



Sabato 23 aprile 2016 – ore 10.00

**OGM sul pianeta Terra: visto da Marte**

Con Carlo Alberto Redi

Dip. Biologia e  
Biotechnologie “Lazzaro Spallanzani”  
Università degli Studi di Pavia

**SCIENZE DI PRIMAVERA 2016 – I CICLO DI CONFERENZE**

**“SIAMO POLVERE DI STELLE: viaggio dall’Universo più  
profondo...alla nostra tavola...”**

**C.D.S. – Centro di Divulgazione Scientifica dell’ I. I. S. S. “G.  
PENNA”**

MA È  
TRANSGENICO!

MANGIA CHE SENO' NON  
SAPREMO MAI SE  
FA MALE O NO.



SPECIAL SECTION

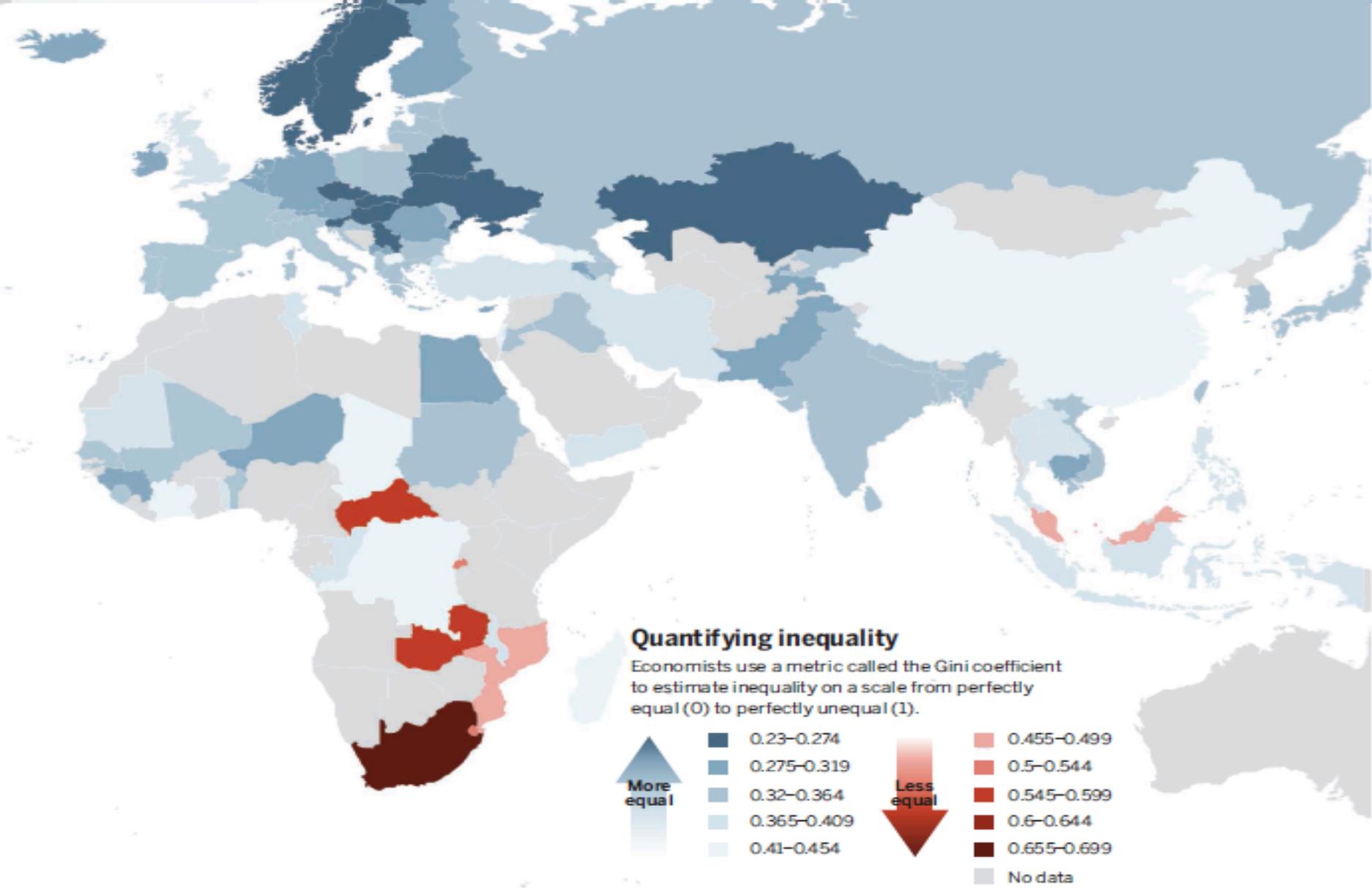
the science of  
**Inequality**  
What the numbers tell us

*By Gilbert Chin and Elizabeth Culotta*

INSIDE



An elderly man holds out his begging cup in bustling Hong Kong.



# A world of difference

Countries vary widely in inequality

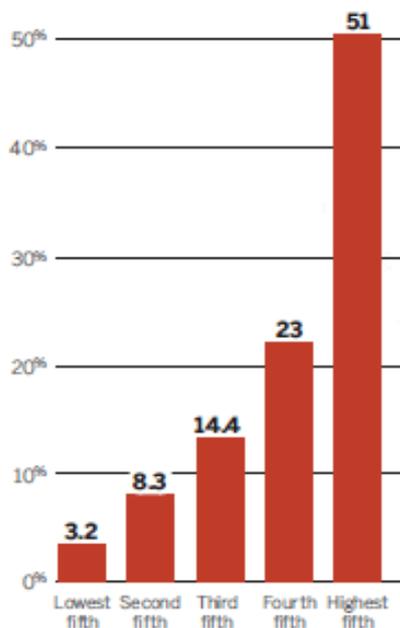
Compiled by **Emily Underwood**

The world Gini data, collected between 2008 and 2012, cover 117 countries and were prepared for Science by researchers Branko Milanovic and Janet Gornick of the Luxembourg Income Study Center at the City University of New York's Graduate Center.

