Literatur

Aktuell

Beale 2011

Nicholas Beale, David G. Rand, Heather Battey, Karen Croxsond, Robert M. May & Martin A. Nowak, *Individual versus systemic risk and the Regulator's Dilemma.* PNAS **108** (2011), 12647–12652.

The global financial crisis of 2007–2009 exposed critical weaknesses in the financial system. Many proposals for financial reform address the need for systemic regulation-that is, regulation focused on the soundness of the whole financial system and not just that of individual institutions. In this paper, we study one particular problem faced by a systemic regulator: the tension between the distribution of assets that individual banks would like to hold and the distribution across banks that best supports system stability if greater weight is given to avoiding multiple bank failures. By diversifying its risks, a bank lowers its own probability of failure. However, if many banks diversify their risks in similar ways, then the probability of multiple failures can increase. As more banks fail simultaneously, the economic disruption tends to increase disproportionately. We show that, in model systems, the expected systemic cost of multiple failures can be largely explained by two global parameters of risk exposure and diversity, which can be assessed in terms of the risk exposures of individual actors. This observation hints at the possibility of regulatory intervention to promote systemic stability by incentivizing a more diverse diversification among banks. Such intervention offers the prospect of an additional lever in the armory of regulators, potentially allowing some combination of improved system stability and reduced need for additional capital.

financial stability | global financial markets | financial regulation

Butler 2011

Daniel M. Butler & David E. Broockman, *Do Politicians Racially Discriminate Against Constituents? A Field Experiment on State Legislators.* American Journal of Political Science **55** (2011), 463–477.

AmJPolSci55-0463-Supplement.doc

We use a field experiment to investigate whether race affects how responsive state legislators are to requests for help with registering to vote. In an email sent to each legislator, we randomized whether a putatively black or white alias was used and whether the email signaled the sender's partisan preference. Overall, we find that putatively black requests receive fewer replies. We explore two potential explanations for this discrimination: strategic partisan behavior and the legislators' own race. We find that the putatively black alias continues to be differentially treated even when the emails signal partisanship, indicating that strategic considerations cannot completely explain the observed differential treatment. Further analysis reveals that white legislators of both parties exhibit similar levels of discrimination against the black alias. Minority legislators do the opposite, responding more frequently to the black alias. Implications for the study of race and politics in the United States are discussed.

Eagle 2011

Robert A. Eagle et al., *Dinosaur Body Temperatures Determined from Isotopic (^{13}C-^{18}O) Ordering in Fossil Biominerals.* science **333** (2011), 443–445.

s333-0443-Supplement.pdf
Robert A. Eagle, Thomas Tütken, Taylor S. Martin, Aradhna K. Tripati, Henry C. Fricke, Melissa Connely, Richard L. Cifelli & John M. Eiler
The nature of the physiology and thermal regulation of the nonavian dinosaurs is the subject of debate. Previously, arguments have been made for both endothermic and ectothermic metabolisms on the basis of differing methodologies. We used clumped isotope thermometry to determine body temperatures from the fossilized teeth of large Jurassic sauropods. Our data indicate body temperatures of 36° to 38°C, which are similar to those of most modern mammals. This temperature range is 4° to 7°C lower than predicted by a model that showed scaling of dinosaur body temperature with mass, which could indicate that sauropods had mechanisms to prevent excessively high body temperatures being reached because of their gigantic size.

HECHINGER 2011

Ryan F. Hechinger, Kevin D. Lafferty, Andy P. Dobson, James H. Brown & Armand M. Kuris, *A Common Scaling Rule for Abundance, Energetics, and Production of Parasitic and Free-Living Species.* science **333** (2011), 445–448.
s333-0445-Supplement.pdf
The metabolic theory of ecology uses the scaling of metabolism with body size and temperature to explain the causes and consequences of species abundance. However, the theory and its empirical tests have never simultaneously examined parasites alongside free-living species. This is unfortunate because parasites represent at least half of species diversity. We show that metabolic scaling theory could not account for the abundance of parasitic or free-living species in three estuarine food webs until accounting for trophic dynamics. Analyses then revealed that the abundance of all species uniformly scaled with body mass to the $-3/4$ power. This result indicates "production equivalence," where biomass production within trophic levels is invariant of body size across all species and functional groups: invertebrate or vertebrate, ectothermic or endothermic, and free-living or parasitic.

PEARCE 2011

Eiluned Pearce & Robin Dunbar, *Latitudinal variation in light levels drives human visual system size.* Biology Letters (2011) preprint, 1–4. <http://dx.doi.org/10.1098/rsbl.2011.0570>.
BiolLett2011-preprint-Supplement.pdf
Ambient light levels influence visual system size in birds and primates. Here, we argue that the same is true for humans. Light levels, in terms of both the amount of light hitting the Earth's surface and day length, decrease with increasing latitude. We demonstrate a significant positive relationship between absolute latitude and human orbital volume, an index of eyeball size. Owing to tight scaling between visual system components, this will translate into enlarged visual cortices at higher latitudes. We also show that visual acuity measured under full-daylight conditions is constant across latitudes, indicating that selection for larger visual systems has mitigated the effect of reduced ambient light levels. This provides, to our knowledge, the first support that light levels drive intraspecific variation in visual system size in the human population.
Keywords: latitude; light levels; eyeball size; visual cortex size; day length

