

Stanford



David Schneider

Professor of Microbiology and Immunology
Microbiology & Immunology

Bio

ACADEMIC APPOINTMENTS

- Professor, Microbiology & Immunology
- Member, Bio-X
- Member, Maternal & Child Health Research Institute (MCHRI)
- Member, Wu Tsai Neurosciences Institute

HONORS AND AWARDS

- Larry Sandler Award Memorial Award for best *Drosophila* thesis, Genetics Society of America (1993)
- New Scholar in Global Infectious Disease, Ellison Medical Foundation (2002-6)
- Senior Scholar Award in Aging, Ellison Medical Foundation (2008-12)
- NIH Director's Pioneer Award, NIH (2011)

PROFESSIONAL EDUCATION

- Ph.D., University of California, Berkeley , Molecular Biology (1992)
- B.Sc., University of Toronto , Biochemistry (1986)

LINKS

- Schneider Lab: <http://schneiderlab.stanford.edu>
- blog: <http://www.phasecurveblog.wordpress.com>

Research & Scholarship

CURRENT RESEARCH AND SCHOLARLY INTERESTS

We study innate immunity and microbial pathogenesis. We have been studying models for a variety of bacterial infections including: *Listeria*, *Mycobacteria*, *Salmonella* and *Streptococcus* as well as some fungi, malaria and viruses. Our current focus is to determine how we recover from infections.

We are using a new approach to study the outcome of infections. We are starting by plotting health by microbe number over the course of infections. This produces characteristic phase plots that we think can be used to predict the outcome of infections and to define appropriate treatments. We like to assess "health" in whole animals rather than in vitro but we use a large range of tools ranging from genetics, to microarray analyses to flow cytometry.

We focus on two models. We recently started working on a mouse model for malaria in which we follow the progress of a *Plasmodium chabaudi* infection. We are making extremely multivariate plots of the disease process. Our goal is to define "biovectors" that predict the outcome of infection and to identify the physiological mechanisms required for recovery from infections.

We continue to work on fruit flies as a model for microbial pathogenesis. Here we take advantage of the spectacularly deep genetic tools available to *Drosophila* geneticists to discover mechanisms involved in pathogenesis and the recovery from infections.

Teaching

COURSES

2023-24

- Creative Visualization Studio: MI 260 (Aut, Win, Spr, Sum)
- Designing Your Life: Empowering Emerging Scientists: BIOS 302 (Spr)
- Foundations in Experimental Biology: BIOS 200 (Aut)

2022-23

- Creative Visualization Studio: MI 260 (Aut, Win, Spr, Sum)

2021-22

- Creative Visualization Studio: MI 260 (Aut, Win, Spr, Sum)

2020-21

- Creative Visualization Studio: MI 260 (Aut, Win, Spr, Sum)

STANFORD ADVISEES

Doctoral Dissertation Reader (AC)

Taylor Pursell

Doctoral Dissertation Co-Advisor (AC)

Elysse Grossi-Soyster

GRADUATE AND FELLOWSHIP PROGRAM AFFILIATIONS

- Immunology (Phd Program)
- Microbiology and Immunology (Phd Program)

Publications

PUBLICATIONS

- **How Many Parameters Does It Take to Describe Disease Tolerance?** *PLOS BIOLOGY*
Louie, A., Song, K. H., Hotson, A., Tate, A. T., Schneider, D. S.
2016; 14 (4)
- **Tracking Resilience to Infections by Mapping Disease Space.** *PLoS biology*
Torres, B. Y., Oliveira, J. H., Thomas Tate, A., Rath, P., Cumnock, K., Schneider, D. S.
2016; 14 (4)
- **Tracing Personalized Health Curves during Infections** *PLOS BIOLOGY*
Schneider, D. S.
2011; 9 (9)

