Applied numerics in system biology

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About me

2004 MS Physics, Biophysics, Moscow Lomonosov University

2000-2001 HU Berlin

2008 Dr. rer. nat. Georg-August-Universität Göttingen

2010-2012 MIT, Cambridge, MA

2004-2013 MPI for Dynamics and Selforganisation, Göttingen

2014-2016 TU Berlin

since **2016** Professor (Juniorprofessor) FU Berlin

AG System Modeling, Institut für veterinary Epidemiology and Biostatistics

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Research focus

Spreading processes on networks (epidemiology, opinion formation)

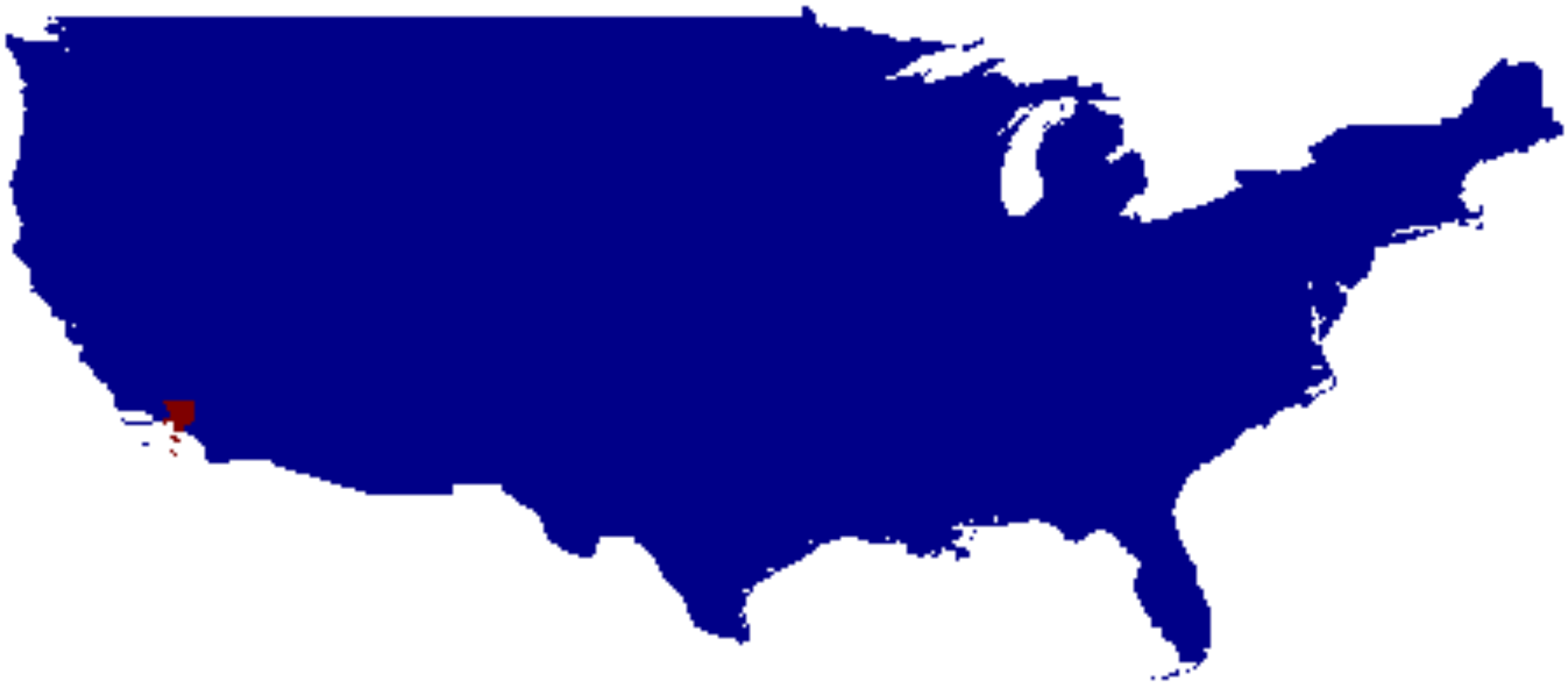
Human and animal mobility

Combining biological and metadata

Data science (sensor data for health applications)

