Antibodies that bind the polysaccharide capsule of *Streptococcus pneumoniae* can enhance transformation, the uptake by such cells of unadorned genetic material, according to Liise-anne Pirofski of Albert Einstein College of Medicine and Montefiore Medical Center in Bronx, N.Y. — who calls their findings “novel”— and her collaborators. Additionally, these antibodies boost expression of genes that govern fratricide, the ability of certain bacteria to kill sibling cells. Their report appears in the September/October 2011 *mBio*.

In the presence of competence stimulating peptide, some antibodies to the pneumococcal capsule enhance transformation and quorum sensing. In the case of one such antibody, designated 1E2, expression of genes that induce transformed cells to kill siblings also increases. Thus, transformation-stimulating antibodies induce the pneumococcus cells to clump, triggering quorum sensing, a process by which cells communicate but only when they are in close proximity to one another, Pirofski says. Quorum sensing induces more transformation. Meanwhile, however, capsule-binding antibodies that promote phagocytosis do not induce clumping, or enhance transformation.

Although antibodies were thought to bind polysaccharide capsules of pneumococci and that was the “end of the story,” these findings from Pirofski and her collaborators show things are not so simple, says microbiologist Jorge L. Benach of Stony Brook University in Stony Brook, N.Y.

If transformed cells kill their non-transformed counterparts, that could “allow the host to clear the infection faster,” Benach points out. However, the opposite might be what happens, he adds, describing a scenario in which the pathogen outmaneuvers its infected host:

“It could be argued that enhancing fratricide, particularly if directed to cells that cannot accept new genetic information, may also work in favor of preserving the competent [transformed] cells by the acquisition of resistance factors,” Benach notes. “If conditions are such that the majority of cells in an *S. pneumoniae* culture can accept DNA more readily than before, those cells could well acquire new resistance factors. In this scenario, the random acquisition of new genes could result in the expression of new antigens not recognized by the antibodies, new exogenous proteases that can cleave immunoglobulins, or a number of other possible factors that would enhance the establishment and continuation of an infection.”

**NSABB Call To Withhold Details of H5N1 Research Stirs Heated Debate**

Late in December, members of the National Science Advisory Board for Biosecurity (NSABB), which advises federal agencies on biodefense issues, recommended that details in two pending reports on the H5N1 influenza strain of virus describing how it can be made more transmissible in mammalian species be withheld from publication. These recommendations to federal officials, in turn, were directed to the authors of those reports and the editors of *Science* and *Nature*, where the reports are to be published. NSABB also recommended adding language to explain “the goals and potential public health benefits of the research, and to detail the extensive safety and security measures taken to protect laboratory workers and the public.” *Science* editor Bruce Alberts said, “Our response will be heavily dependent upon the further steps taken by the U.S. government to set forth a written, transparent plan to ensure that any information that is omitted from the publication will be provided to all those responsible scientists who request it, as part of their legitimate efforts to improve public health and safety.” Philip Campbell, his counterpart at *Nature*, said, “We have noted the unprecedented NSABB recommendations that would restrict public access to data and methods, and recognize the motivation behind them.

It is essential for public health that the full details of any scientific analysis of flu viruses be available to researchers. We are discussing with interested parties how, within the scenario recommended by NSABB, appropriate access to the scientific methods and data could be enabled.” Meanwhile, many microbiologists and other experts were voicing widely differing opinions, some arguing that it would do little good to withhold information about these H5N1 studies and others suggesting that such research should not be done. Final responses to the NSABB recommendations were pending when this issue of *Microbe* went to press.

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Recent Developments Involving Antimicrobial Adjuncts and Alternatives

Recent efforts to develop unusual antimicrobial agents or compounds that spare conventional antibiotics—or to put antibiotics to unconventional uses—include:

- A mannoside that interferes with the adherence of bacterial pathogens to bladder epithelial cells appears to be a promising adjunct or alternative to antibiotic treatment of urinary tract infections, based on tests in mice, according to Corrine Cusmano and Scott Hultgren of Washington University in St. Louis, Mo., and their collaborators. Details appear in the 16 November 2011 Science Translational Medicine.
- Treating rats with a probiotic kept them from developing pancreatitis or sepsis, apparently by allowing a commensal ileum bacterium to grow more freely, according to Jacoline Gerritsen of University Medical Center in Utrecht, the Netherlands, and her collaborators. Details appear in the November 2011 Applied and Environmental Microbiology, 77:7749–7756.
- Odorous frogs are a rich source of antimicrobial peptides, according to Yun Zhang of the Kunming Institute of Zoology in Kunming, Yunnan, China, whose analysis describes 728 such peptides from 9 different kinds of frog. Details appear in the November 2011 Journal of Proteome Research, doi: 10.1021/pr200782u.
- The antibiotic tigecycline kills leukemia cells in culture by interfering with energy production, according to Marko Skrtič and Aaron Schimmer at the Princess Margaret Hospital of the University of Toronto in Toronto, Ontario, Canada. Details appear in the November 2011 Cancer Cell, doi. 10.1016/j.ccr.2011.10.015.
- A solution of bacteriophage containing genes to renew the sensitivity of antibiotic-resistant bacterial pathogens to such drugs could be added to cleaning agents to make hospital rooms safer for patients, according to Udi Qimron of Tel Aviv University in Tel Aviv, Israel, and his collaborators. Details appear in the November 2011 Applied and Environmental Microbiology, doi: 10.1128/ AEM.05741–11.
- A vapor containing ozone and hydrogen peroxide proves effective in sterilizing hospital rooms, according to Dick Zoutman of Queen’s University in Kingston, Ontario, Canada, and his collaborators. Details appear in the December 2012 American Journal of Infection Control.

These findings provide important insights for those who develop vaccines against this and other capsule-producing pathogens, according to Elaine Tuomanen of St. Jude Children’s Research Hospital in Memphis, Tenn. “The major pathogens of children—pneumococcus, haemophilus, and meningococcus—are all naturally transformable, and vaccines target their capsules,” she says. “Capsule switch is the main mechanism of vaccine evasion, and it appears that the bacteria can ‘sense’ a hostile immune response and increase their ability to shop for new DNA. This is a new twist in the war that makes it critical to develop vaccines that don’t encourage this process.”

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Beyond Metagenomics, How Soil Microbes and Climate Interact

Metagenomic analysis is helping investigators learn how microbial communities behave in soils and how global cycles might affect or be affected by that behavior. Last October, more than 150 scientists from 80 institutions in 9 countries gathered for the 3rd Argonne Soil Metagenomics workshop, held at the Argonne National Laboratory in Argonne, Ill., to review how recent advances in technologies that reach beyond metagenomics are affecting this field. The workshop was convened as a part of the Earth Microbiome Project (EMP), an effort to analyze microbial communities from specific sites around the globe (see “Modeling the Earth Microbiome,” p. 64).

“The workshop focused on new techniques developed for exploring how terrestrial microbial communities respond to climate change,” says Jack Gilbert of Argonne National Laboratory, a principal organizer of the workshop and also a co-principal investigator of the EMP. One of those newer approaches, called predicted relative metabolic turnover (PRMT), uses gene annotations for enzymes to map changing abundances among samples. These measurements then are used to estimate whether environmental changes lead metabolites to be consumed or produced.

PRMT is being used, for example, to predict whether microbial communities at particular sites will serve as sinks for excess carbon dioxide consumption. “We link PRMT to a bioclimatic modeling infrastructure