- **The Role of Anorexia in Resistance and Tolerance to Infections in *Drosophila*** *PLOS BIOLOGY*
Ayres, J. S., Schneider, D. S.
2009; 7 (7)
- **Resilience integrates concepts in aging research.** *iScience*
Promislow, D., Anderson, R. M., Scheffer, M., Crespi, B., DeGregori, J., Harris, K., Horowitz, B. N., Levine, M. E., Riolo, M. A., Schneider, D. S., Spencer, S. L., Valenzano, D. R., Hochberg, et al
2022; 25 (5): 104199
- **Linking functional and molecular mechanisms of host resilience to malaria infection** *ELIFE*
Kamiya, T., Davis, N. M., Greischar, M. A., Schneider, D., Mideo, N.
2021; 10
- **Metabolomic Analysis of Diverse Mice Reveals Hepatic Arginase-1 as Source of Plasma Arginase in *Plasmodium chabaudi* Infection.** *mBio*
Davis, N. M., Lissner, M. M., Richards, C. L., Chevee, V., Gupta, A. S., Gherardini, F. C., Schneider, D. S.
2021: e0242421
- **Immunology's intolerance of disease tolerance.** *Nature reviews. Immunology*
Schneider, D. S.
2021; 21 (10): 624-625
- **Metabolic profiling during malaria reveals the role of the aryl hydrocarbon receptor in regulating kidney injury.** *eLife*
Lissner, M. M., Cumnock, K., Davis, N. M., Vilches-Moure, J. G., Basak, P., Navarrete, D. J., Allen, J. A., Schneider, D.
2020; 9
- **Uncovering drivers of dose-dependence and individual variation in malaria infection outcomes.** *PLoS computational biology*
Kamiya, T. n., Greischar, M. A., Schneider, D. S., Mideo, N. n.
2020; 16 (10): e1008211
- **Western diet regulates immune status and the response to LPS-driven sepsis independent of diet-associated microbiome.** *Proceedings of the National Academy of Sciences of the United States of America*
Napier, B. A., Andres-Terre, M., Massis, L. M., Hryckowian, A. J., Higginbottom, S. K., Cumnock, K., Casey, K. M., Haileselassie, B., Lugo, K. A., Schneider, D. S., Sonnenburg, J. L., Monack, D. M.
2019; 116 (9): 3688–94
- **Vector Immunity and Evolutionary Ecology: The Harmonious Dissonance.** *Trends in immunology*
Shaw, D. K., Tate, A. T., Schneider, D. S., Levashina, E. A., Kagan, J. C., Pal, U., Fikrig, E., Pedra, J. H.
2018
- **The physiological basis of disease tolerance in insects.** *Current opinion in insect science*
Lissner, M. M., Schneider, D. S.
2018; 29: 133–36
- **Going to Bat(s) for Studies of Disease Tolerance** *FRONTIERS IN IMMUNOLOGY*
Mandl, J. N., Schneider, C., Schneider, D. S., Baker, M. L.
2018; 9
- **Going to Bat(s) for Studies of Disease Tolerance.** *Frontiers in immunology*
Mandl, J. N., Schneider, C., Schneider, D. S., Baker, M. L.
2018; 9: 2112
- **Host Energy Source Is Important for Disease Tolerance to Malaria** *CURRENT BIOLOGY*
Cumnock, K., Gupta, A. S., Lissner, M., Chevee, V., Davis, N. M., Schneider, D. S.
2018; 28 (10): 1635–+
- **Novel M-CSF-producing gamma delta T cells protect against recurrent malaria**
Mamedov, M. R., Scholzen, A., Nair, R. V., Cumnock, K., Kenkel, J. A., Oliveira, J. M., Trujillo, D. L., Saligrama, N., Zhang, Y., Rubelt, F., Schneider, D. S., Chien, Y., Sauerwein, et al
AMER ASSOC IMMUNOLOGISTS.2018