U.S. data are based on 2012 U.S. Census Bureau surveys of 122,459 households.

## A sharp divide

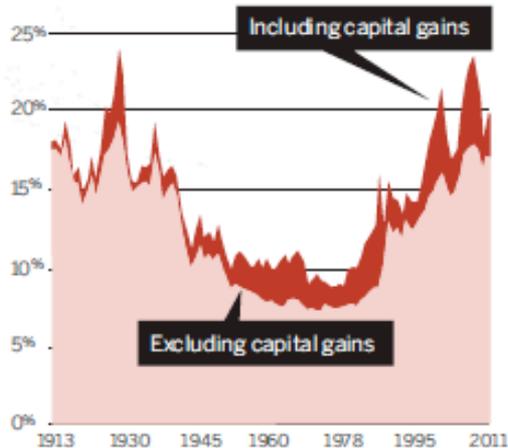
Shares of U.S. income by quintile, 2012



Source: U.S. Census Bureau

## Winners take all

Top 1% income share in the United States



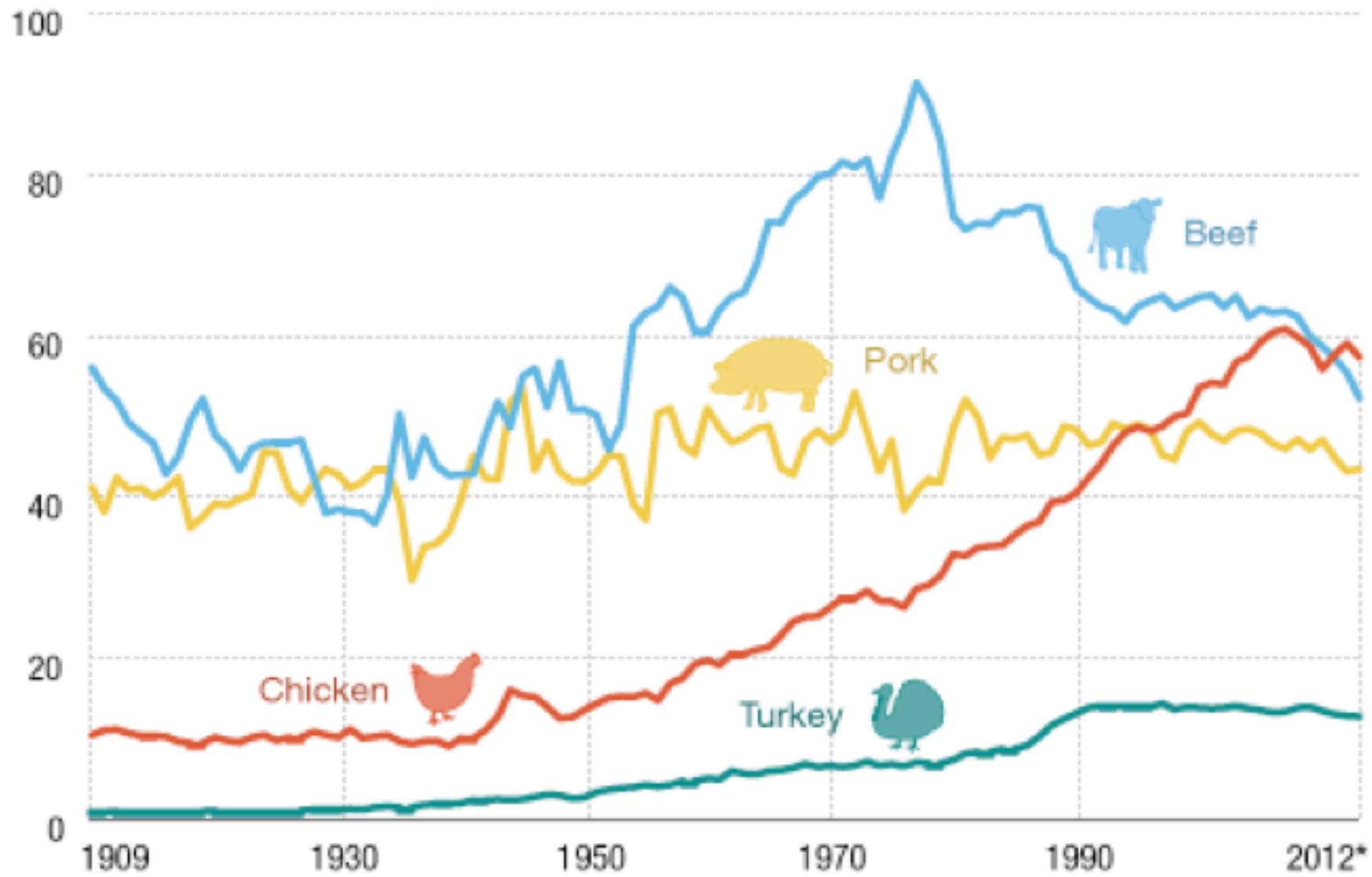
Source: Piketty and Saez, 2013

# DEFINE



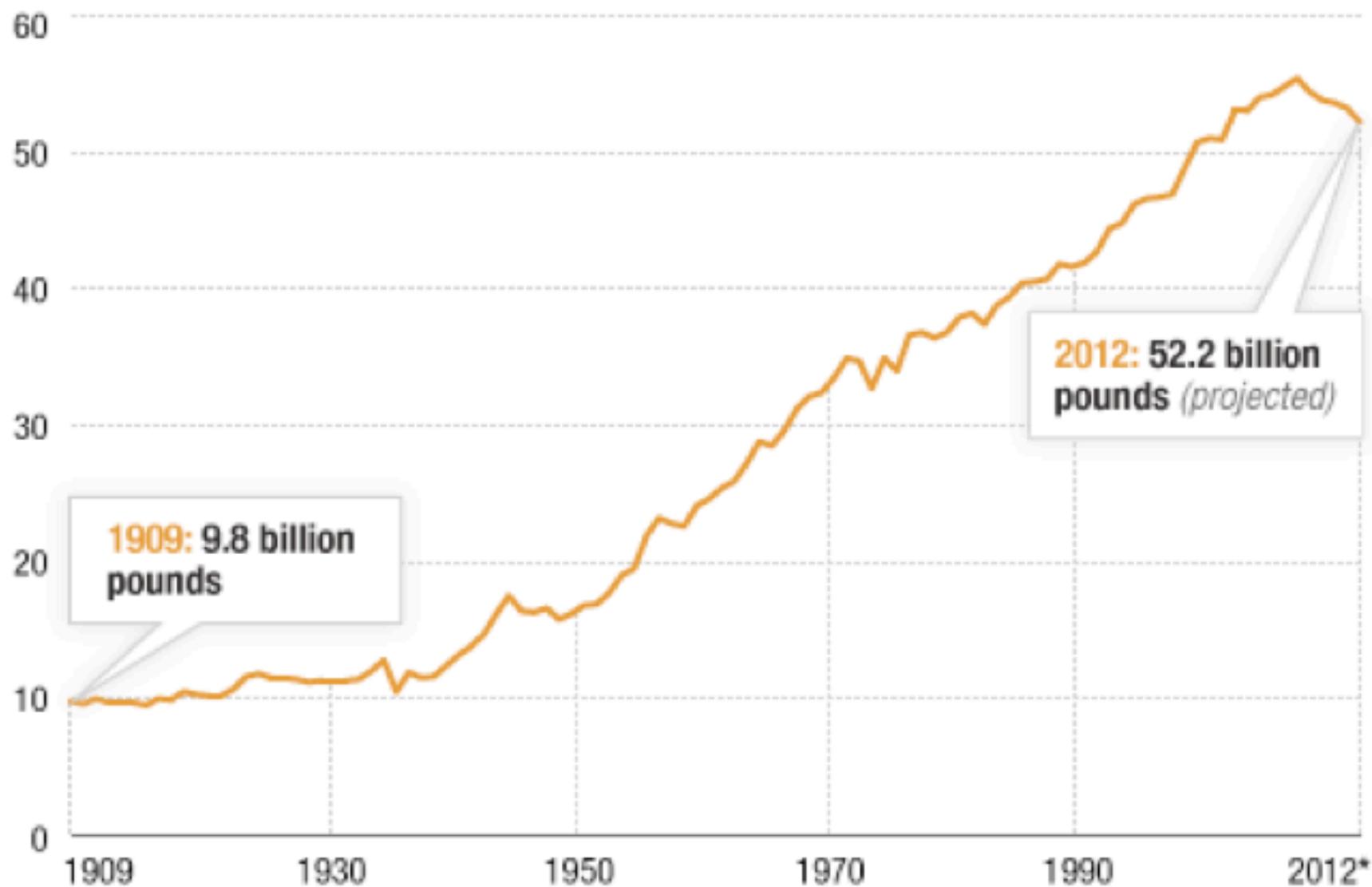
# NECESSITY

## U.S. meat consumption per person, in pounds



Source: Earth Policy Institute

## U.S. total meat consumption, in billion pounds



Source: Earth Policy Institute

## What It Takes To Make A Quarter-Pound Hamburger



feed

**6.7**

Pounds of  
grains and forage



water

**52.8**

Gallons for drinking water  
and irrigating feed crops



land

**74.5**

Square feet for grazing  
and growing feed crops



fossil fuel  
energy

**1,036**

BTUs for feed production and  
transport. That's enough to power a  
typical microwave for 18 minutes.



Source: J.L. Capper, *Journal of Animal Science*, July, 2011.

Credit: Producers: Eliza Barclay, Jessica Stoller-Conrad; Designer: Kevin Uhrmacher/NPR

# FOOD & AGRICULTURE ORGANIZATION OF THE UN

**5.000 l** di acqua (giornaliero) per sfamare un essere umano

Litri / Kg per la produzione di : latte 1.020

zucchero 1.782

pasta 1.849

riso 2.497

carne di pollo 4.325

carne di manzo 15.415

**SOIA 1.053**





Dried and crushed mealworms could be fed to cattle, pigs, poultry, and fish.

# BUZZ FOOD

Feeding insect meal to livestock could help the planet, but will it be good for people? *By Kai Kupferschmidt*