Anthropologie

LI 2011

Heng Li & Richard Durbin, *Inference of human population history from individual whole-genome sequences.* nature **475** (2011), 493–496.

n475-0493-Supplement.pdf

The history of human population size is important for understanding human evolution. Various studies1-5 have found evidence for a founder event (bottleneck) in East Asian and European populations, associated with the human dispersal out-of-Africa event around 60 thousand years (kyr) ago. However, these studies have had to assume simplified demographicmodels with fewparameters, and they do not provide a precise date for the start and stop times of the bottleneck. Here, with fewer assumptions on population size changes, we present a more detailed history of human population sizes between approximately ten thousand and a million years ago, using the pairwise sequentially Markovian coalescentmodel applied to the complete diploid genome sequences of a Chinese male (YH)6, a Korean male (SJK)7, three European individuals (J. C. Venter8, NA12891 and NA12878 (ref. 9)) and two Yoruba males (NA18507 (ref. 10) and NA19239). We infer that European and Chinese populations had very similar population-size histories before 10-20 kyr ago. Both populations experienced a severe bottleneck 10-60 kyr ago, whereas African populations experienced a milder bottleneck from which they recovered earlier. All three populations have an elevated effective population size between 60 and 250 kyr ago, possibly due to population substructure11. We also infer that the differentiation of genetically modern humans may have started as early as 100-120 kyr ago12, but considerable genetic exchanges may still have occurred until 20-40 kyr ago.

Energie

MIT-Fukushima 2011

J. Buongiorno, R. Ballinger, M. Driscoll, B. Forget, C. Forsberg, M. Golay, M. Kazimi, N. Todreas, J. Yanch, *Technical Lessons Learned from the Fukushima-Daichii Accident and Possible Corrective Actions for the Nuclear Industry: An Initial Evaluation.* (Cambridge 2011). <http://mitnse.files.wordpress.com/2011/06/fukushima-lessons-learned-mit-nsp-025.pdf> (2011-07-30).

Decision-making in the immediate aftermath of a major crisis is often influenced by emotion. Therefore, the following questions should be addressed after searching for vulnerabilities at existing plants, but before enacting significant changes in nuclear energy regulations and policy. Does an accident like Fukushima, which is so far beyond design basis, really warrant a major overhaul of current nuclear safety regulations and practices? If so, when is safe safe enough? Where do we draw the line? It seems that a rational approach to this question would need to be based on a riskinformed comparison of nuclear energy with other energy sources (particularly its most credible competitors, such as coal and natural gas), including their effects on climate change, global economy, stability and reliability of the energy supply, and geo-politics. But can the decision makers take a risk-informed approach to energy policy?

All engineered structures (e.g. power plants, bridges, skyscrapers, dams, highways) will fail if subjected to loads far enough beyond what they were designed for. The catastrophic failure of an irrigation water dam in the Fukushima prefecture, which occurred when the earthquake hit, went virtually un-reported in the media. What does this failure say about the safety of hydro power? Are the design basis selections of energy industry structures posing high environmental hazard, such as oil drilling platforms offshore, coal mines and water dams, consistent with those of nuclear plants? If not, are we as a society irrationally accepting higher risks from certain technologies than others?

Klima

K ERR 2011

Richard A. Kerr, *Antarctic Ice's Future Still Mired in Its Murky Past.* science **333** (2011), 401.

As shrinking ice sheets raise sea level, estimates of how quickly the frozen continent is losing and gaining ice remain slippery.

Greenland has clearly been losing ice faster than snow can replenish it, and the deficit is raising seas worldwide. In the south, the ice sheet of West Antarctica is in the same boat. Warming air and sea seem to be behind both net losses of ice. But what of the ice of East Antarctica, more than eight times the mass of either Greenland's or West Antarctica's? Published estimates for the period 1992 to 2009 had ranged from a net gain of 50 billion tons per year to a loss of 250 billion tons per year. Their new preferred estimate for 1992 to 2005 spans a far narrower range, from a gain of 27 billion tons to a loss of just 40 billion tons per year. For 1992 to 2001, the researchers estimate a loss of only 31 billion tons per year.

Physik

VAN A SSCHE 1988

Pieter H. M. van Assche, *The ignored discovery of the element $Z = 43$.* Nuclear Physics A **480** (1988), 205–214.

Until now Perrier and Segrè (Palermo, 1937) are credited for the first observation of the element $Z = 43$, called technetium (Tc). We give arguments for the statement that Walter Noddack, Ida Tacke and Otto Berg (Berlin, 1925) should be credited for the discovery of this element. In their search for the missing eka-manganese elements with $Z = 43$ and $Z = 75$ they observed the X-rays of these elements, with the peculiar behaviour though that the $Z = 43$ lines only appeared in ores, quoted to contain percentage quantities of uranium. The presence of element $Z = 43$ in uranium-containing ores can now be explained through the long-living fission product $^{99}43$ in their samples; they proposed the names masurium (Ma) and rhenium (Re) for the discovered elements. By reanalyzing the original experimental conditions, we conclude that the detection limit for their observing the X-rays of $Z = 43$ can be 1000 times lower than the 10^{-9} detection limit for the element $Z = 75$. This brings us very close to the expected abundance of $Z = 43$ in the analysed samples, such that we do not see reasons for questioning the credibility of the experimental evidence.