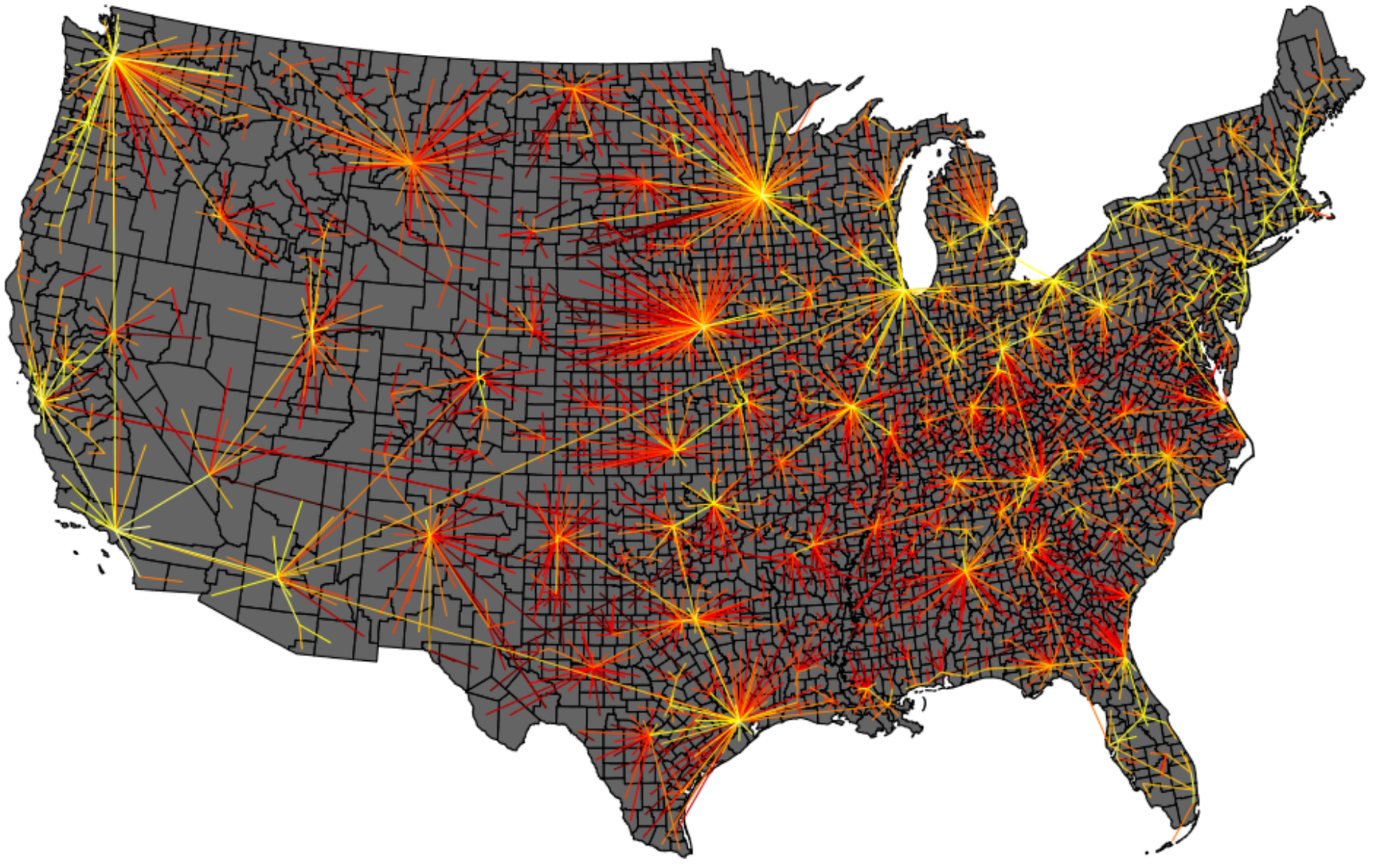
Host-parasite-environment interactions, hormone dynamics