trials designed to answer an increasingly urgent question: **Are insects the animal feed of the future?**

**Some scientists are convinced the answer is yes. The world's appetite for meat is growing, and the production of animal feed is an increasing strain on land and water. Insects could provide much of the protein animals need at a much lower environmental cost; many insect species can feed on manure, like Grant's maggots, or other types of organic waste, such as leftover food, offal, and grains discarded by breweries.**

Regulatory agencies are beginning to weigh the benefits against potential safety risks, including the possibility that insects

stock or fish are switched to this new diet. But in other countries the brave new world of industrial-scale insect farming is already on view.

**THE BEST WAY TO TURN INSECTS** into food is simply to eat them—and in many countries people already do. **More than 2 billion people occasionally cook caterpillars, boil beetles, or marinate maggots as part of their traditional diet. In Southern Africa, 9.5 billion mopane caterpillars—named for their favorite tree—are harvested every year for human consumption, and in Uganda, a kilogram of grasshoppers is more expensive than a kilogram of beef.**



**Many people find the idea of eating mealworms repulsive. Feeding them to animals avoids that problem.**

## Waste

Insects can feed on leftover food, grains discarded by distilleries, or even manure.



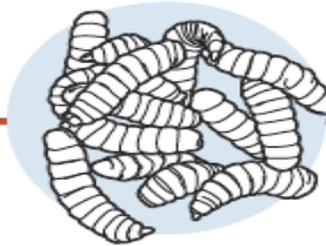
## Flies

Adult flies are kept in a room; their eggs are collected.



