero, A. (2008) Quorum quenching activity in Anabaena sp. PCC 7120: identification of AiiC, a novel AHL-acylase. FEMS Microbiology Letters. 280: 73-80.

20. Diggle, S. P., Griffin, A. S., Campbell, G. S. & West S. A. (2007) Cooperation & conflict in quorum sensing bacterial populations. Nature. 450: 411-414.

19. Diggle, S. P., Crusz, S. A. & Camara, M. (2007) Quorum sensing. Current Biology. 17: R907-R910.

18. Fletcher, M. P., Diggle, S. P., Crusz, S. A., Chhabra, S. R., Camara, M. & Williams, P. (2007) A dual biosensor for 2-alkyl-4-quinolone quorum sensing signal molecules. Environmental Microbiology. 9: 2683-2693.

17. West, S. A., Diggle, S. P., Buckling, A. Gardner, A. & Griffin, A. S. (2007) The social lives of microbes. Annual Review of Ecology, Evolution and Systematics. 38: 53-77.

16. Diggle, S. P., Gardner, A., West, S. A. & Griffin, A. S. (2007) Evolutionary theory of bacterial quorum sensing: When is a signal not a signal? Philosophical Transactions of the Royal Society B. 362: 1241-1249.

15. Fletcher, M. P., Diggle, S. P., Camara, M. & Williams, P. (2007) Biosensor-based assays for PQS, HHQ and related 2-alkyl-4-quinolone quorum sensing signal molecules. Nature Protocols. 2: 1254-1262.

14. Diggle, S. P., Matthijs, S., Wright, V. J., Fletcher, M. P., Chhabra, S. R., Lamont, I. L., Kong, X., Hider, R. C., Cornelis, P., Camara, M. & Williams, P. (2007) The *Pseudomonas aeruginosa* 4-quinolone signal molecules HHQ and PQS play multi-functional roles in quorum sensing and iron entrapment. Chemistry & Biology. 14: 87-96.

13. Lumjiaktase, P., Diggle, S. P., Loprasert, S., Tungpradabkul, S., Daykin, M., Camara, M., Williams, P. & Kunakorn, M. (2006) Quorum sensing regulates *dpsA* and the oxidative stress response in *Burkholderia pseudomallei*. Microbiology. 152: 3651-3659.

12. Diggle, S. P., Lumjiaktase, P., Dipilato, F., Winzer, K., Kunakorn, M., Barrett, D., Chhabra, S. R., Camara, M. & Williams, P. (2006) Functional genetic analysis reveals a 2-alkyl-4-quinolone signaling system in the human pathogen *Burkholderia pseudomallei* and related bacteria. Chemistry & Biology. 13: 701-710.

11. West, S. A., Griffin, A. S., Gardner, A & Diggle, S. P. (2006) Social evolution theory for

microorganisms. Nature Reviews Microbiology. 4: 597-607.

10. Diggle, S. P., Stacey, R. E., Dodd, C., Camara, M., Williams, P. & Winzer. K. (2006) The galactophilic lectin, LecA, contributes to biofilm development in *Pseudomonas aeruginosa*. Environmental Microbiology. 8: 1095-1104.

9. Sio, C. F., Otten, L. G., Cool, R. H., Diggle, S. P., Braun, P. G., Bos, R., Daykin, M., Williams, P. & Quax, W. (2006) Quorum quenching by an N-acyl homoserine lactone acylase of *Pseudomonas aeruginosa* PAO1. Infection & Immunity. 74: 1673-1682.

8. Diggle, S. P., Cornelis, P., Williams, P. & Camara, M. (2006) 4-Quinolone signalling in *Pseudomonas aeruginosa*: Old molecules, new perspectives. International Journal of Medical Microbiology. 296: 83-91.

7. Krasnogor, N., Gheorghe, M., Terrazas, G., Diggle, S. P., Williams, P. & Camara, M. (2005) An appealing computational mechanism drawn from bacterial quorum sensing. Bulletin of the European Association for Theoretical Computer Science. 83: 135-148.

