

Literatur

Aktuell

BASILYAN 2011

A. E. Basilyan, M. A. Anisimov, P. A. Nikolskiy & V. V. Pitulko, *Woolly mammoth mass accumulation next to the Paleolithic Yana RHS site, Arctic Siberia: its geology, age, and relation to past human activity*. [Journal of Archaeological Science](#) **38** (2011), 2461–2474.

JArchSci38-2461-Supplement.doc

In 2001, the Yana RHS archaeological site was discovered in the lower Yana river valley, Arctic Siberia. Its radiocarbon age is about 28 000 BP. While enormous amount of Pleistocene mammal bones was excavated from the site, the mammoth bones occurred at an unexpectedly low frequency. That was interpreted as an indication of the limited role of mammoths in the subsistence economy of the Pleistocene Yana people. In 2008, next to the excavation local ivory miners opened a mass accumulation of mammoth accompanied by the artifacts. About one thousand mammoth bones from at least 26 individuals, and few woolly rhinoceros, bison, horse, reindeer, and bear bones have been unearthed there. Stratigraphy and radiocarbon dating provide evidence for cultural layer of Yana RHS and the mass accumulation of mammoth to be coeval. The geology and taphonomy of Yana mass accumulation of mammoth indicate its anthropogenic nature. Discovery of the anthropogenic mass accumulation of mammoth next to the Yana site suggests a greater role of mammoth in the subsistence practices of the Pleistocene Yana people than previously thought.

Keywords: Mammoth; Paleolithic; Pleistocene; Arctic Siberia; Yana river; Yana RHS site; Mammoth mass accumulation

BRUNET 2011

Manola Brunet & Phil Jones, *Data rescue initiatives: bringing historical climate data into the 21st century*. [Climate Research](#) **47** (2011), 29–40.

The currently limited availability of long and high-quality surface instrumental climate records continues to hamper our ability to carry out more robust assessments of the climate. Such assessments are needed to better understand, detect, predict and respond to global climate variability and change. Despite the wealthy heritage of past climate data and recent efforts to improve data availability and accessibility, much more surface data could be digitised. Additionally, some long records are not of the quality needed for more confidently supporting any climate assessment, service, or application. The present paper discusses the usefulness of undertaking integrated data rescue (DARE) activities by showing several climate assessments as examples. It describes emerging DARE activities worldwide, with a focus on the World Meteorological Organization Mediterranean Data Rescue (MEDARE) and the Atmospheric Circulation Reconstructions over the Earth (ACRE) initiatives to assess the benefits historical instrumental climate data can bring to studies of climate variability and change that consider the 21st century.

KEY WORDS: Climate change | Instrumental period | Climate assessments | Data rescue • Integrated DARE | High-quality climate data development | WMO/MEDARE initiative • ACRE initiative

Datierung

BUCHANAN 2011

Briggs Buchanan, Marcus Hamilton, Kevan Edinborough, Michael J. O'Brien & Mark Collard, *A comment on Steele's (2010) "radiocarbon dates as data: quantitative strategies for estimating colonization front speeds and event densities"*. *Journal of Archaeological Science* **38** (2011), 2116–2122.

We show that Steele's (2010) criticisms of Hamilton and Buchanan (2007) and Buchanan et al. (2008) do not hold water and demonstrate that his re-analyses of Hamilton and Buchanan's (2007) and Buchanan et al.'s (2008) datasets are flawed. In the process, we highlight some important issues for researchers interested in using radiocarbon dates to reconstruct population movements and demography. Most notably, we explain why OLS regression is preferable to RMA regression when estimating diffusion velocity, and demonstrate that the summed probability distributions yielded by CalPal are more reliable as guides to past demographic change than those produced by Calib and OxCal.

Keywords: Paleoindians; Colonization of North America; Demography; Extraterrestrial impact hypothesis; Radiocarbon dates; Diffusion analysis; Summed probability distribution analysis

HAMILTON 2007

Marcus J. Hamilton & Briggs Buchanan, *Spatial gradients in Clovis-age radiocarbon dates across North America suggest rapid colonization from the north*. *PNAS* **104** (2007), 15625–15630.