## Larvae

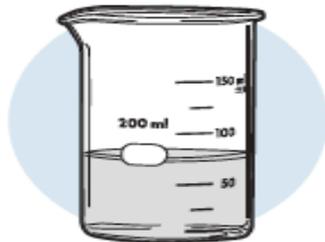
The eggs develop into larvae. Some of them are allowed to grow into flies to lay more eggs.



## Pressing

## Oil

Insect oil could replace fish oil or soy oil in animal feed.



## Drying

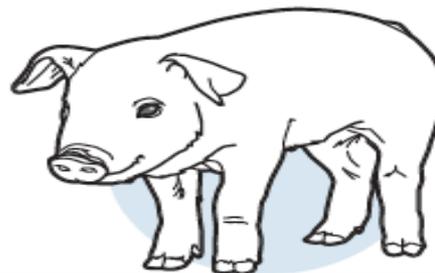
## Meal

Insect meal could replace fish meal or soy meal.



## Livestock and fish

Feeding trials are ongoing; regulators are studying the risks of allowing insect-fed animals into the human food chain.



# Savage River Inc.

**Thanks for your interest in meat substitute products!**



We value the trust you've put in our hands by giving us your email address. You'll only be contacted with important information—no frivolous “news” about changing the color of our logo...that is if we had a logo.

As you read in the *New York Times* article, we don't yet have a name for our brand. That's where you come in.

We need you to break the tie and move the needle on one of our name finalists.

Give us your top choice for a brand name as soon as you can so that we can get back to making products for you to enjoy!

Thanks again for your support. We'll be back to you soon with more information on our products and where and when you'll be able to buy them.





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**BEYOND EGGS™**

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INSIDE THIS WEEK: A 16-PAGE SPECIAL REPORT ON WATER

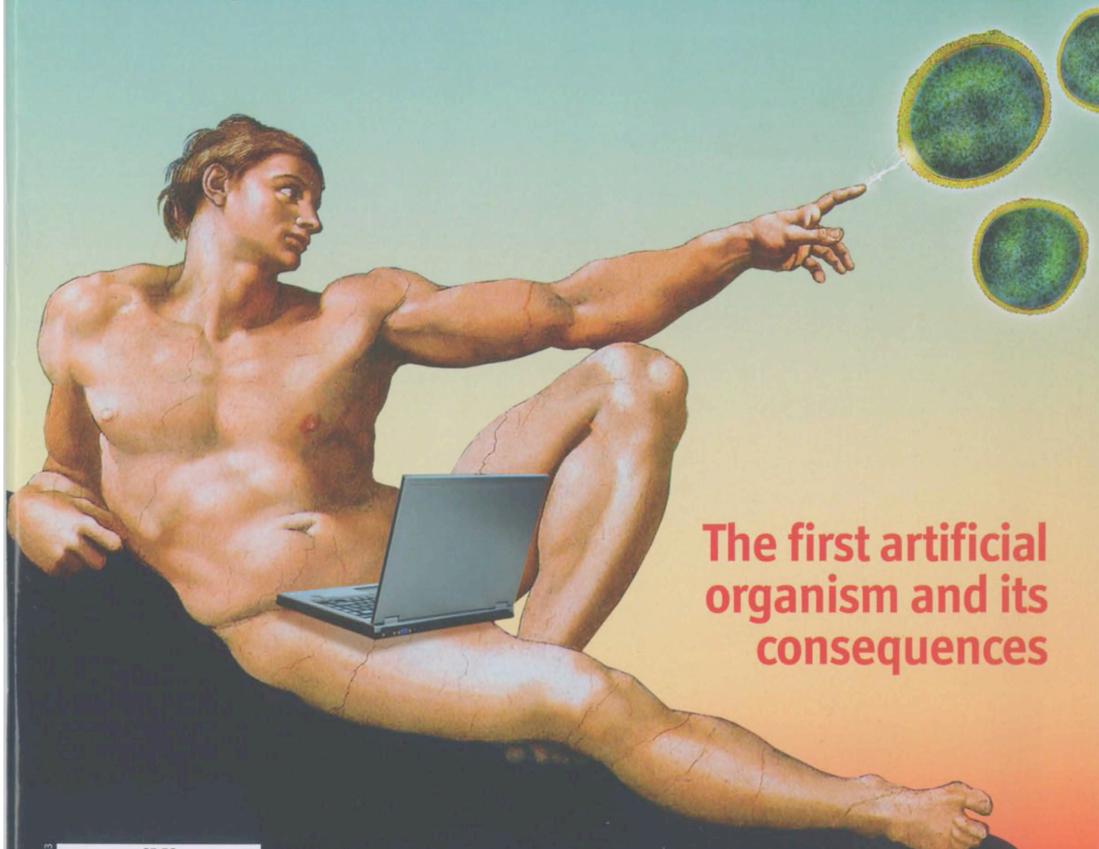
# The Economist

MAY 22ND-28TH 2010

Economist.com

The battle of Bangkok  
America's surprising primaries  
Does Facebook know too much?  
Labour after Gordon Brown  
How to plug an oil well