6. Aendekerk, S., Diggle, S. P., Song, Z., Hoiby, N., Cornelis, P., Williams, P. and Camara, M. (2005) The MexGHI-OpmD multidrug efflux pump controls fitness, antibiotic susceptibility and virulence in *Pseudomonas aeruginosa* via 4-quinolone-dependent cell-to-cell communication. Microbiology. 151: 1113-1125.

5. Westfall, L. W., Luna, A. M., Francisco, M. S., Diggle, S. P., Worrall, K. E., Williams, P., Camara, M. and Hamood, A. N. (2004) The *Pseudomonas aeruginosa* global regulator MvaT specifically binds to the *ptxS* upstream region and enhances *ptxS* expression. Microbiology. 150: 3797-3806.

4. Vallet, I., Diggle, S. P., Stacey, R. E., Camara, M., Ventre, I., Lory, S., Lazdunski, A., Williams, P. & Filloux, A. (2004) Biofilm formation in *Pseudomonas aeruginosa*: Fimbrial cup gene clusters are controlled by the transcriptional regulator MvaT. Journal of Bacteriology. 186: 2880-2890.

3. Diggle, S. P., Winzer, K., Chhabra, S. R., Worrall, K. E., Camara, M. & Williams, P. (2003) The *Pseudomonas aeruginosa* quinolone signal molecule overcomes the cell density-dependency of the quorum sensing hierarchy, regulates *rhl*-dependent genes at the onset of stationary phase and can be produced in the absence of LasR. Molecular Microbiology. 50: 29-43.

2. Diggle, S. P., Winzer, K., Lazdunski, A., Williams, P. & Camara, M. (2002) Advancing the quorum in *Pseudomonas aeruginosa*: MvaT and the regulation of N-acylhomoserine lactone production and virulence gene expression. Journal of Bacteriology. 184: 2576-2586.

1. Winzer, K., Falconer, C., Garber, N. C., Diggle, S. P., Camara, M. & Williams, P. (2000) The *Pseudomonas aeruginosa* lectins PA-IL and PA-IIL are controlled by quorum sensing and by RpoS. Journal of Bacteriology. 182: 6401-6411.

B2. Conference Presentations with Proceedings
No data

B3. Other Referred Material
No data

B4. Submitted Journal Articles

***O'Connor, K.**[G], Zhao, C. Y. & Diggle, S. P. (2021) Frequency of quorum sensing mutations in *Pseudomonas aeruginosa* strains isolated from different environments. bioRxiv pre-print. In revision Applied & Environmental Microbiology.

C. Other Publications and Creative Products

C1. Dissertations

Diggle S.P. (2001) Quorum sensing and the regulation of virulence gene expression in *Pseudomonas aeruginosa.* PhD dissertation, University of Nottingham. Supervisor Paul Williams

D. Presentations

D1. Invited Presentations at Conferences and Workshops (While based at GT*)

*32. ASM Microbe Meeting, Washington DC, USA (2022)
*31. ASM Rocky Mountain Branch Meeting, USA (2022)
*30. ASM Rio Grande Branch Meeting, USA (2022)
*29. Microbiology Society Annual General Meeting, Belfast, Ireland (2022)
*28. ASM Intermountain Branch Meeting, Weber State University, USA (2021)
*27. ASM NCB Branch Meeting, USA (2021)
*26. ASM Hawaii Branch Meeting, USA (2021)
*25. ASM EYN Branch Meeting, New York State Department of Health, Albany, USA (2021)
*24. Social Biofilms, Online worldwide Biofilm conference (2020)
*23. Emergence in Communication and Learning Symposium, University of Michigan, USA (2020)
*22. GRC on Microbial Adhesion, Newport, USA (2019)
*21. ASM Microbe Meeting, San Francisco, USA (2019)
*20. ASM meeting on Biofilms, Washington, USA (2018)
19. Keynote speaker at VBC PhD student symposium, Vienna, Austria (2015)
18. 15th Pseudomonas meeting, Washington DC, USA (2015)
17. Eurobiofilms, Brno, Czech Republic (2015)
16. Korean Society of Microbiology, Busan, Korea (2015)
15. Keynote speaker at the North West Microbiology Day, Salford, UK (2014)
14. SGM Annual General Meeting, Liverpool, UK (2014)
13. 14th Pseudomonas meeting, Lausanne, Switzerland (2013)
12. ASM Annual General Meeting, Denver, USA (2013)
11. Forum on Microbial Threats, Institute of Medicine, Washington DC, USA (2012)
10. MiCom 2011, International Student Conference on Microbial Communication, Germany (2011)
9. Gordon Conference on Microbial Population Biology, New England, USA (2011)
8. Danish Biochemistry and Molecular Biology Society, Copenhagen, Denmark (2010)
7. Cellular decision-making conference, Arlington, VA, USA (2010)
6. Fleming Prize Lecture (Society for General Microbiology), Edinburgh, UK (2010)
5. Cell-cell communication in bacteria (3rd International Conference), Austin, Texas, USA (2007)
4. Department of Pathology, Mahidol University, Bangkok, Thailand (2006)
3. UK Melioidosis meeting, Health Protection Agency, Plymouth, UK (2005)
2. Cell-cell communication in bacteria (2nd International Conference), Banff, Canada (2004)
1. UK Melioidosis meeting, Imperial College, London, UK (2004)