Epidemics



V Belik, T Geisel, D Brockmann
Physical Review X 1 (1), 011001

Underlying network



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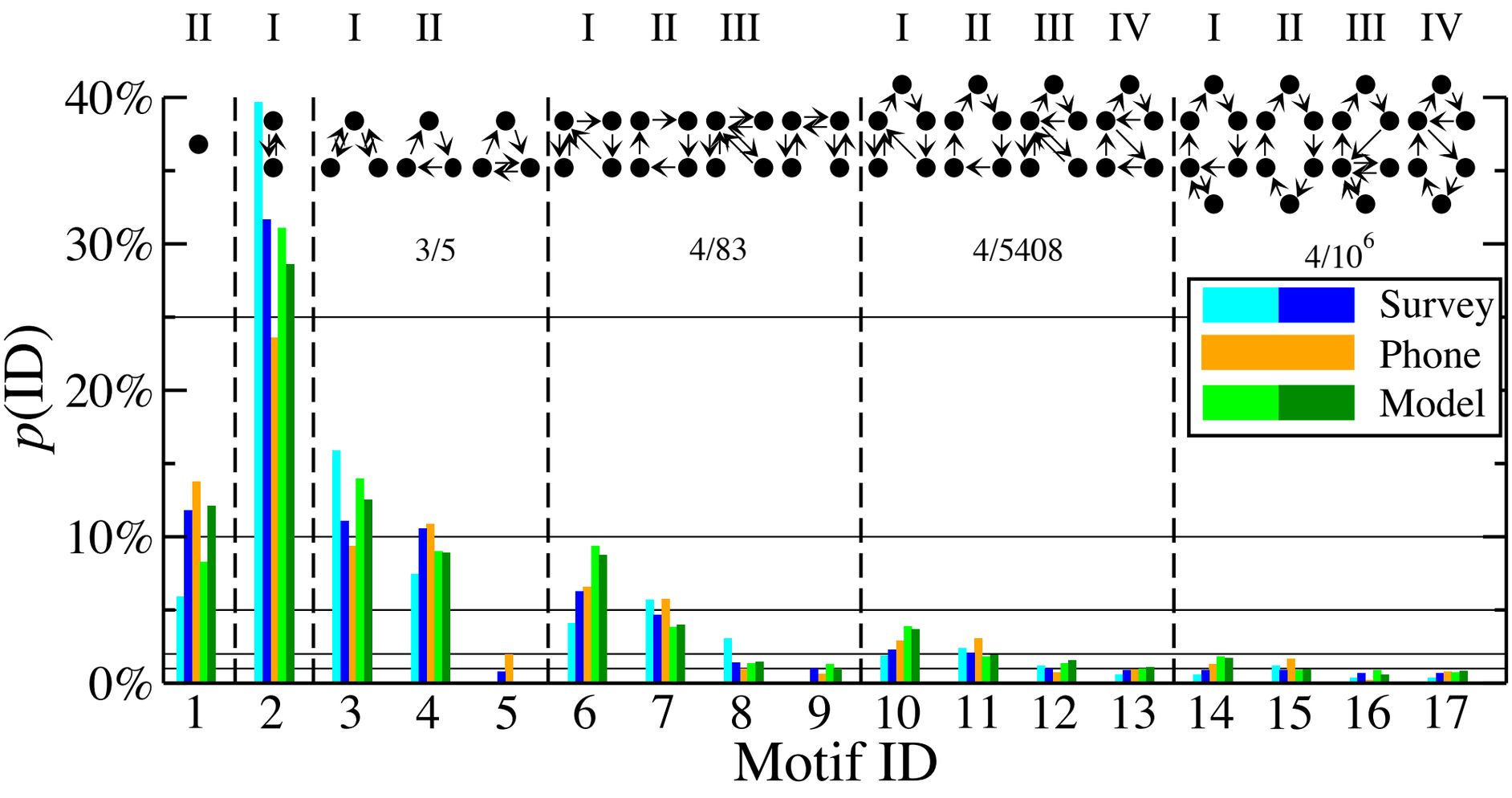
Human mobility



CM Schneider, V Belik, T Couronné, Z Smoreda, MC González
Journal of The Royal Society Interface 10 (84), 20130246