## And man made life



The first artificial organism and its consequences

ISSN 0959-9142

€5.50



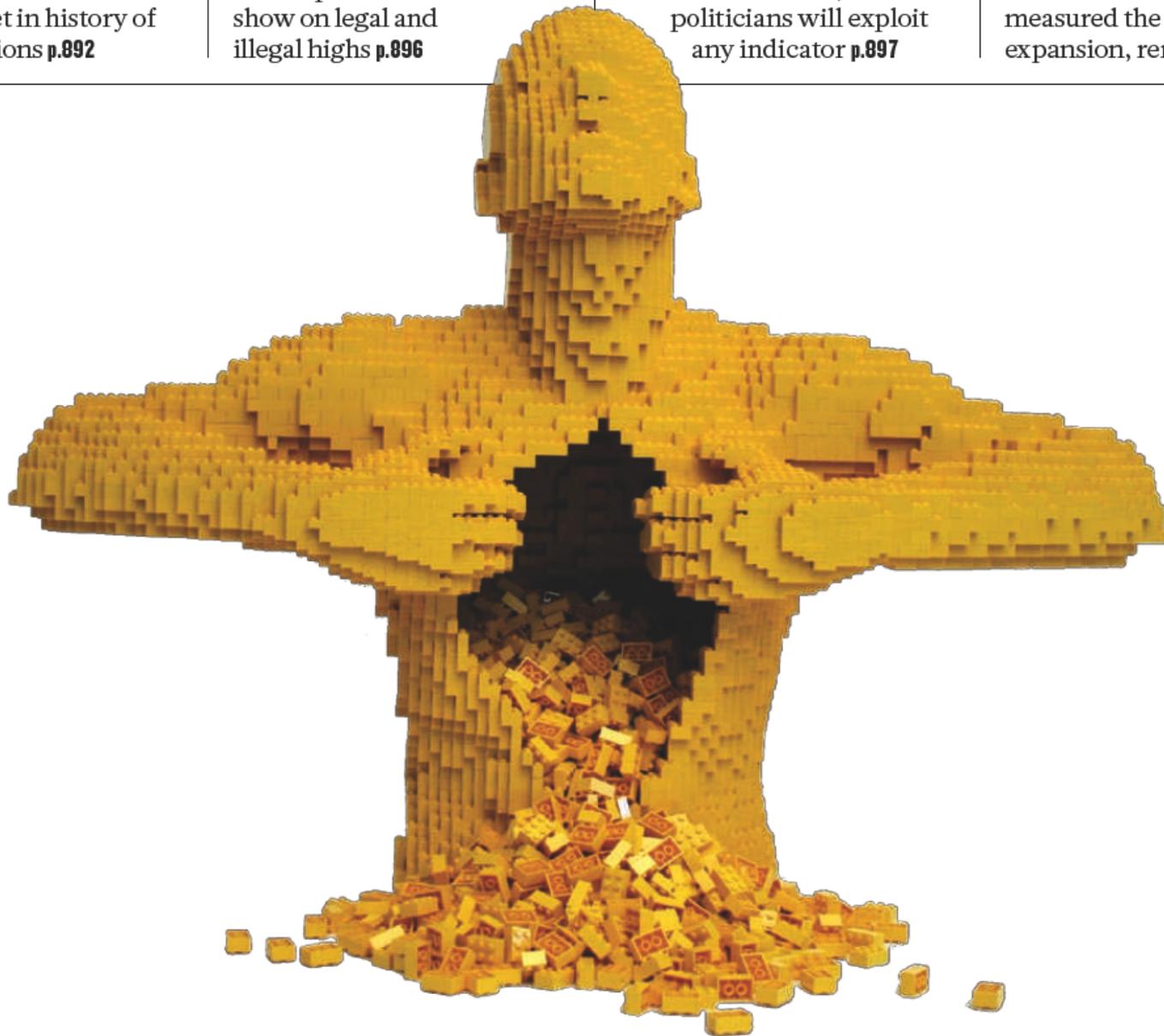
Albania	ALL760	Croatia	HRK48	France	€5.50	Ireland	€5.50	Latvia	LVL3.90	Nigeria	Naira 700	Romania	RON24	South Africa	R45.00
Austria	€5.50	Cyprus	€5.50	Gibraltar	€5.50	Israel	NIS 38.90	Lebanon	LEL1,500	Norway	Nkr 50	Saudi Arabia	Riial40	Sweden	SEK55
Bahrain	Dinar4.00	Czech Rep	CZK150	Greece	€5.50	Italy	€5.50	Lithuania	Lit120	Poland	PLN4	Serbia	RSD60	Switzerland	Sfr10
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**TECHNOLOGY** Lessons for future  
the Internet in history of  
communications **p.892**