D2. Invited Presentations at Universities and Institutes (While based at GT*)

*30. University of Colorado, USA (2022)
*29. Texas Tech University, USA (2021)
*28. Montana State University, USA (2021)
*27. University of Arizona, USA (2019)
*26. Penn State University, USA (2019)
*25. University of Washington, USA (2018)
24. University of Dundee, UK (2016)
23. Society of Biology Special Lecture, Nottingham, UK (2016)
22. University of Austin in Texas, Austin, USA (2016)
21. Georgia Institute of Technology, Atlanta, USA (2016)
20. University of Glasgow, UK (2016)
19. University of Newcastle, UK (2014)
18. University of Aberdeen, UK (2013)
17. University of Birmingham, UK (2013)
16. University of Sheffield, UK (2011)
15. University of Toulouse, France (2011)
14. University of Surrey, UK (2011)
13. University of Cardiff, UK (2010)
12. University of Cambridge, UK (2010)
11. Fettes College, Edinburgh, UK (2009)
10. ICGEB, Trieste, Italy (2009)
9. Oakham School, Rutland, UK (2008)
8. University of Birmingham, UK (2008)
7. Medizinische Hochschule, Hanover, Germany (2008)
6 University of Exeter in Cornwall, Centre for Ecology and Conservation, UK(2007)
5. University of Salford, Manchester, UK (2006)
4. University of Konstanz, Germany (2006)
3. 1st Biotutors convention, Oakham, UK (2005)
2. Oakham School, Rutland, UK (2004)
1. University of Brussels, Brussels, Belgium (2003)

E. Grants and Contracts (since moving to georgia tech in april 2017)

E1. As Principle Investigator (Total: $3,383,066)

Currently Funded

Title of Project:	Understanding *in vivo* antibiotic resistance in diverse *Pseudomonas aeruginosa* populations
Agency/Company:	NIH NIAID R01AI153116
Total Dollar Amount:	$2,254,202
Role:	PI
Collaborators:	Tim Read (co-PI)
Period of Contract:	04/09/2021 – 03/31/2026
Candidate's Share:	$1,319,374
Summary:	The major goal of this project is to understand how evolutionary trade-offs and social interactions between *Pseudomonas aeruginosa* isolates affect heterogeneity and influence antimicrobial resistance.

Title of Project:	Using R-pyocins to target Pseudomonas aeruginosa in cystic fibrosis
Agency/Company:	Cystic Fibrosis Foundation DIGGLE20G0
Total Dollar Amount:	$275,449
Role:	PI

Collaborators:	None
Period of Contract:	01/01/2021 – 01/01/2023
Candidate's Share:	$275,449
Summary:	The major goal of this project is to understand how R-pyocins can be used to treat *Pseudomonas aeruginosa* infections in CF.

Title of Project:	Understanding *in vivo* antibiotic resistance in diverse *Pseudomonas aeruginosa* populations
Agency/Company:	NIH NIAID R56AI153116
Total Dollar Amount:	$508,065
Role:	PI
Collaborators:	Tim Read (co-PI)
Period of Contract:	08/20/2020 – 07/31/2021
Candidate's Share:	$315,995
Summary:	The major goal of this project is to understand how evolutionary trade-offs and social interactions between *Pseudomonas aeruginosa* isolates affect heterogeneity and influence antimicrobial resistance.

