

- Malarial parasite DNA can now be separated from the host.
- Behavior of microbiome can be studied with a algorithm tool.
- Personalised pain killers can be found with the help of gene testing.
- US takes its first shot at ZIKA.
- Organisms can be “reprogrammed” to produce sugar from carbon dioxide.

BIO COSMOS

through a microbiological perspective....

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Global, evolving and historic makeup of Malaria species uncovered

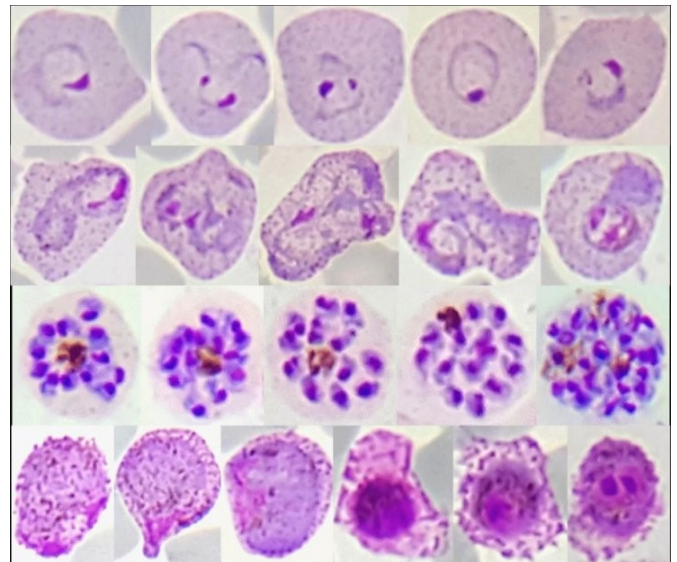
A team of scientists has uncovered the global, evolving, and historic makeup of *Plasmodium vivax*, one of the five species of malaria that infect humans. The research which links the spread of the parasite back to colonial seafaring, among the other phenomena, underscores the challenges health experts face in controlling the parasite.

“*Plasmodium vivax* is going to be the last malaria parasite standing”, observes James Carlton, a professor in NYU’s department of Biology. “Our findings shows it is evolving in response to anti-malarial drugs and adapting to regional differences, indicating a wide range of approaches will likely be necessary to eliminate it globally.”

P. vivax causes an estimated 15.8 million clinical malaria cases each year. However, it remains understudied because it is both less lethal than other species and because it has historically been difficult to analyze since it cannot be grown in the la-

boratory. Another challenge is separating the parasite’s DNA from human DNA.

According to a study in *Nature Genetics* journal, the re-



Red blood cell stages of *P. vivax* from Malaria patients.

search team sequenced approximately 200 DNA samples of *P. vivax* collected from patients—the largest of *P. vivax* genomes sequenced to date—in 11 countries. The scientists were able to separate *P. vivax* DNA from its human host by using a set of unique ‘sticky baits’ that captured the parasite DNA enabling the human DNA to be washed away.

The sequencing of the parasite’s genome offered an array of new insights to the nature of *P. vivax* as it exists today and also served as a ‘genetic history book’.



New tool for forecasting behavior of the microbiome

A team of investigators from Brigham and Women's hospital and the University of Massachusetts have developed a suite of computer algorithms that can accurately predict the behavior of the microbiome— the vast collection of microbes living on and inside the human body. In a paper published in *Genome Biology*, the authors show how their algorithms can be applied to develop new treatments for serious diarrheal infections, including *Clostridium difficile*, and inflammatory Bowel disease. The team also shows how to identify bacteria most crucial for a healthy and stable microbial community, which could inform the development of probiotics and other therapies.

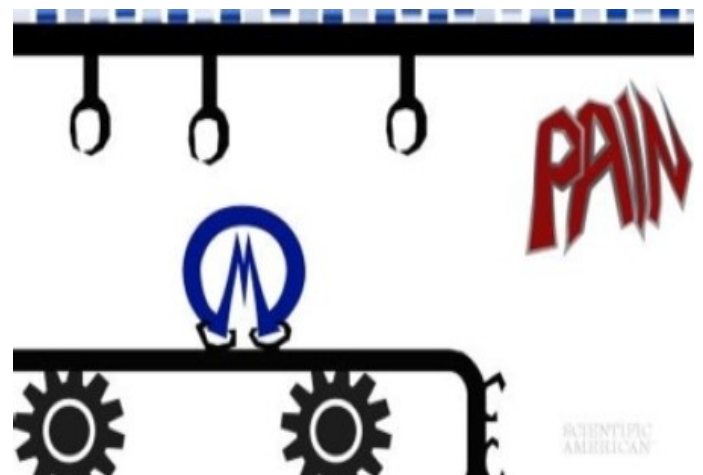
“Simple genetic tests can help them hit that sweet spot.”