A key issue in the debate over the initial colonization of North America is whether there are spatial gradients in the distribution of the Clovis-age occupations across the continent. Such gradients would help indicate the timing, speed, and direction of the colonization process. In their recent reanalysis of Clovis-age radiocarbon dates, Waters and Stafford [Waters MR, Stafford TW, Jr (2007) *Science* 315:1122-1126] report that they find no spatial patterning. Furthermore, they suggest that the brevity of the Clovis time period indicates that the Clovis culture represents the diffusion of a technology across a preexisting pre-Clovis population rather than a population expansion. In this article, we focus on two questions. First, we ask whether there is spatial patterning to the timing of Clovis-age occupations and, second, whether the observed speed of colonization is consistent with demic processes. With timedelayed wave-of-advance models, we use the radiocarbon record to test several alternative colonization hypotheses. We find clear spatial gradients in the distribution of these dates across North America, which indicate a rapid wave of advance originating from the north. We show that the high velocity of this wave can be accounted for by a combination of demographic processes, habitat preferences, and mobility biases across complex landscapes. Our results suggest that the Clovis-age archaeological record represents a rapid demic colonization event originating from the north.

Early Paleoindian | wave of advance | landscape complexity | hunter-gatherers | Late Pleistocene

Grundlagen

WEAVER 2011

Timothy D. Weaver, Ryan H. Boyko & Teresa E. Steele, *Cross-platform program for likelihood-based statistical comparisons of mortality profiles on a triangular graph*. *Journal of Archaeological Science* **38** (2011), 2420–2423.

The construction of mortality profiles to investigate age-at-death patterns is a typical component of most faunal analyses. While many methods exist for constructing and comparing mortality profiles, plotting the percentages of juvenile, prime, and old individuals on a triangular graph, or ternary diagram, remains a popular method for making comparisons. Typically, these comparisons are made visually, but because sample sizes are often small, any differences may be the product of sampling rather than meaningful contrasts in depositional history. To overcome this problem, here we present a likelihood-based method for making statistical comparisons of mortality profiles on a triangular graph, and we make available a cross-platform computer program that implements the method. Although we developed the method with mortality profiles in mind, in principle, it can be used to analyze any kind of artifact for which there are three distinct categories. Keywords: Ternary diagram; Faunal analysis; Zooarchaeology; Age profiles; Age distributions; Sample size; Age-at-death; Age structure

Klima

SLIK 2011

J. W. Ferry Slik et al., *Soils on exposed Sunda Shelf shaped biogeographic patterns in the equatorial forests of Southeast Asia*. [PNAS 108 \(2011\), 12343–12347](#).

[pnas108-12343-Supplement1.xlsx](#), [pnas108-12343-Supplement2.xlsx](#)

J. W. Ferry Slik, Shin-Ichiro Aiba, Meredith Bastian, Francis Q. Brearley, Charles H. Cannon, Karl A. O. Eichhorn, Gabriella Fredriksson, Kuswata Kartawinata, Yves Laumonier, Asyraf Mansor, Antti Marjokorpi, Erik Meijaard, Robert J. Morley, Hidetoshi Nagamasu, Reuben Nilus, Eddy Nurtjahya, John Payne, Andrea Permana, Axel D. Poulsen, Niels Raes, Soedarsono Riswan, Carel P. van Schaik, Douglas Sheil, Kade Sidiyasa, Eizi Suzuki, Johan L. C. H. van Valkenburg, Campbell O. Webb, Serge Wich, Tsuyoshi Yoneda, Rahmad Zakaria, and Nicole Zweifel

The marked biogeographic difference between western (Malay Peninsula and Sumatra) and eastern (Borneo) Sundaland is surprising given the long time that these areas have formed a single landmass. A dispersal barrier in the form of a dry savanna corridor during glacial maxima has been proposed to explain this disparity. However, the short duration of these dry savanna conditions make it an unlikely sole cause for the biogeographic pattern. An additional explanation might be related to the coarse sandy soils of central Sundaland. To test these two nonexclusive hypotheses, we performed a floristic cluster analysis based on 111 tree inventories from Peninsular Malaysia, Sumatra, and Borneo. We then identified the indicator genera for clusters that crossed the central Sundaland biogeographic boundary and those that did not cross and tested whether drought and coarse-soil tolerance of the indicator genera differed between them. We found 11 terminal floristic clusters, 10 occurring in Borneo, 5 in Sumatra, and 3 in Peninsular Malaysia. Indicator taxa of clusters that occurred across Sundaland had significantly higher coarse-soil tolerance than did those from clusters that occurred east or west of central Sundaland. For drought tolerance, no such pattern was detected. These results strongly suggest that exposed sandy sea-bed soils acted as a dispersal barrier in central Sundaland. However, we could not confirm the presence of a savanna corridor. This finding makes it clear that proposed biogeographic explanations for plant and animal distributions within Sundaland, including possible migration routes for early humans, need to be reevaluated. climate change | human migration | plant distribution | sea-level change Migration of Early Humans Through Sundaland.

