

Bio-Bites!

Finding meaning in the sequence of the human genome

More than 400 scientists united in an international project called ENCODE (Encyclopedia of DNA Elements),¹ have published their 10 year efforts in assigning functions to the human genome in more than 30 papers across many different journals.

This international collaboration of research groups is funded by the National Human Genome Research Institute (NHGRI). The project has systematically mapped regions of transcription, transcription factor association, chromatin structure and histone modification. According to the authors, these data allow us to assign biochemical functions to 80% of the genome, in particular outside of the

well-studied protein-coding regions. Many of the newly discovered candidate regulatory elements are physically associated with one another and with expressed genes, providing new insights into the mechanisms of gene regulation. The newly identified elements also show a statistical correspondence to sequence variants linked to human disease, and can thereby guide interpretation of this variation. Overall, the project provides new insights into the organization and regulation of our genes and genome, and is an expansive resource of functional annotations for biomedical research.²

References

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2. The ENCODE Project Consortium. An integrated encyclopedia of DNA elements in the human genome. *Nature*. 2012 September 5; Available from: <http://www.nature.com/nature/journal/v489/n7414/full/nature11247.html>

EU court rules Italy can not deny cultivation of approved GM maize

The judgment concludes a dispute between the Italian Ministry of Agriculture and the Italian arm of biotechnology company Pioneer Hi-Bred, which produces and distributes conventional and genetically modified (GM) seeds.¹ Pioneer Hi-Bred was seeking to cultivate a variety derived from Monsanto's controversial insect-resistant maize, MON810, which the EU approved for use in 1998, despite fears that it could cause harm to the environment.

In its ruling on September 6, 2012, the court wrote that a member state cannot prohibit "in

a general manner the cultivation on their territory of such GMOs pending the adoption of coexistence measures," citing legislation that placed the use and marketing of GMOs under the jurisdiction of the European Union (EU), which approved the use of GM maize in 1997.

This means that states in the EU cannot create their own approval process for growing genetically modified organisms (GMOs).²

References

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2. Mole BM. A Win for GM Crops. *The Scientist*. 2012 September 10; Available from: <http://the-scientist.com/2012/09/10/a-win-for-gm-crops/>

Transgenic rice study in children heavily criticized by Greenpeace China

Golden rice¹ was created in the late 1990s as an attempt to help people worldwide suffering from vitamin A deficiency; which is estimated to cause blindness in more than a quarter of a million children annually.² The rice variety produces β -carotene, a precursor to vitamin A not naturally present in rice. The study in China sought to establish how efficiently β -carotene in golden rice is converted to vitamin A, once ingested. According to the published study, which was conducted in 2008, the researchers fed 72 children either golden rice, spinach, or capsules with β -carotene in oil. They reported that golden rice was as good a vitamin source as the capsules,

and better than spinach.³ The study published in early August drew little attention until the activist group Greenpeace China claimed the trial shouldn't have gone forward and called it a "scandal of international proportions." Defenders of the trial, including the US National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK), which partly funded the research, have countered that the research was carried out with all the necessary legal and ethical permissions in place. Adrian Dubock, manager of the Golden Rice Project in Dornach, Switzerland, who was not part of the study, has branded Greenpeace's actions "callous and cynical"

References

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3. Tang G, Hu Y, Yin SA, Wang Y, Dallal GE, Grusak MA, Russell RM. β -Carotene in Golden Rice is as good as β -carotene in oil at providing vitamin A to children. *Am J Clin Nutr* 2012; 96:658-64; PMID:22854406; <http://dx.doi.org/10.3945/ajcn.111.030775>.

Allergen free milk

Researchers have long struggled to remove cow milk's allergy-inducing protein, beta-lactoglobulin, which can cause diarrhea and vomiting in children. However, scientists at AgResearch in Hamilton, New Zealand, have recently isolated a microRNA (miRNA) in mice that targets beta-lactoglobulin mRNA.¹ By inserting DNA encoding a version of this miRNA into the genomes of cow embryos they identified one calf (out of 100) which produced beta-globulin-free milk. The

findings demonstrate miRNA-mediated depletion of an allergenic milk protein in cattle and validate targeted miRNA expression as an effective strategy to alter milk composition and other livestock traits.²

References

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2. Cossins D. The GM Barnyard. *The Scientist*. 2012 October 3; Available from: <http://www.the-scientist.com/?articles.view/articleNo/32718/title/The%20GM%20Barnyard>.

Study on GM-maize faces serious critique from regulatory bodies

Gilles-Eric Seralini, a molecular biologist at the University of Caen, France, is under intense pressure to report the full data behind his team's finding that rats fed for two years with Monsanto's glyphosate-resistant NK603 maize (corn) had an increased incidence of cancer. After the study has been published,¹ the European Food Safety Agency (EFSA)² and Germany's Federal Institute for Risk Assessment (BfR)³ both issued statements stressing its scientific inadequacy and poor reporting. The main points of critique were that an unsuitable rat strain was used (very high background tumor incidence), insufficient group size and not enough control animals, insufficient reporting (i.e., food intake, food quality, body weight gain, etc.), statistical evaluation, and

missing reports on other endpoints. "There is a high probability that the findings in relation to the tumour incidence are due to chance, given the low number of animals and the spontaneous occurrence of tumours in Sprague-Dawley rats," concludes the EFSA report. In response to the EFSA's assessment, the European Federation of Biotechnology—an umbrella body in Barcelona, Spain, that represents biotech researchers, institutes and companies across Europe—called for the study to be retracted, describing its publication as a "dangerous case of failure of the peer-review system."

References

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