**DRUGS** Opium dominates  
show on legal and  
illegal highs **p.896**

**ECONOMICS** Beware,  
politicians will exploit  
any indicator **p.897**

**OBITUARY** Allan Sandage,  
measured the Universe's  
expansion, remember



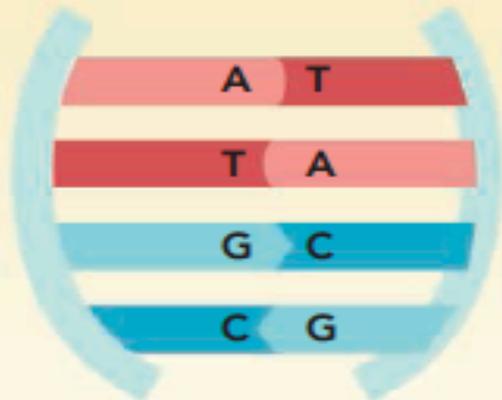
Build life to understand it

XNA

BEFORE

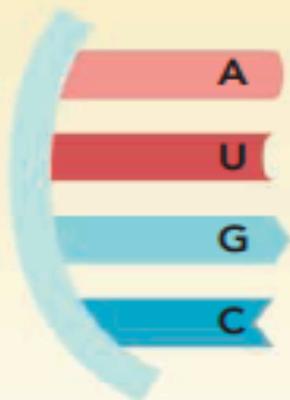
### DNA

4 nucleotides, 2 base pairs



### RNA

4 nucleotides



### Proteins

can be built with

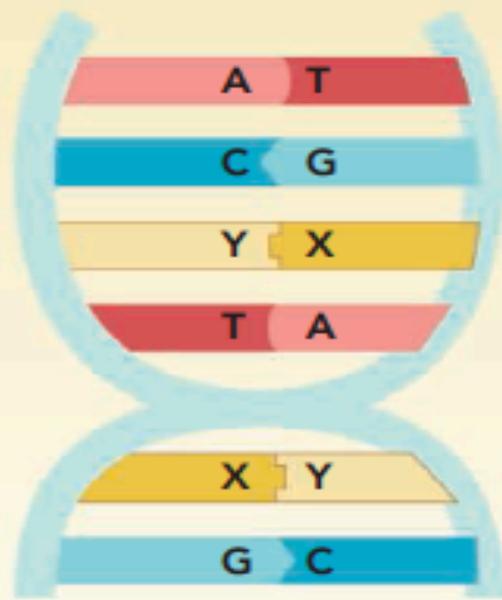
# 20

amino acids

AFTER

### Expanded DNA

6 nucleotides, 3 base pairs



### Expanded RNA

6 nucleotides



### Proteins

can be built with

# 172

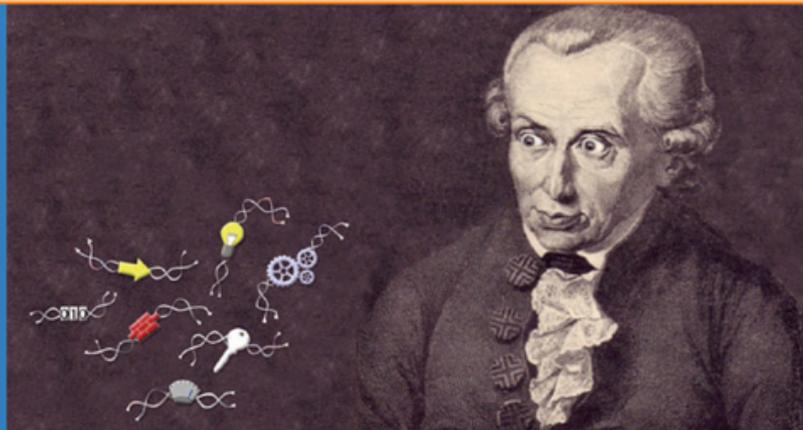
amino acids

DNA 2.0. By adding a new base pair, X and Y, to DNA's A-T and G-C pairs, researchers will

Markus Schmidt · Alexander Kelle  
Agomoni Ganguli-Mitra · Huib de Vriend  
*Editors*