The presence of a savanna corridor in central Sundaland has been used as an argument for the rapid dispersal of early humans (between ca. 60,000 and 45,000 y ago) from mainland Southeast Asia and central Sundaland to Java and then onward to eastern Indonesia,

Papua New Guinea, and Australia. However, the presence of swamps and heath forests in central Sundaland, as suggested by our study, would not favor this human-dispersal route because swamps and heath forests, aside from being hard to traverse, are generally low-productivity systems with limited wildlife and other edible products for hunter-gatherers. It would be more likely that humans used the coastal routes along Sundaland to reach Java and beyond, especially because, during this period, large parts of central Sundaland would have been submerged by sea, leaving only a small land area in central Sundaland as a land connection.

Kultur

MELHUISH 2011

Edward C. Melhuish, *Preschool Matters*. [science 333 \(2011\), 299–300](#).

Evidence grows that starting preschool at age 3 or 4 can produce benefits decades later.

REYNOLDS 2011

Arthur J. Reynolds, Judy A. Temple, Suh-Ruu Ou, Irma A. Arteaga & Barry A. B. White, *School-Based Early Childhood Education and Age-28 Well-Being: Effects by Timing, Dosage, and Subgroups*. [science 333 \(2011\), 360–364](#).

s333-0360-Supplement.pdf

Advances in understanding the effects of early education have benefited public policy and developmental science. Although preschool has demonstrated positive effects on life-course outcomes, limitations in knowledge on program scale, subgroup differences, and dosage levels have hindered understanding. We report the effects of the Child-Parent Center Education Program on indicators of well-being up to 25 years later for more than 1400 participants. This established, publicly funded intervention begins in preschool and provides up to 6 years of service in inner-city Chicago schools. Relative to the comparison group receiving the usual services, program participation was independently linked to higher educational attainment, income, socioeconomic status (SES), and health insurance coverage, as well as lower rates of justice-system involvement and substance abuse. Evidence of enduring effects was strongest for preschool, especially for males and children of high school dropouts. The positive influence of four or more years of service was limited primarily to education and SES. Dosage within program components was mostly unrelated to outcomes. Findings demonstrate support for the enduring effects of sustained school-based early education to the end of the third decade of life.

SAMMONS 2008

Pam Sammons, Kathy Sylva, Edward Melhuish, Iram Siraj-Blatchford, Brenda Taggart & Stephen Hunt, *Influences on Children's Attainment and Progress in Key Stage 2: Cognitive Outcomes in Year 6*. (Nottingham 2008). <<http://eppe.ioe.ac.uk/eppe3-11/eppe3-11%20pdfs/eppepapers/DfE-RR048.pdf>> (2011-07-28).

Parents' (especially mothers') highest qualification levels, although weaker in Year 6, is a key predictor of attainment, as is low birth weight, need for support with English as an additional language (EAL), early developmental problems (as reported by parents at the start of the study), socio-economic status (SES) and fathers qualification level.

The Early years home learning environment (HLE) remains one of the most important background factors relating to a child's attainment in English and Mathematics.

Key Stage 1 HLE shows some predictive power: high levels of one-to-one child-parent interaction have a negative impact on attainment in both English and Mathematics,

while high levels of home computing has a negative impact on English. In both cases the child's activities may effectively be being replaced, e. g. being read to rather than reading; playing computer games rather than reading.

Neighbourhood: there was no evidence of the neighbourhood exerting an independent influence on attainment or progress, but a moderate association was found between poor attainment in Mathematics and parental perceptions of an unsafe neighbourhood, which is likely to be an expression of social disadvantage.

Those children who attended low quality pre-schools no longer show a significant cognitive benefit in attainment after six years in primary school, i. e. their scores are not significantly different from those of the 'home' children. The same is true for those who attended medium quality pre-schools, but only in the case of English. This is a change from previous findings, reported at age 5 years, which showed that all pre-school experience had positive effects, regardless of the quality.

The attainment of more disadvantaged pupils is enhanced by having attended high quality or highly effective pre-schools; however it is the more advantaged pupils that gain most from attending such pre-schools.

There are clear longer term advantages from attending a pre-school irrespective of parental qualification level, although children with parents with higher levels (a degree or above) do better. This was also the case when considering pre-school quality and effectiveness, although children of low qualified parents do gain an advantage from attending high quality/effective pre-schools.

