Ants live together in highly complex societies, often sacrificing individual gain to achieve common goals such as forming a living bridge. Such cooperation makes evolutionary sense because the ants are all related, as detailed in this month’s Origins essay on page 1196. The essay and two Reports on pages 1269 and 1272 address how cooperation evolves in unrelated individuals and even between species.

Photo credit: iStockphoto.com/Anders Boman
CONTENTS

BREVIA

1221  Shor’s Quantum Factoring Algorithm on a Photonic Chip
A. Politi et al.
A quantum algorithm to factor numbers is implemented on an optical chip.

REPORTS

1222  An Ultramassive, Fast-Spinning White Dwarf in a Peculiar Binary System
S. Mereghetti et al.
X-ray observations show that a white dwarf has a mass near the limit above which these stars become gravitationally unstable.

1224  Realization of an Excited, Strongly Correlated Quantum Gas Phase
E. Haller et al.
Confinement of a cloud of ultracold atoms along one dimension creates tunable metastable excited states.

1227  Complete Methods Set for Scalable Ion Trap Quantum Information Processing
J. P. Home et al.
Coupling of different ion creates states that are insensitive to stray magnetic fields and more robust for quantum computing.

1230  A Sulfilimine Bond Identified in Collagen IV
R. Vanacore et al.
An unusual sulfilimine bond provides reinforcing cross-link of an extracellular matrix protein, collagen IV.

1234  Reassessing the Source of Long-Period Comets
N. A. Kaib and T. Quinn
Numerical simulations show that the inner Oort Cloud is a major source of long-period comets that cross Earth’s orbit.

1236  Recent Warming Reverses Long-Term Arctic Cooling
D. S. Kaufman et al.
A 2000-year-long Arctic cooling trend seen in surface air temperature reconstruction was reversed during the last century.

1240  Poly(ADP-ribose)–Dependent Regulation of DNA Repair by the Chromatin Remodeling Enzyme ALC1
D. Ahel et al.
A chromatin remodeling complex targeted by poly(ADP ribosyl)ation plays a role in DNA repair.

1244  Fundamental Evolutionary Limits in Ecological Traits Drive Drosophila Species Distributions
V. Kellermann et al.
The evolutionary potential of key traits may be restricted by limited genetic variation.

1246  Common Regulatory Variation Impacts Gene Expression in a Cell Type–Dependent Manner
A. S. Dimas et al.
Genetic variation in regulatory elements among humans affects gene expression in a tissue-specific manner.

1250  Rab35 Controls Actin Bundling by Recruiting Fascin as an Effector Protein
J. Zhang et al.
Development of sensory bristles in flies depends on controlling the colocalization of actin assembly on membranes.

1254  Regulation of Histone Acetylation in the Nucleus by Sphingosine-1-Phosphate
N. C. Hait et al.
A phospholipid that binds to nuclear enzymes modifies gene transcription in response to external stimuli.

1258  Perineuronal Nets Protect Fear Memories from Erasure
N. Gogolla et al.
Fearful memories in adults are difficult to erase because of the physical environment of specific neurons in the brain.

1261  Activation of the PI3K Pathway in Cancer Through Inhibition of PTEN by Exchange Factor P-REX2a
B. Fine et al.
Cancer cell growth is stimulated by the inhibition of a previously unknown step in cell signaling for tumor suppression.

1265  Recruitment of Antigen-Specific CD8+ T Cells in Response to Infection Is Markedly Efficient
J. W. J. van Heijst et al.
Lymphocyte proliferation, more than recruitment to the site of an infection, determines the success of the immune response.

1269  Differential Sensitivity to Human Communication in Dogs, Wolves, and Human Infants
J. Topál et al.
Social interactions with humans govern the way dogs and children learn, but wolves learn by focusing on objects.

1272  Positive Interactions Promote Public Cooperation
D. G. Rand et al.
Reward is as good as punishment to promote cooperation, costs less, and increases the share out of resources up for grabs.

CONTENTS continued >>