# Synthetic Biology

*The technoscience and  
its societal consequences*



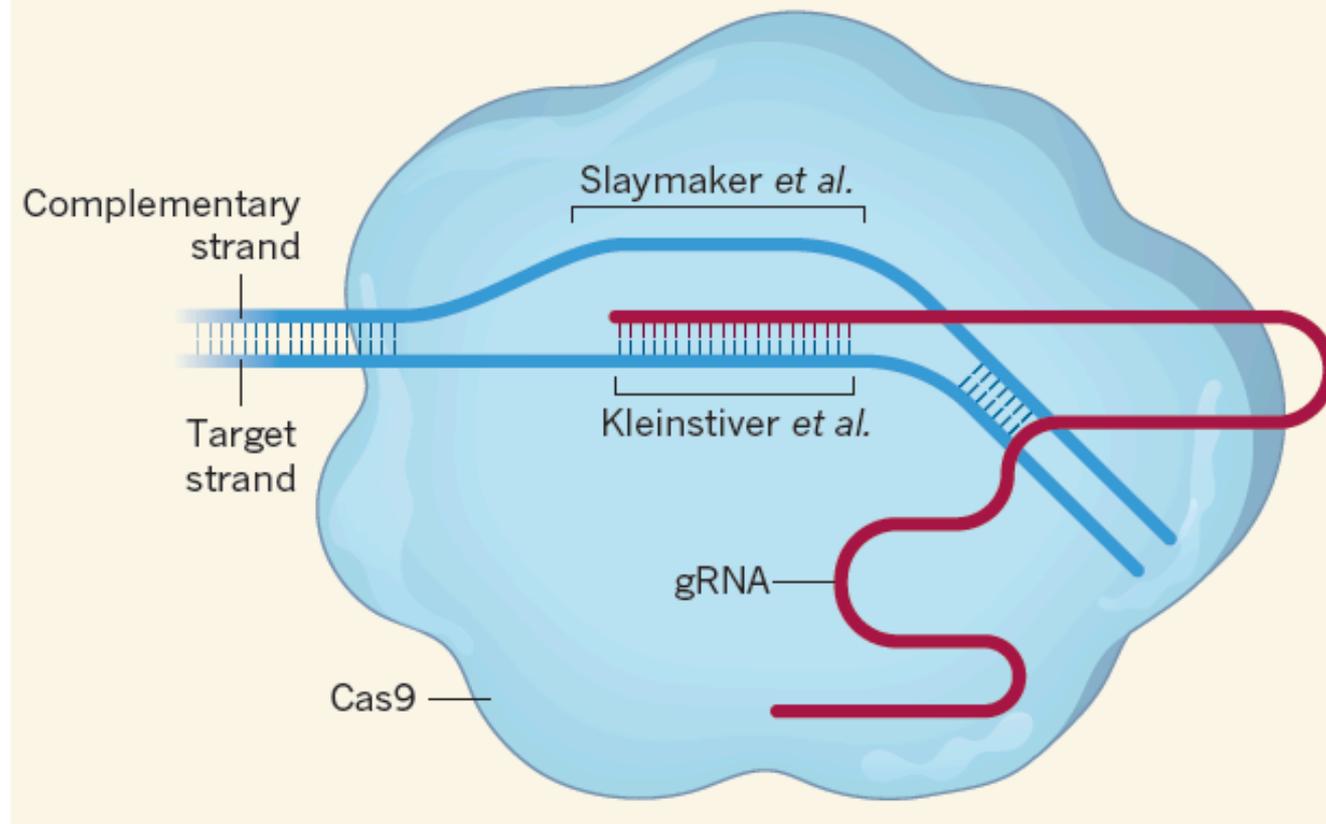
Craig Venter



Synthia



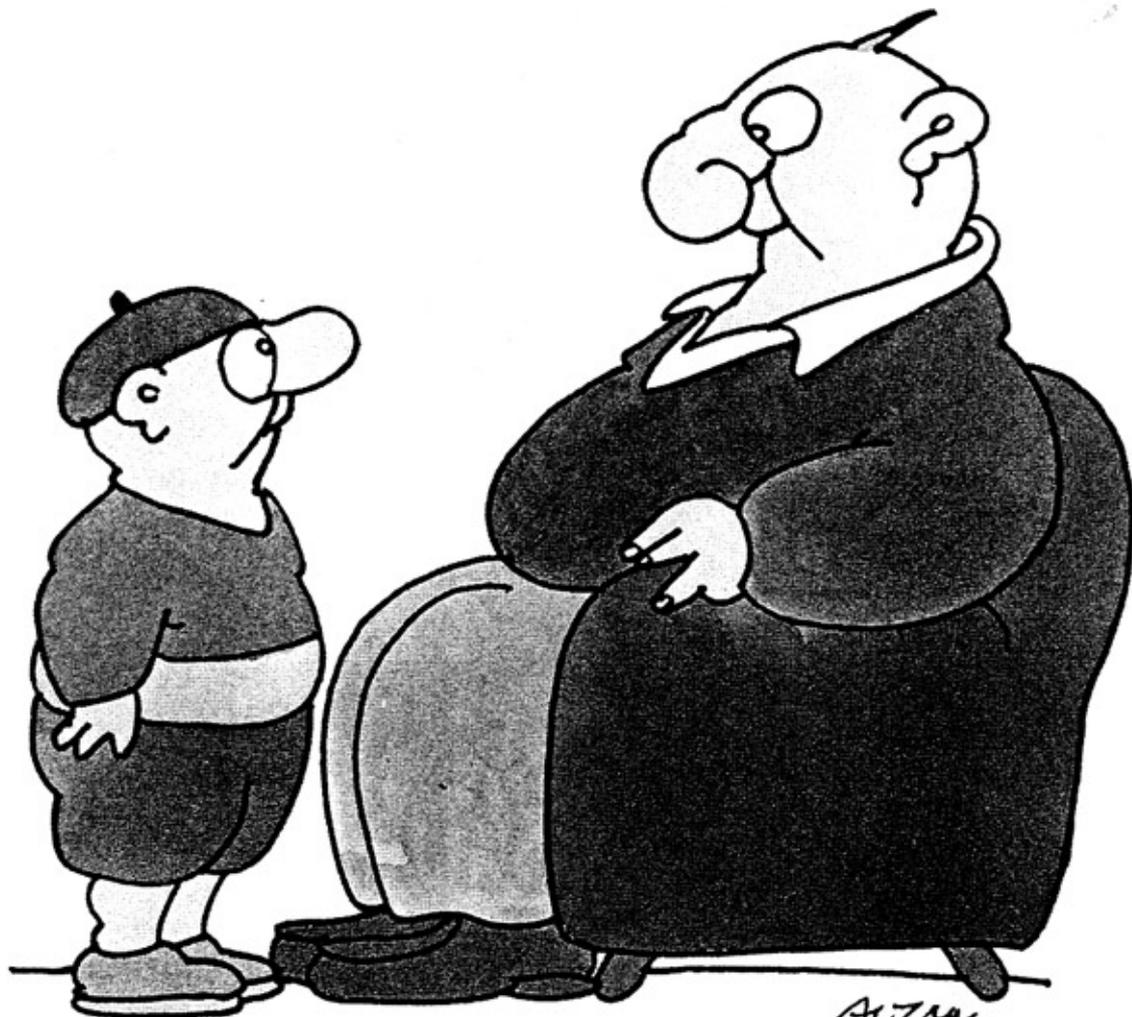
From left, former Twitter CEO Dick Costolo, Emmanuelle Charpentier, Jennifer Doudna and Cameron Diaz.



**Figure 1 | Taming a wild enzyme.** The Cas9 enzyme cuts specific DNA sequences, which it identifies using a guide RNA (gRNA) that pairs with the chosen sequence in an unwound DNA double helix. Kleinstiver *et al.*<sup>1</sup> engineered Cas9 such that interactions between the enzyme and the backbone of the gRNA-paired DNA were weakened. Slaymaker *et al.*<sup>2</sup> engineered the contacts that the enzyme makes with the complementary DNA single strand, which is not recognized by the gRNA. These modifications forced the engineered enzymes to rely to a greater extent on the gRNA for sequence recognition, thus improving their binding specificity. (Adapted from ref. 1.)

HO PAURA,  
BABBO.

CALMA: SE DIVENTI  
GRANDE, FARAI  
LO SCIENZIATO  
E TI PASSERA'.