The results indicate that the combined influence of attending a better (higher quality and high academically effective) pre-school and a more academically effective primary school can give a significant boost to children's later cognitive outcomes at age 11 years, especially for Mathematics. These effects are similar in size to the impact of having a mother with a high qualification level (degree rather than none).

SCHULTZÉN 2011

Joakim Schultzén, *Remodelling the past – Archaeometrological analysis applied on Birka weight material using a 3D scanner & Computer-Aided Design*. *Journal of Archaeological Science* **38** (2011), 2378–2386.

Archaeometrological analysis has traditionally involved reconstructing the originally intended mass of a weight by hand; measuring with a calliper or a profile microscope, as well as using the artefact's displacement in water for factors such as volume and density. Ideally, corrosion was to be left intact, which is inconsistent with the goals of the conservationist. In all, the process was time consuming and may in some cases even have accelerated the deterioration of the artefacts.

The CAD-method described in this article has been developed as a non-destructive alternative, employing a 3D scanner to create a virtual representation of the weight on which analysis can be performed. Density is calculated by dividing current mass with current volume, as supplied from the virtual model. Original volume is calculated by reconstructing the weight using basic geometrical shapes in a Computer-Aided Design program. Finally, to obtain the weight's original mass, the recreated original volume is multiplied by its current density. If the latter is found to have been altered through corrosion, a mean value of previously analysed weights in good condition (MNCA) may be applied instead.

This new method for archaeometrological analysis is put to the test on a population of weights excavated at Birka. Four of these were previously analysed with the Traditional method, which makes it possible to compare results and draw conclusions on the accuracy of the CAD-method. An additional seven weights were analysed for further evaluation and also to investigate Sperber's theory of a 4.0 g standard unit in the metrology of Birka.

Keywords: Archaeometry; Birka; 3D-scanning; CAD; Viking age; Medieval; Weight

Physik

BOHR 1939

N. Bohr, *Disintegration of Heavy Nuclei*. [nature 143 \(1939\), 330](#).

These circumstances find their straightforward explanation in the fact, stressed by Meitner and Frisch, that the mutual repulsion between the electric charges in a nucleus will for highly charged nuclei counteract to a large extent the effect of the short-range forces between the nuclear particles in opposing a deformation of the nucleus. The nuclear problem concerned reminds us indeed in several ways of the question of the stability of a charged liquid drop, and in particular, any deformation of a nucleus, sufficiently large for its fission, may be treated approximately as a classical mechanical problem, since the corresponding amplitude must evidently be large compared with the quantum mechanical zero-point oscillations. Just this condition would in fact seem to provide an understanding of the remarkable stability of heavy nuclei in their normal state or in the states of low excitation, in spite of the large amount of energy which would be liberated by an imaginable division of such nuclei.

FERMI 1934

E. Fermi, *Possible Production of Elements of Atomic Number Higher than 93*. [nature 133 \(1934\), 898–899](#).

As a matter of fact, it has been shown¹ that a large number of elements (47 out of 68 examined until now) of any atomic weight could be activated, using neutron sources consisting of a small glass tube filled with beryllium powder and radon up to 800 millicuries. This source gives a yield of about one million neutrons per second.

This evidence seems to show that three main processes are possible: (a) capture of a neutron with instantaneous emission of an α -particle; (b) capture of the neutron with emission of a proton; (c) capture of the neutron with emission of a γ -quantum, to get rid of the surplus energy. From a theoretical point of view, the probability of processes (a) and (b) depends very largely on the energy of the emitted α - or H-particle; the more so the higher the atomic weight of the element. The probability of process (c) can be evaluated only very roughly in the present state of nuclear theory; nevertheless, it would appear to be smaller than the observed value by a factor 100 or 1,000.

Better investigated is the case of uranium; the existence of periods of about 10 sec., 40 sec., 13 min., plus at least two more periods from 40 minutes to one day is well established.

This negative evidence about the identity of the 13 min.-activity from a large number of heavy elements suggests the possibility that the atomic number of the element may be greater than 92.

FERMI 1940

Enrico Fermi, *Reactions produced by neutrons in heavy elements*. [nature 146 \(1940\), 640–642](#).