Previously Funded

Title of Project:	*Pseudomonas aeruginosa* population dynamics in the cystic fibrosis lung
Agency/Company:	Cystic Fibrosis Foundation DIGGLE18I0
Total Dollar Amount:	$108,000
Role:	PI
Collaborators:	None
Period of Contract:	11/01/18 – 10/31/20
Candidate's Share:	$108,000
Summary:	The major goal of this project was to understand how diversity in *Pseudomonas aeruginosa* populations impacts on antibiotic resistance and virulence in the cystic fibrosis lung. And also to setup a biobank of *P. aeruginosa* populations from CF sputum.

E2. As Co-Principal Investigator (Total: $553,638)

Currently Funded

Title of Project:	Development of small chemical-molecule inhibitors of quorum sensing regulator: a novel treatment for antibiotic resistant bacterial infections
Agency/Company:	NIH R21
Total Dollar Amount:	$414,770
Role:	Co-PI
Collaborators:	Gopal Jadhav (PI)
Period of Contract:	08/20/2020 – 07/31/2022
Candidate's Share:	$28,637
Summary:	The major goal of this project is to use compounds from the Jadhav lab in order to test their antimicrobial properties against laboratory and clinical strains of *Pseudomonas aeruginosa.*

Title of Project:	Material consequences of distinct interbacterial modes of aggression in bacterial biofilms
Agency/Company:	National Science Foundation BMAT
Total Dollar Amount:	$525,000
Role:	Co-PI
Collaborators:	Peter Yunker (PI); Brian Hammer (Co-PI)

Period of Contract:	06/15/2020 – 05/13/2023
Candidate's Share:	$173,250
Summary:	The major goal of this proposal is to understand the impact of local and non-local bacterial killing on biofilm structure and material properties.

Previously funded

Title of Project:	Bacterial regulatory evolution during adaptation to chronic infections
Agency/Company:	NIH R56
Total Dollar Amount:	$501,147
Role:	Co-PI
Collaborators:	Sam Brown (PI); Marvin Whiteley (Co-PI)
Period of Contract:	09/01/18 – 08/31/20 (includes 1 year NCE)
Candidate's Share:	$28,215
Summary:	The major goal of this project was to understand the environmental drivers of and metabolic constraints on *Pseudomonas aeruginosa* adaptive evolution in the cystic fibrosis lung environment.

E3. As Senior Personnel or Contributor
No data

E4. Pending Proposals

Title of Project:	Spatial mechanisms for establishing and maintaining diverse microbiome communities
Agency/Company:	NSF
Total Dollar Amount:	$1,675,391
Role:	Co-PI
Collaborators:	Brian Hammer (PI); Peter Yunker (Co-PI)
Period of Contract:	09/01/21 – 08/31/25
Candidate's Share:	TBD
Summary:	The major goal of this proposal is to understand the impact of local and non-local bacterial killing on biofilm structure and material properties.

Title of Project:	Evaluation of *Pseudomonas aeruginosa* biofilm formation on nanotextured stainless steel
Agency/Company:	Georgia Tech
Total Dollar Amount:	$100,000
Role:	PI
Collaborators:	Julie Champion (PI)
Period of Contract:	08/01/21 – 07/31/23
Candidate's Share:	$50,000
Summary:	The major goal of this proposal is to understand how *Pseudomonas aeruginosa* clinical isolates form biofilms on nanotexured stainless steel.