C URIE 1934

I. Curie & F. Joliot, *Mass of the Neutron.* nature **133** (1934), 721–721.

C URIE 1938

Irène Curie & Paul Savitch, *Sur la nature du radioélément de période 3,5 heures formé dans l'uranium irradié par les neutrons.* Comptes rendus de l'Académie des sciences **206** (1938), 1643–1644. <http://gallica.bnf.fr/ark:/12148/cb343481087/date1938>.

C URIE 1938

Irène Curie & Paul Savitch, *Sur le radioélément de période 3,5 heures formé dans l'uranium irradié par les neutrons.* Comptes rendus de l'Académie des sciences **206** (1938), 906–908. <http://gallica.bnf.fr/ark:/12148/cb343481087/date1938>.

HAHN 1939

O. Hahn & F. Straßmann, *Uber den Nachweis und das Verhalten der bei der Bestrahlung des Urans mittels Neutronen entstehenden Erdalkalimetalle.* Naturwissenschaften **27** (1939), 11–15.

Nun müssen wir aber noch auf einige neuere Untersuchungen zu sprechen kommen, die wir der seltsamen Ergebnisse wegen nur zögernd veröffentlichen.

Wir kommen zu dem Schluß: Unsere „Radiumisotope" haben die Eigenschaften des Bariums; als Chemiker müßten wir eigentlich sagen, bei den neuen Körpern handelt es sich nicht um Radium, sondern um Barium; denn andere Elemente als Radium oder Barium kommen nicht in Frage.

Als Chemiker müßten wir aus den kurz dargelegten Versuchen das oben gebrachte Schema eigentlich umbenennen and statt Ra, Ac, Th die Symbole Ba, La, Ce einsetzen. Als der Physik in gewisser Weise nahestehende „Kernchemiker" können wir uns zu diesem, allen bisherigen Erfahrungen der Kernphysik widersprechenden, Sprung noch nicht entschließen. Es könnten doch noch vielleicht eine Reihe seltsamer Zufälle unsere Ergebnisse vorgetäuscht haben.

HERRMANN 1989

Günter Herrmann, *Discovery and confirmation of fission.* Nuclear Physics A **502** (1989), 141c–158c.

An outline of the history of fission is presented beginning 1934, when fission products were first produced by neutron-irradiation of uranium but were attributed to transuranium elements, till December 1938, when fission was discovered with radiochemical techniques and confirmed in the following weeks with physical methods.

NODDACK 1925

Walter Noddack & Ida Tacke, *Die Ekamangane.* Naturwissenschaften **13** (1925), 567–574.

1. Es wird eine Voraussage der wichtigsten geologischen und chemischen Eigenschaffen der fehlenden Homologen des Mangans mit den Ordnungszahlen 43 und 75 gegeben. Die Konzentration der beiden Elemente in derErdoberfläche wird zu 10^{-12} bis 10^{-13} geschätzt.

2. Nach der Voraussage der chemischen Eigenschaften wird ein Anreicherungsverfahren auf eine Anzahl von Mineralien angewandt.

3. Angereicherte Präparate aus dem Columbit zeigten einen Gehalt von etwa 0,5 % an Ekamangan und 5 % an Dwimangan. Auch in einer Reihe yon anderen Mineralien wurden Spuren der gesuchten Elemente gefunden.

4. Die Identität der gefundenen Stoffe mit den fehlenden Elementen 43 und 75 wurde durch das Röntgenspektrogramm bewiesen.

5. Vom Element 43 wurden die Linien $K\alpha_1, K\alpha_2, K\beta_1$ vom Element 75 die Linien $L\alpha_1, L\alpha_2, L\beta_1, L\beta_2$ ausgemessen.

Wir schlagen für die neu entdeckten Elemente folgende Namen vor:

Für das Element 43 nach unserer Ostmark den Namen Masurium (Ma) und für das Element 75 nach dem deutschen Rhein den Namen Rhenium (Re).

Story or Book

ROBINSON 2011

Andrew Robinson, *Known unknowns.* nature **475** (2011), 450–451.

Andrew Robinson enjoys a history of a controversial probability tool – Bayes' theorem.

The Theory That Would Not Die: How Bayes' Rule Cracked the Enigma Code, Hunted Down Russian Submarines and Emerged Triumphant from Two Centuries of Controversy. Sharon Bertsch McGrayne. Yale University Press: 2011. 336 pp. $27.50

For all the book's skilful mingling of ideas and intriguing personal details, I found it sloppy on occasions. Tautologies slip in, and evidence is lacking for some claims. Nonetheless, "The Theory That Would Not Die" is a rollicking tale of the triumph of a powerful mathematical tool.