The (n, γ) reactions was discovered by Hahn and Meitner, who recognized that among the active products produced in uranium by neutron bombardment, one, with a period of 23 minutes, produced by a typical resonance process is carried by an isotope of uranium. The assignment of the atomic weight of this isotope as 239 has been confirmed by direct experiment by Nier, Booth, Dunning and Grosse. U239 disintegrates into an isotope of element 93, which is also radioactive with a period of 2.3 days, as proved by the investigation of Abelson and McMillan.

It was early recognized that the simple theory of the fission process fails to represent the detailed results, in so far as the splitting does not occur into two equal fragments, but rather into fragments in which one is somewhat lighter and one is somewhat heavier. We have therefore to distinguish between a light and a heavy group of fragments. Presumably

a fragment belonging to the light group and a fragment belonging to the heavy group are emitted in the same act. The problem arises now to determine what percentage of the fissions of uranium gives rise to the formation of a certain radioactive product, or rather of a certain radioactive chain. Since it is expected that in every fission a chain belonging to the heavier group and a chain belonging to the lighter group are formed, we would expect a total percentage of 100 for each of the two groups, except for the improbable direct formation of a stable fragment.

VON HALBAN 1939

H. von Halban, jun., F. Joliot & L. Kowarski, *Liberation of Neutrons in the Nuclear Explosion of Uranium*. [nature 143 \(1939\), 470–471](#).

Another possible process is the direct liberation of neutrons, taking place either as a part of the explosion itself, or as an ‘evaporation’ from the resulting nuclei which would be formed in an excited state.

In order to find some evidence of this second phenomenon, we studied the density distribution of the thermal neutrons produced by the slowing down of photo-neutrons from a Ra γ -Be source in a 1-6 molar solution of uranyl nitrate and in a 1-6 molar solution of ammonium nitrate (the hydrogen contents of these two solutions differ by only 2 per cent).

The density excess, shown by the uranyl curve beyond 13 cm, must therefore be considered as a proof of neutron production due to an interaction between the primary neutrons and the uranium nuclei. A reaction of the well-known (n,2n) type is excluded because our primary neutrons are too slow for such a reaction.

The interest of the phenomenon observed as a step towards the production of exo-energetic transmutation chains is evident. However, in order to establish such a chain, more than one neutron must be produced for each neutron absorbed. This seems to be the case, since the cross-section for the liberation of a neutron seems to be greater than the cross-section for the production of an explosion.

VON HALBAN 1939

H. von Halban, jun., F. Joliot & L. Kowarski, *Number of Neutrons Liberated in the Nuclear Fission of Uranium*. [nature 143 \(1939\), 680](#).

Such observations give no information on the mean number of neutrons produced per nucleus split; this number ν may be very small (less than 1) and the result of the experiment will still be positive. We are now able to give information on the value of ν .

We find: $\nu = 3.5 \pm 0.7$.

The interest of the phenomenon discussed here as a means of producing a chain of nuclear reactions was already mentioned in our previous letter. Some further conclusions can now be drawn from the results reported here. Let us imagine a medium containing only uranium and nuclei the total neutron absorption of which, as compared to that of uranium, may be neglected (containing, for example, only some hydrogen for slowing down purposes). In such a medium, if $A_f/A_{tot} \cdot \nu > 1$ (A_{tot} includes now only uranium terms), the fission chain will perpetuate itself and break up only after reaching the walls limiting the medium. Our experimental results show that this condition will most probably be satisfied. (The quantity $A_f/A_{tot} \cdot \nu - 1$, though positive, will be, however, small.)

VON HALBAN 1939

H. von Halban, jun., F. Joliot & L. Kowarski, *Energy of Neutrons liberated in the Nuclear Fission of Uranium induced by Thermal Neutrons*. [nature 143 \(1939\), 939](#).

The high energy of these fast neutrons shows that their parent nuclei are in a highly excited state at the moment of their liberation, which is probably simultaneous with the

fission. In this way a non-negligible fraction of the fission energy is disposed of; a further fraction is carried off by the (β - and γ -rays afterwards emitted by the nuclei produced in the fission. The remainder available as kinetic energy for these recoiling nuclei is therefore considerably smaller than the total amount of energy liberated in the fission process (about 200 MeV).

MEITNER 1939

Lise Meitner, *New Products of the Fission of the Thorium Nucleus*. [nature 143 \(1939\), 637](#).

From the evidence given above, one can conclude that some of the fission products of thorium show a chemical behaviour similar to that of the ‘transuranium’ elements. This is a further indication that essentially the same chemical elements are produced in the fission of uranium and thorium.