E5. Proposals Submitted but Not Funded (Last Two Years)

Title of Project:	Evaluation of *Pseudomonas aeruginosa* biofilm formation on nanotextured stainless steel
Agency/Company:	Georgia Tech
Total Dollar Amount:	$100,000
Role:	PI
Collaborators:	Julie Champion (PI)

Title of Project: Mechanisms of R-pyocin release and reception in Pseudomonas aeruginosa
Agency/Company: NIH
Total Dollar Amount: $415,775
Role: PI

Title of Project: Social dynamics in quorum sensing Pseudomonas aeruginosa populations
Agency/Company: NIH
Total Dollar Amount: $1,886,497
Role: PI

F. Other Scholarly and Creative accomplishments
No data

G. Societal and Policy Impacts
No data

H. Other Professional Activities
2021 - Present American Society for Microbiology Distinguished Lecturer
2021 - Present Senior Editor for Microbiology
2018 - 2021 Editor for Microbiology

V. Education

A. Courses Taught

Semester	Course	Name	Number of students
Fall, 2021	BIOS2300	General Ecology	110
Fall, 2021	BIOS4340	Medical Microbiology	24
Spring, 2021	BIOL4460	Comm. Biol. Res.	21
Fall, 2020	BIOL8803	Front. Mol. Cell. Biol.	9
Fall, 2020	BIOS4340	Medical Microbiology	35
Spring, 2020	BIOL8801	Bacterial Pathogenesis	13
Fall, 2019	BIOL4340	Medical Microbiology	32
Fall, 2019	BIOL2335	General Ecology	100
Spring, 2019	BIOL4660	Comm. Biol. Res.	12
Fall, 2018	BIOL4340	Medical Microbiology	30
Fall, 2018	BIOL2335	General Ecology	90
Fall, 2017	BIOL2335	General Ecology	103

B. Individual Student Guidance

B1. Ph.D students (Georgia Tech: 5 total)
5. Robert Edmiston (Joint QBioS with Jennifer Curtis, Physics. Started Aug 2020)
4. Davina Campbell (Started GT PhD in Aug 2020). Based at the CDC
3. Jelly Vanderwoude (Started GT PhD in Jan 2019)
2. Kathleen O' Connor (Started GT PhD in Sept 2018)
1. Madeline Mei (Started GT PhD in Sept 2017)

Prior to Georgia Tech
2014 – 2018 Dr. Ana Da Silva (Nottingham PhD, now postdoc at Nottingham)
2013 – 2017 Dr. Alex Day (Nottingham PhD)
2012 – 2016 Dr. Oluyombo Bukola (Nottingham PhD, now NHS England)
2010 – 2014 Dr. James Gurney (Nottingham PhD, now postdoc at Georgia Tech)
2009 – 2013 Dr. Eric Pollitt (Nottingham PhD, now postdoc at Uni of Sheffield)
2009 – 2013 Dr. Sophie Darch (Nottingham PhD, now PI at Florida University, Tampa)

2007 – 2011 Dr. Roman Popat (Nottingham PhD, now running his own company)

B2. M.S. Students
No data from GT but prior to Georgia Tech, I mentored 10 MS students (2006-2017)

B3. Undergraduate Students (GT only: 5 total)

Isabela Pavkov	GT Biology Undergraduate student (2018-2021)
Hannah Goodsite	GT Biology Undergraduate student (2019-2020)
Sara Cleland	GT Biology Undergraduate student (2018-2020)
Ricardo Martinez	GT Biology Undergraduate student (2018)
Katherine Twibell	GT Biology Undergraduate student (2018)

B4. Service on Thesis or Dissertation Committees (Students while at GT*)
*19. Marian Dominguez (student of Joshua Weitz), Georgia Tech (2020)
*18. Ashley Alexander (student of Joanna Goldberg, Tim Read), Emory Uni. (2020)
*17. Rogelio Rodriguez Gonzalez (student of Joshua Weitz), Georgia Tech (2020)
*16. Alexander Klementiev (student of Marvin Whiteley), Georgia Tech (2020)
*15. Mengshi Zhang (student of Marvin Whiteley), Georgia Tech (2018)
*14. Tim O' Sullivan (student of Sam Brown), Georgia Tech (2018)
*13. Urvish Trivedi (student of Soren Sorenson), Uni of Copenhagen, Denmark (2018)
*12. Jennifer Rattrey (student of Sam Brown), Georgia Tech, USA (2017)
11. Nick Lowery (student of Sam Brown), Uni of Edinburgh (2016)
10. Zak Bean (student of Nigel Minton), Uni of Nottingham (2017)
9. Esteban Parades (student of Kim Hardie, Uni of Nottingham (2015)
8. Eliza Soh (student of Paul Williams), Uni of Nottingham (2014)
7. Benjamin Wilson (student of Nigel Minton), Uni of Nottingham (2014)
6. Liqin Zhou (student of Craig McClean), Uni of Oxford (2014)
5. Sabrina Chen (student of Paul Williams), Uni of Nottingham (2014)
4. Marco Garavaglia (student of Paul Williams), Uni of Nottingham (2014)
3. Lili Sheng (student of Nigel Minton), Uni of Nottingham (2013)
2. Robert Goldstone (student of Paul Williams), Uni of Nottingham (2011)
1. Marco Messina (student of Paul Williams), Uni of Nottingham (2011)