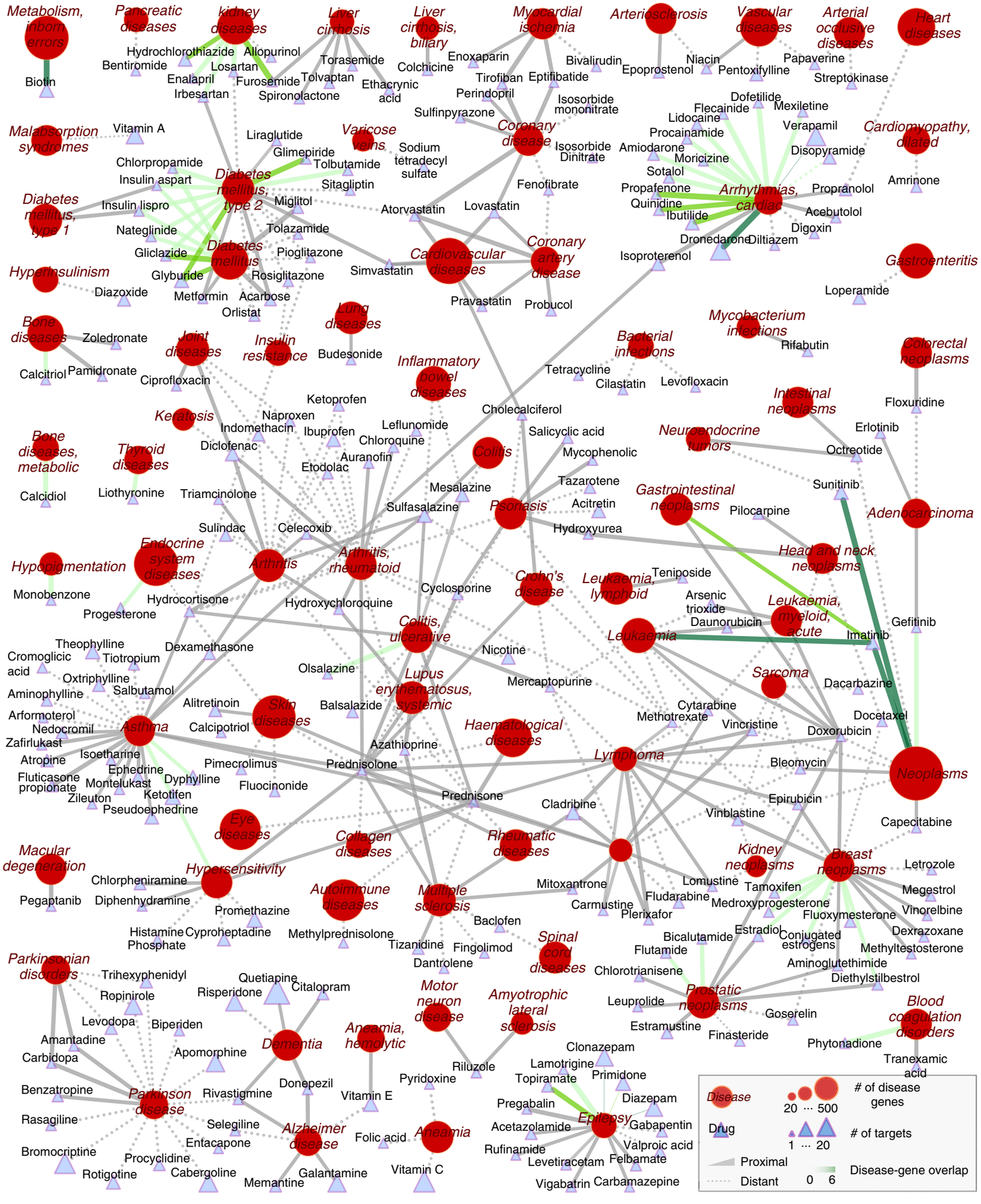
Animal trade network

Animation by T Selhorst

H Lentz et al., Trade communities and their spatial patterns in the German pork production network, Preventive veterinary medicine, 98, 176 (2011)

Swine trade network

4000 nodes with edges
occurring more than 50 times



Zhong at al. Mol. Sys. Bio. 12: 865 (2016)

Time plan

19.04	Intro	7.06	project implementation
26.04	--	14.06	project implementation
03.05	Intro	21.06	2 student talks
10.05	lecture topic I	28.06	2 student talks
17.05	lecture topic II	5.07	2 student talks
24.05	lecture topic III	12.07	2 student talks
31.05	*project implementation*		

Workflow

1. Supervisors give introductory lectures and hand out project work
2. Supervisor-student interaction (~ three occasions)
   - Clarification of the tasks and resolving questions by the student
     - Student must have read the articles & tasks before
     - Student should know afterwords how to proceed/implement
   - Resolving implementation issues, discussing results
     - Student implemented the tasks and might have encountered problems
     - Student has prepared specific questions
     - Supervisor helps with approaches to bug fixing
   - Feedback for the talk
     - Student has prepared the talk
     - Supervisor gives specific feedback regarding structure/content and presentation
3. Student talks + discussion/defence