- **Timing of host feeding drives rhythms in parasite replication** *PLOS PATHOGENS*
Prior, K. F., van der Veen, D. R., O'Donnell, A. J., Cumnock, K., Schneider, D., Pain, A., Subudhi, A., Ramaprasad, A., Rund, S. C., Savill, N. J., Reece, S. E.
2018; 14 (2): e1006900
- **A Macrophage Colony-Stimulating-Factor-Producing ## T Cell Subset Prevents Malarial Parasitemic Recurrence.** *Immunity*
Mamedov, M. R., Scholzen, A. n., Nair, R. V., Cumnock, K. n., Kenkel, J. A., Oliveira, J. H., Trujillo, D. L., Saligrama, N. n., Zhang, Y. n., Rubelt, F. n., Schneider, D. S., Chien, Y. H., Sauerwein, et al
2018; 48 (2): 350–63.e7
- **Predicting position along a looping immune response trajectory.** *PloS one*
Rath, P., Allen, J. A., Schneider, D. S.
2018; 13 (10): e0200147
- **Innate Immune Memory: Activation of Macrophage Killing Ability by Developmental Duties.** *Current biology : CB*
Schneider, D., Tate, A. T.
2016; 26 (12): R503-R505
- **What Can Vampires Teach Us about Immunology?** *Trends in immunology*
Schneider, D. S.
2016; 37 (4): 253-256
- **Tracking Resilience to Infections by Mapping Disease Space** *PLOS BIOLOGY*
Torres, B. Y., Oliveira, J. H., Tate, A. T., Rath, P., Cumnock, K., Schneider, D. S.
2016; 14 (4)
- **Drosophila melanogaster Natural Variation Affects Growth Dynamics of Infecting Listeria monocytogenes** *G3-GENES GENOMES GENETICS*
Hotson, A. G., Schneider, D. S.
2015; 5 (12): 2593-2600
- **Defining Resistance and Tolerance to Cancer** *CELL REPORTS*
Dillman, A. R., Schneider, D. S.
2015; 13 (5): 884-887
- **Drosophila melanogaster Natural Variation Affects Growth Dynamics of Infecting Listeria monocytogenes.** *G3 (Bethesda, Md.)*
Hotson, A. G., Schneider, D. S.
2015
- **The genetics of immunity.** *Genetics*
Lazzaro, B. P., Schneider, D. S.
2014; 197 (2): 467-70
- **The Drosophila Deubiquitinating Enzyme dUSP36 Acts in the Hemocytes for Tolerance to Listeria monocytogenes Infections** *JOURNAL OF INNATE IMMUNITY*
Taillebourgar, E., Schneider, D. S., Fauvarque, M.
2014; 6 (5): 632-638
- **The ubiquitin ligase parkin mediates resistance to intracellular pathogens.** *Nature*
Manzanillo, P. S., Ayres, J. S., Watson, R. O., Collins, A. C., Souza, G., Rae, C. S., Schneider, D. S., Nakamura, K., Shiloh, M. U., Cox, J. S.
2013; 501 (7468): 512-516
- **Listeria monocytogenes Infection Causes Metabolic Shifts in Drosophila melanogaster** *PLOS ONE*
Chambers, M. C., Song, K. H., Schneider, D. S.
2012; 7 (12)
- **How the Fly Balances Its Ability to Combat Different Pathogens** *PLOS PATHOGENS*
Chambers, M. C., Lightfield, K. L., Schneider, D. S.
2012; 8 (12)
- **Where Does Innate Immunity Stop and Adaptive Immunity Begin?** *CELL HOST & MICROBE*
Ziauddin, J., Schneider, D. S.