B5. Mentorship of Postdoctoral Fellows or Visiting Scholars

2018 – 2020	Dr Jacob Thomas (Research Scientist)
2017 – present	Dr Sheyda Azimi (Postdoc)
2015 – 2016	Dr Aled Roberts (Postdoc)
2013 – 2015	Dr Yasuhiko Irie (Postdoc)
2012 – 2016	Dr Freya Harrison (Postdoc)

C. Educational Innovations and Other Contributions
No data

VI. Service

A. Professional Contributions
Journal and publishing reviewing
Nature, Science, PloS Biology, PloS Pathogens, PloS ONE, Nature Microbiology, Scientific Reports, Proc Soc, Molecular Microbiology, Current Biology, PNAS, Chemistry & Biology, Journal of Bacteriology, Environmental Microbiology, Microbiology, American Naturalist, Trends in Genetics, Journal of Medical Microbiology, FEMS Microbiology Reviews, FEMS Microbiology Letters and Bioorganic Chemistry, ISME J.

Grant reviewing

I have reviewed for funding bodies in Canada, Denmark, France, UK, USA and for international bodies (EU, HFSP): The National Science Foundation (USA); The Biotechnology and Biological Sciences Research Council (UK); the Natural Environment Research Council (UK); The Medical Research Council (UK); The Leverhulme Trust (UK); Wellcome Trust (UK); Royal Society (UK); Agence Nationale de la Recherche (France); National Sciences and Engineering Research Council (Canada); Human Frontier Science Program (International); The European Research Council, ERC (EU); Canadian CF Foundation (Canada).

Symposia and workshop organization
2017 - Member of the advisory board for the ASM 7th International Conference on Cell-to-Cell Signaling in Bacteria.
2014 - Member of the advisory board for the ASM 6th International Conference on Cell-to-Cell Signaling in Bacteria (San Antonio, Texas).
2011 - Organized a 2-day session on social evolution in microbes at the 2011 Microbiology Society General meeting in Harrogate.

Editorial service
Senior Editor, *Microbiology* (2021 - Present)
Academic Editor, *Microbiology* (2017-2021)
Invited Editor, *mBio* (2017)
Academic Editor, *Open Science* (2014-2017)
Academic Editor, *BMC Microbiology* (2012-2014)
Academic Editor, *Microbiology Open* (2011-2017)
Academic Editor, *FEMS Microbiology Letters* (2008-2012)

Committees and Councils
Member of the Microbiology Society Policy Committee (2016-2017)
Microbiology Society Elected Council Member (2013-2017)

B. Public and Community Service
I have spoken at a number of schools about Microbiology and the social lives of microbes. Schools include Oakham School, Manchester Grammar and Fettes College.

Science communication
My work has received coverage in *Radio Lab, BBC, The New York Times*, *CNN, The Washington Post, The Guardian*, *Wired, National Geographic, The Telegraph, The Daily Mail, Nature*, *Science*, *New Scientist, The British Library, Playboy* and many other print and online outlets. I have given a 15 minute live BBC interview on the Radio 4 show *Material World*, and was recorded for the BBC show *Frontiers*. I have also undergone of media training with The Royal Society.

I was elected to serve on the American Society for Microbiology Distinguished Lecturer Program from 2021.

C. Institute Contributions

2021 - 2021	Commission on the Research Next: Strategy Development and Implementation Committee
2020 - Present	Outreach and Communications Director for the Institute for Microbial Dynamics and Infection
2020 - Present	IBC Committee
2017 - Present	Departmental Seminar Committee