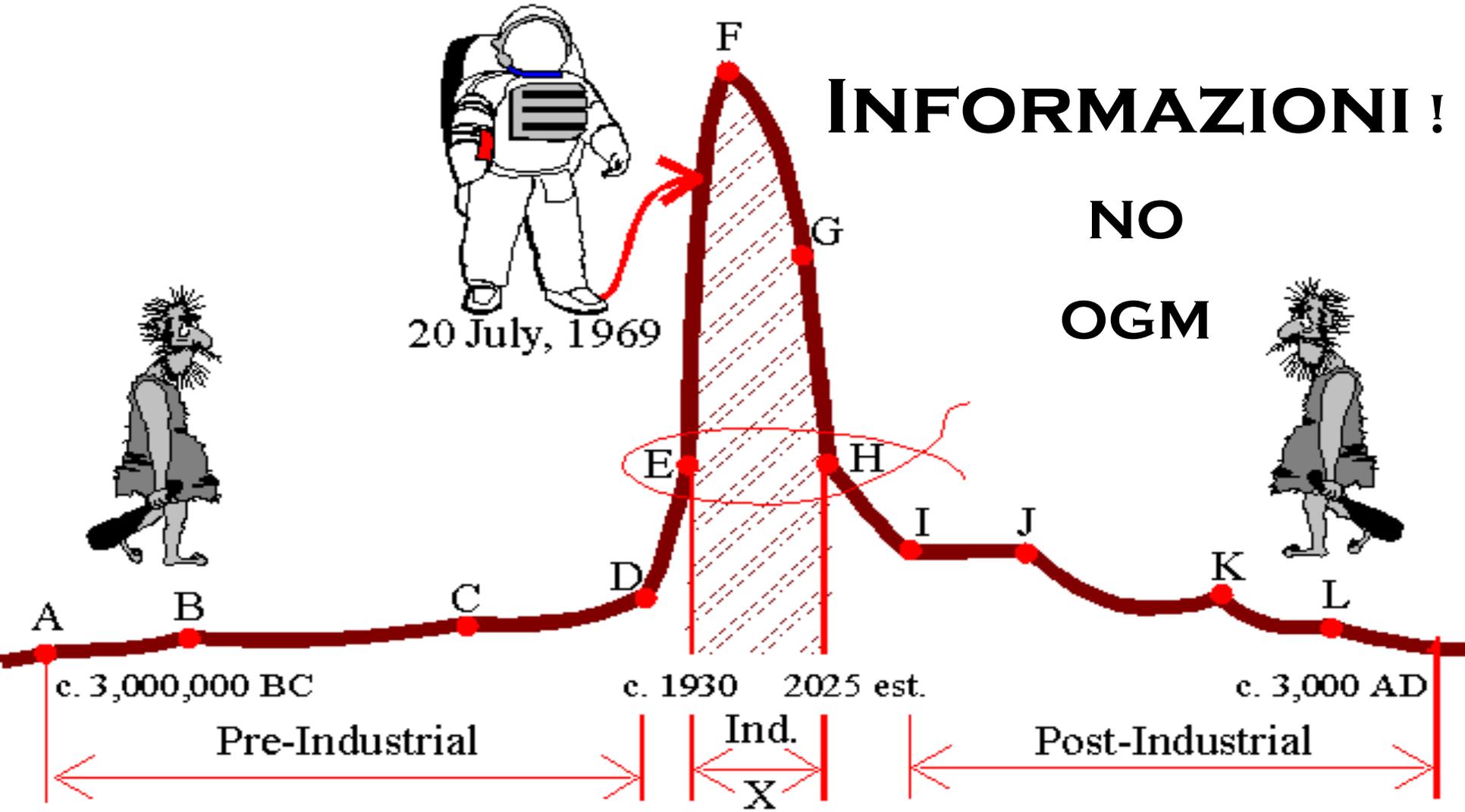
ACTAA.

**NO**

**INFORMAZIONI!**

**NO**

**OGM**



Carlo Alberto Redi

SIRONI  
EDITORE

In libreria dal 21 settembre 2011

# Il biologo furioso

Provocazioni d'autore  
tra scienza e politica



Pagine 224 Prezzo: € 18,00

Il primo libro di uno tra i più importanti biologi italiani dello sviluppo, scienziato vulcanico e senza peli sulla lingua

Dalla clonazione all'inizio-vita, dalle staminali agli ogm, dall'evoluzionismo agli investimenti per la ricerca: 16 brevi saggi di grande attualità tra scienza e politica

«Non è il biologo, o in generale lo scienziato, a creare danni: è il modo di usufruire delle conoscenze che è pericoloso se svincolato da scelte politiche e morali superiori. È per questo che mi indigno con chi ha le redini del nostro Paese, i decisori politici e i grandi (si fa per dire) pensatori, i quali non mostrano la benché minima umiltà nel chiedere di sapere, nell'informarsi sulle conoscenze biologiche necessarie per condurre una società laica e giusta».

Carlo Alberto Redi, tra i più autorevoli biologi italiani dello sviluppo, è scienziato di fama internazionale ma anche un cittadino indignato, anzi furente. L'embrione è un individuo? Lo spermatozoo è vita? Cosa sono gli OGM cisgenici? Quanto investe in ricerca la Corea del Sud? E l'Italia?

Con questo libro sceglie di prendere la parola affrontando temi di caldissima attualità: dalla clonazione all'inizio-vita, dalle staminali agli ogm, dall'evoluzionismo agli investimenti per la ricerca.

Redi ingaggia un confronto aperto con coloro che in Italia "prendono le decisioni" sapendo quasi nulla di ciò su cui devono legiferare e non risparmia fendenti neppure a quanti "tromboni, da avanspettacolo" si arrogano il diritto di parola pubblica su questioni di cui sembrano ignorare le più elementari conoscenze scientifiche.

Con questo pamphlet il biologo offre al lettore elementi per farsi un'opinione più informata e meno ideologica, più argomentata e meno cialtrona. Ma Redi non perde occasione anche per affrontare argomenti più leggeri: Il sesso maschile? In biologia è accessorio! Quando porgete un fiore sapete cosa state tenendo in mano... biologicamente parlando?

Vulcanico, eclettico, scomodo, Redi sa argomentare e, perché no, divertire. Una sola la regola imprescindibile: motivare le proprie affermazioni con i risultati delle ricerche scientifiche più recenti.

Carlo Alberto Redi è docente di Zoologia presso l'Università di Pavia. Ha vinto il *Premio per le Scienze biologiche* dell'Accademia nazionale dei Lincei, di cui è socio corrispondente. È stato membro della Commissione nazionale di studio sull'uso delle cellule staminali ed è membro del Comitato nazionale per la biosicurezza, le biotecnologie e le scienze della vita. I suoi contributi scientifici sono pubblicati sulle più prestigiose riviste internazionali. Dirige il gruppo di ricerca che ha partecipato alla clonazione del topo *Cumulina* e attualmente si occupa di riprogrammazione genetica dei nuclei di cellule somatiche. Insieme a Gianna Milano e Amedeo Santosuosso dirige *OpenLab* di Pavia: laboratorio annuale di eventi e incontri con magistrati, giornalisti e addetti ai lavori.

**GRAZIE !**  
**per l' attenzione !**