2012; 12 (4): 394-395

- **Infection-Related Declines in Chill Coma Recovery and Negative Geotaxis in *Drosophila melanogaster*** *PLOS ONE*
Linderman, J. A., Chambers, M. C., Gupta, A. S., Schneider, D. S.
2012; 7 (9)
- **Balancing resistance and infection tolerance through metabolic means** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*
Chambers, M. C., Schneider, D. S.
2012; 109 (35): 13886-13887
- **Immunity in Society: Diverse Solutions to Common Problems** *PLOS BIOLOGY*
Babayan, S. A., Schneider, D. S.
2012; 10 (4)
- **Disease Tolerance as a Defense Strategy** *SCIENCE*
Medzhitov, R., Schneider, D. S., Soares, M. P.
2012; 335 (6071): 936-941
- **Pioneering immunology: insect style** *CURRENT OPINION IN IMMUNOLOGY*
Chambers, M. C., Schneider, D. S.
2012; 24 (1): 10-14
- **Tolerance of Infections** *ANNUAL REVIEW OF IMMUNOLOGY, VOL 30*
Ayres, J. S., Schneider, D. S.
2012; 30: 271-294
- ***Drosophila* immunity research on the move.** *Fly*
Eleftherianos, I., Schneider, D.
2011; 5 (3): 247-254
- **Reciprocal Analysis of *Francisella novicida* Infections of a *Drosophila melanogaster* Model Reveal Host-Pathogen Conflicts Mediated by Reactive Oxygen and imd-Regulated Innate Immune Response** *PLOS PATHOGENS*
Moule, M. G., Monack, D. M., Schneider, D. S.
2010; 6 (8)
- **Relating immune and stress responses to infection resistance and tolerance** *BRAIN BEHAVIOR AND IMMUNITY*
Schneider, D.
2010; 24 (2): 193-193
- **The *Drosophila* TNF Ortholog Eiger Is Required in the Fat Body for a Robust Immune Response** *JOURNAL OF INNATE IMMUNITY*
Mabery, E. M., Schneider, D. S.
2010; 2 (4): 371-378
- **The Imd Pathway Is Involved in Antiviral Immune Responses in *Drosophila*** *PLOS ONE*
Costa, A., Jan, E., Sarnow, P., Schneider, D.
2009; 4 (10)
- **A Signaling Protease Required for Melanization in *Drosophila* Affects Resistance and Tolerance of Infections** *PLOS BIOLOGY*
Ayres, J. S., Schneider, D. S.
2008; 6 (12): 2764-2773
- **MICROBIOLOGY Rogue Insect Immunity** *SCIENCE*
Schneider, D. S., Chambers, M. C.
2008; 322 (5905): 1199-1200
- **Two ways to survive infection: what resistance and tolerance can teach us about treating infectious diseases** *NATURE REVIEWS IMMUNOLOGY*
Schneider, D. S., Ayres, J. S.
2008; 8 (11): 889-895
- **Use of a *Drosophila* Model to Identify Genes Regulating Plasmodium Growth in the Mosquito** *GENETICS*