How Gene Testing Could Help You Find Personalized Painkillers

Drug dosing is all about balance. Doctors need to prescribe enough of a drug to treat the problem, but not so much as to cause toxicity or other issues. Now, simple genetic tests can help them hit that sweet spot. Factors like age, weight and kidney function influence how well a drug works. But genetics often play a role, too. Take the common painkiller codeine. Typically, the body makes an enzyme that breaks down codeine into morphine, which muzzles pain.

But some people have gene variants that lead to low enzyme levels. For them, almost no codeine is converted into morphine, and there's no pain relief. As many as 10 percent of people are in this predicament. Another small percentage of people make too much

of the enzyme. That means too much morphine, and the possibility of a fatal overdose. Genetic variation affects how people respond to other drugs as well. Multiple studies suggest that half of hospital patients could have genes that fuel issues with their medications. It is not yet part of standard medical practice to match drugs to your genetic makeup. But a few hospitals that are offering such tests are hoping that someday soon that will change.



The U.S. Takes Its First Shot at Zika

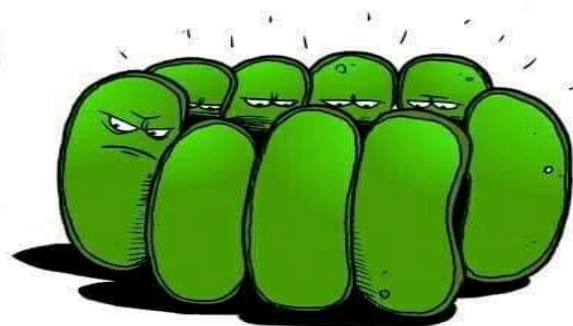


Roughly a year after Brazilian doctors and researchers first suspected a link between a spate of alarming birth defects and the Zika

virus, a cadre of potential vaccines are now headed for testing in humans. The first vaccine to receive the green light for human trials is a product from Pennsylvania-based Inovio Pharmaceuticals. Unlike any other vaccine designed for human use, this product would be a DNA vaccine that only contains a particular part of the pathogen (rather than a vaccine with

an inactivated live or dead virus, for example). This vaccine would include a circular plasmid of DNA with the genes of specific proteins of the Zika virus inserted into it, and its effect will be similar to that of an inactivated vaccine—making the virus unable to copy itself. This synthetic vaccine will hopefully trigger in recipients an antibody response that will help fight off any Zika virus it encounters..

An NIH-backed vaccine is among several heading for human trials, but the timeline for large-scale deployment remains murky



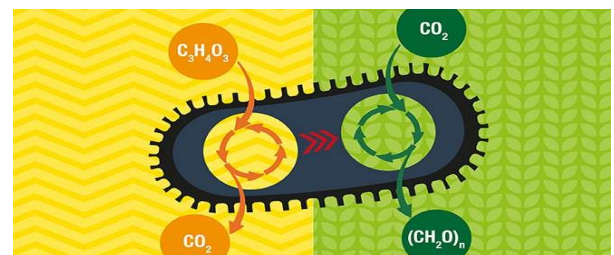
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Sugar from greenhouse carbon dioxide

Is it possible to reprogram an organism that is found in the higher food chain, which consumes sugar and releases carbon dioxide, so that it will consume carbon dioxide from the environment and produce sugars it needs to build its body mass?

Scientists now report that they have engineered bacteria to create sugar from the greenhouse gas carbon dioxide.



Weizmann institute scientists engineer bacteria to create sugar from the greenhouse gas carbon dioxide

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Some interesting facts....

- The largest bacteria found so far can actually be seen without the use of a microscope (*Thiomargarita namibiensis* and *Epulopiscium fischelsoni*). *Thiomargarita namibiensis*, which means “sulfur pearl of Namibia” is a single celled giant bacteria that lives in the ocean.
- To prove that stomach ulcers were caused by bacteria and not stress, a scientist drank a beaker of the bacterium. He did indeed develop stomach ulcers and won the Nobel Prize in Medicine for proving it.
- Honey is a natural reservoir for the Botulism bacteria. Adults can normally process it and infants can't and this is why you shouldn't give babies honey.

How microbes see it.....

