Bio-bites!

**Insulin producing mini organs successfully control blood glucose levels in mice**

In a publication in *Cell Stem Cell*, a team of researchers led by Qiao Zhou, of the Harvard University Department of Stem Cell and Regenerative Biology reports successfully controlling blood glucose levels in mice by mini organs containing pylorus cells re-programmed to secrete insulin. The insulin-producing potential of the pyloric stomach cells likely comes from their natural similarity to pancreatic β cells. The researchers found that many genes critical for β cell function are also normally expressed in the pylorus’s hormone-producing cells.

Reprogrammed Stomach Tissue as a Renewable Source of Functional β Cells for Blood Glucose Regulation.

Ariyachet C, Tovaglieri A, Xiang G, Lu J, Shah MS, Richmond CA, Verbeke C, Melton DA, Stanger BZ, Mooney D, Shivdasani RA, Mahony S, Xia Q, Breault DT, Zhou Q.

*Cell Stem Cell*. 2016 Mar 3;18(3):410–21

Engineered mini-stomachs produce insulin in mice

Cell Press Public Release, Feb 2016

Available from http://www.eurekalert.org/pub_releases/2016-02/cp-emp021216.php

**Bioremediation of PET**

Polyethylene terephthalate (PET) is used extensively worldwide in plastic products, and its accumulation in the environment has become a cause for global concern. Because the ability to enzymatically degrade PET has been thought to be limited to a few fungal species, biodegradation is not yet a viable remediation or recycling strategy. By screening natural microbial communities exposed to PET in the environment, a team of Japanese scientists isolated a novel bacterium, *Ideonella sakaiensis* 201-F6, that is able to use PET as its major energy and carbon source.

A bacterium that degrades and assimilates polyethylene terephthalate

Yoshida S, Hiraga K, Takehana T, Taniguchi I, Yamaji H, Maeda Y, Toyohara K, Miyamoto K, Kimura Y, Oda K.

*Science*. 2016 Mar 11;351(6278):1196–9

**Minimal genome contains 473 genes**

In three cycles of design, synthesis and testing, researchers at the J. Craig Venter Institute (JCVI) in San Diego, produced JCVI-syn3.0 (531 kgbase pairs, 473 genes), which has a genome smaller than that of any autonomously replicating cell found in nature. JCVI-syn3.0 retains almost all genes involved in the synthesis and processing of macromolecules. Unexpectedly, it also contains 149 genes with unknown biological functions. The team’s starting point was the bacterium *Mycoplasma genitalium*, which has the smallest known genome of any living cell with just 525 genes. According to the authors, JCVI-syn3.0 is a versatile platform for investigating the core functions of life and for exploring whole-genome design.

Design and synthesis of a minimal bacterial genome.

Hutchinson CA 3rd, Chuang RY, Noskov VN, Assad-Garcia N, Deerinck TJ, Ellisman MH, Gill J, Kannan K, Karas BJ, Ma L, Pelletier JF, Qi ZQ, Richter RA, Strychalski EA, Sun L, Suzuki Y, Tsvetanova B, Wise KS, Smith HO, Glass JI, Merryman C, Gibson DG, Venter JC.

*Science*. 2016 Mar 25;351(6280):aad6253.

Minimal Genome Created

R Williams

The Scientist, March 2016
Hearts from transgenic pigs survive in baboons

Preventing xenograft rejection is one of the greatest challenges of transplantation medicine. In a recent publication in *Nature Communications*, a team of researchers led by Muhammad M. Mohiuddin described long-term survival of cardiac xenografts from α 1–3 galactosyltransferase gene knockout pigs, which express human complement regulatory protein CD46 and human thrombomodulin (GTKO.hCD46.hTBM), when transplanted into baboons. Combined with an αCD40 (2C10R4) antibody-based immunomodulatory regimen, median graft survival of 298 d was attained.

Chimeric 2C10R4 anti-CD40 antibody therapy is critical for long-term survival of GTKO.hCD46.hTBM pig-to-primate cardiac xenograft.

Mohiuddin MM, Singh AK, Corcoran PC, Thomas Iii ML, Clark T, Lewis BG, Hoyt RF, Eckhaus M, Pierson Iii RN, Belli AJ, Wolf E, Klymiuk N, Phelps C, Reimann KA, Ayares D, Horvath KA.

Nat Commun. 2016 Apr 5;7:11138

Genetically engineered pig hearts survive a record-breaking 2 y inside baboons

Rachel Feltman, April 2016

The Washington Post

Available from: https://www.washingtonpost.com/news/speaking-of-science/wp/2016/04/05/genetically-engineered-pig-hearts-survive-a-record-breaking-2-years-inside-baboons/

Genetically engineered hornless cattle

Physical dehorning of dairy cattle is practiced to protect animals and their handlers. Genetic analyses have identified variants that are associated with hornlessness (referred to as “polled”), a trait that is common in beef but rare in dairy breeds. Using transcription activator-like effector nucleases (TALENs), researchers at Recombinetics, a St. Paul, Minnesota–based biotech company that uses genetic technologies for agriculture and biomedicine, inserted an allele for the POLLED gene into the genome of bovine embryo fibroblasts. They then used somatic cell nuclear transfer to clone the genetically engineered cell lines and implanted the embryos into recipient mother cows. Five calves were born, 2 of which are still living. None of the calves had evidence of horn buds.

Production of hornless dairy cattle from genome-edited cell lines.

Carlson DF, Lancto CA, Zang B, Kim ES, Walton M, Oldeschulte D, Seabury C, Sonstegard TS, Fahrkenrug SC.

Nat Biotechnol. 2016 May 6;34(5):479–81.

Genetically Engineered Hornless Dairy Calves

Jef Akst. May 2016. The Scientist. Available from: http://www.the-scientist.com/?articles.view/articleNo/46064/title/Genetically-Engineered-Hornless-Dairy-Calves/&utm_campaign=NEWSLETTER_TS_The-Scientist-Daily_2016&utm_source=hs_email&utm_medium=email&utm_content=29467906&_hsenc=p2ANqtz-yynjHaslNtwKcocxPO4rofZLyaurkjqLTH001eaLDNM8LGOpqRnm5Xtpbog0ie5hr236-y_C5W0-75eJWEloXCtqW8A&_hsmp=29467906

Genetically modified salmon approved in Canada

At a news conference in Ottawa, Health Canada and the Canadian Food Inspection Agency announced AquaBounty’s genetically modified salmon has been approved for sale as food in Canada. A final round of thorough and rigorous Canadian scientific reviews found that AquAdvantage Salmon is as safe and nutritious as conventional salmon. The fish grow twice as fast as conventionally farmed Atlantic salmon because of the addition of genes from a Chinook salmon and an eel known as an ocean pout. Health Canada will not require AquAdvantage Salmon sold on Canadian grocery store shelves to be labeled as a genetically modified product.

Genetically Modified Salmon Approved for Sale as Food in Canada

Laura Chapin, May 2016. CBC News. Available from: http://www.cbc.ca/news/canada/prince-edward-island/pei-aquabounty-salmon-genetically-modified-food-1.3589613