MEITNER 1939

Lise Meitner & O. R. Frisch, *Products of the Fission of the Uranium Nucleus*. [nature 143 \(1939\), 471–472](#).

It can be shown by simple considerations that this type of nuclear reaction may be described in an essentially classical way like the fission of a liquid drop, and that the fission products must fly apart with kinetic energies of the order of hundred million electronvolts each². Evidence for these high energies was first given by O. R. Frisch³ and almost simultaneously by a number of other investigators⁴.

The possibility of making use of these high energies in order to collect the fission products in the same way as one collects the active deposit from alpha-recoil has been pointed out by L. Meitner (see ref. 3). In the meantime, F. Joliot has independently made experiments of this type⁶. We have now carried out some experiments, using the recently completed high-tension equipment of the Institute of Theoretical Physics, Copenhagen. From these results, it can be concluded that the ‘transuranium’ nuclei originate by fission of the uranium nucleus. Mere capture of a neutron would give so little kinetic energy to the nucleus that only a vanishing fraction of these nuclei could reach the water surface. So it appears that the ‘transuranium’ periods, too, will have to be ascribed to elements considerably lighter than uranium.

MEITNER 1940

Lise Meitner, *Capture Cross-Sections for Thermal Neutrons in Thorium, Lead and Uranium* 238. [nature 145 \(1940\), 422–423](#).

NODDACK 1934

Ida Noddack, *Über das Element 93*. [Angewandte Chemie 47 \(1934\), 653–655](#).

Man kann ebensogut annehmen, daß bei dieser neuartigen Kernzertrümmerung durch Neutronen erheblich andere „Kernreaktionen“ stattfinden, als man sie bisher bei der Einwirkung von Protonen- und α -Strahlen auf Atomkerne beobachtet hat. Bei den letztgenannten Bestrahlungen findet man nur Kernumwandlungen unter Abgabe von Elektronen, Protonen und Heliumkernen, wodurch sich bei schweren Elementen die Masse der bestrahlten Atomkerne nur wenig ändert, da nahe benachbarte Elemente entstehen. Es wäre denkbar, daß bei der Beschießung schwerer Kerne mit Neutronen diese Kerne in mehrere größere Bruchstücke zerfallen, die zwar Isotope bekannter Elemente, aber nicht Nachbarn der bestrahlten Elemente sind.

Man muß noch weitere Untersuchungen abwarten, ehe man behaupten darf, daß hier das Element 93 wirklich gefunden ist. Fermi selbst ist in dieser Hinsicht, wie bereits erwähnt wurde, vorsichtig, nur in einem Referat über seine Versuche und in den Berichten der Tagespresse glaubt man schon des Resultates sicher zu sein.

NODDACK 1939

Ida Noddack, *Bemerkung zu den Untersuchungen von O. Hahn, L. Meitner und F. Straßmann über die Produkte, die bei der Bestrahlung von Uran mit Neutronen entstehen*. *Naturwissenschaften* **27** (1939), 212–213.

Mündlich auf diese Unterlassung aufmerksam gemacht, lehnte O. Hahn ein Zitieren meiner Arbeit ab, offenbar weil er meine Vermutung, daß das Uran vielleicht in größere Bruchstücke zerfallen könnte, für unsinnig hielt, da den Theoretikern damals solche Kernreaktionen unmöglich erschienen.

Wenn man die zahlreichen, in den nächsten 4 Jahren erschienenen Veröffentlichungen von Hahn, Meitner und Strassmann über die künstliche Umwandlung des Urans durch Neutronen und die dabei entstehenden Produkte sorgfältig liest, so fällt einem auf, daß die Verfasser, die immer weitere Produkte gefunden haben, ihre Ansichten über die untersuchten Prozesse und die entstandenen Atomarten vielfach änderten, daß sie etwas vorher “Bewiesenes” mehrfach zurücknahmen und wieder anders deuteten.

Am 18. November 1938 sagen Hahn und Strassmann zusammenfassend: “Als Folge der Neutronenbestrahlung der einen Atomart Uran 238 sind also bisher im ganzen 16 verschiedene künstliche Atomarten mit den Ordnungszahlen 88–90 und 92–96 nachgewiesen und in ihren Eigenschaften festgestellt worden.” Sie hatten bis dahin 7 Transuran-Isotope ($Z = 93–96$) und je 3 Uran-, Radium- und Actiniumisotope festgestellt und beschrieben.

Story or Book

HECHT 2011

Jeff Hecht, *Event Horizon, A bitter pill*. *nature* **475** (2011), 418.