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- Brandt, S. M., Jaramillo-Gutierrez, G., Kumar, S., Barillas-Mury, C., Schneider, D. S.
2008; 180 (3): 1671-1678
- **Models of infectious diseases in the fruit fly *Drosophila melanogaster*** *DISEASE MODELS & MECHANISMS*
Dionne, M. S., Schneider, D. S.
2008; 1 (1): 43-49
 - **Pathogenesis of *Listeria*-infected *Drosophila wntD* mutants is associated with elevated levels of the novel immunity gene *edin*** *PLOS PATHOGENS*
Gordon, M. D., Ayres, J. S., Schneider, D. S., Nusse, R.
2008; 4 (7)
 - **Identification of *drosophila* mutants altering defense of and endurance to *Listeria monocytogenes* infection** *GENETICS*
Ayres, J. S., Freitag, N., Schneider, D. S.
2008; 178 (3): 1807-1815
 - **Confronting physiology: how do infected flies die?** *CELLULAR MICROBIOLOGY*
Shirasu-Hiza, M. M., Schneider, D. S.
2007; 9 (12): 2775-2783
 - **How and why does a fly turn its immune system off?** *PLOS BIOLOGY*
Schneider, D. S.
2007; 5 (9): 1847-1849
 - **Interactions between circadian rhythm and immunity in *Drosophila melanogaster*** *CURRENT BIOLOGY*
Shirasu-Hiza, M. M., Dionne, M. S., Pham, L. N., Ayres, J. S., Schneider, D. S.
2007; 17 (10): R353-R355
 - **A specific primed immune response in *Drosophila* is dependent on phagocytes** *PLOS PATHOGENS*
Pham, L. N., Dionne, M. S., Shirasu-Hiza, M., Schneider, D. S.
2007; 3 (3)
 - ***Drosophila eiger* mutants are sensitive to extracellular pathogens** *PLOS PATHOGENS*
Schneider, D. S., Ayres, J. S., Brandt, S. M., Costa, A., Dionne, M. S., Gordon, M. D., Mabery, E. M., Moule, M. G., Pham, L. N., Shirasu-Hiza, M. M.
2007; 3 (3)
 - ***Psidin* is required in *Drosophila* blood cells for both phagocytic degradation and immune activation of the fat body** *CURRENT BIOLOGY*
Brennan, C. A., Delaney, J. R., Schneider, D. S., Anderson, K. V.
2007; 17 (1): 67-72
 - **Bacterial infection of fly ovaries reduces egg production and induces local hemocyte activation** *DEVELOPMENTAL AND COMPARATIVE IMMUNOLOGY*
Brandt, S. M., Schneider, D. S.
2007; 31 (11): 1121-1130
 - **Akt and foxo dysregulation contribute to infection-induced wasting in *Drosophila*** *CURRENT BIOLOGY*
Dionne, M. S., Pham, L. N., Shirasu-Hiza, M., Schneider, D. S.
2006; 16 (20): 1977-1985
 - **Genomic dissection of microbial pathogenesis in cultured *Drosophila* cells** *TRENDS IN MICROBIOLOGY*
Ayres, J. S., Schneider, D. S.
2006; 14 (3): 101-104
 - ***WntD* is a feedback inhibitor of Dorsal/NF-kappa B in *Drosophila* development and immunity** *NATURE*
Gordon, M. D., Dionne, M. S., Schneider, D. S., Nusse, R.
2005; 437 (7059): 746-749
 - **Secreted bacterial effectors and host-produced *eiger*/TNF drive death in a *Salmonella*-infected fruit fly** *PLOS BIOLOGY*
Brandt, S. M., Dionne, M. S., Khush, R. S., Pham, L. N., Vigdal, T. J., Schneider, D. S.
2004; 2 (12): 2067-2075
 - **Exploration of host-pathogen interactions using *Listeria monocytogenes* and *Drosophila melanogaster*** *CELLULAR MICROBIOLOGY*
Mansfield, B. E., Dionne, M. S., Schneider, D. S., Freitag, N. E.
-

2003; 5 (12): 901-911

- **Drosophila melanogaster is a genetically tractable model host for Mycobacterium marinum** *INFECTION AND IMMUNITY*
Dionne, M. S., Ghori, N., Schneider, D. S.
2003; 71 (6): 3540-3550
- **Plant immunity and film noir: What gumshoe detectives can teach us about plant-pathogen interactions** *CELL*
Schneider, D. S.
2002; 109 (5): 537-540
- **Malaria parasite development in a Drosophila model** *SCIENCE*
Schneider, D., Shahabuddin, M.
2000; 288 (5475): 2376-2379
- **Interactions between the cellular and humoral immune responses in Drosophila** *CURRENT BIOLOGY*
Elrod-Erickson, M., Mishra, S., Schneider, D.
2000; 10 (13): 781-784
- **Using Drosophila as a model insect** *Nature Reviews Genetics*
Schneider, D.S.
2000
- **A PROCESSED FORM OF THE SPATZLE PROTEIN DEFINES DORSAL-VENTRAL POLARITY IN THE DROSOPHILA EMBRYO** *DEVELOPMENT*
Schneider, D. S., JIN, Y. S., Morisato, D., Anderson, K. V.
1994; 120 (5): 1243-1250
- **DOMINANT AND RECESSIVE MUTATIONS DEFINE FUNCTIONAL DOMAINS OF TOLL, A TRANSMEMBRANE PROTEIN REQUIRED FOR DORSAL VENTRAL POLARITY IN THE DROSOPHILA EMBRYO** *GENES & DEVELOPMENT*
Schneider, D. S., Hudson, K. L., Lin, T. Y., Anderson, K. V.
1991; 5 (5): 797-807