

La cara oculta de la ciencia

Juan Miguel
Campanario
Universidad de Alcalá

Ideas comunes sobre la Ciencia

- ☞ La Ciencia es un conjunto de verdades
- ☞ Algo probado “científicamente” está fuera de toda duda
- ☞ La Ciencia es una actividad desapasionada, pura, libre de problemas, prejuicios, corruptelas



Los científicos leen y escriben

- ✍ Mantenerse informados
- ✍ Revistas científicas
- ✍ Dar a conocer sus descubrimientos
- ✍ Ingrediente fundamental pero desconocido
- ✍ **“Publica o muere”**



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Proteomic approaches to bacterial differentiation

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Available online 17 August 2006 **Fechas**

Abstract

Mass spectrometry-based proteomics has been used extensively to explore the proteomes of various organisms, and this technology is now being applied to the characterization of bacterial species. Predominantly, two methods emerge as leaders in this application. Intact protein profiling creates fingerprints of bacterial species which can be used for differentiation and tracking over time. Peptide-centric approaches, analyzed after enzymatic digestion, enable high-throughput proteome characterization in addition to species determination from the identification of peptides distinctive to a species. Highlighted herein is an application of a peptide-centric approach to the identification and quantitation of species-specific peptide identifiers using an *in silico* exploration and an experimental mass spectrometry-based method. The application to microbial communities is addressed with an *in silico* analysis of an artificial complex community of 25 microorganisms.

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Keywords: AMT tag; Bacterial Communities; Species detection; Unique Identifiers

Table 1
Protein and peptide counts for a simple microbial community of 4 organisms of importance to bioremediation projects

Organism	Proteins	Total <i>in silico</i> peptides	Organism-specific peptides			
			5 ppm and 1% NBE1	5 ppm and 1% NBE2	5 ppm and 1% NBE3	5 ppm and 1% NBE4
			Percent unique (%)	Unique peptides	Percent unique (%)	Percent unique (%)
<i>D. radiodurans</i>	3377	267,263	6	41,738	22	26
<i>C. metalliferans</i>	4797	309,911	5	61,238	20	23
<i>C. sulfuroxidans</i>	2448	284,634	8	53,094	19	22
<i>S. aciditolerans</i>	4798	268,691	5	64,555	22	26
Total	16,112	604,564	9	221,596	34	52

The values indicate the number of peptides that are distinctive to a single organism within a mixture of the 4 organisms. The asterisk indicates the level used for false matching of the MS data from the sample community to the reference database.

4.2.1. In silico differentiation of a 4-organism mixture

A reference database for an *in silico* study of differentiation was generated from proteomic data obtained from the sequence repository at TIGR (March 2000) for *Shewanella aciditolerans* MR-1, *Deinococcus radiodurans*, *Geobacter sulfuroxidans*, and *Clostridium metalliferans* (Table 1). Protein sequences generated from EMBL files were combined and digested *in silico* by using Digestion Simulator, a program written in-house (2004). The number of predicted proteins for a particular organism ranged from 3117 for *D. radiodurans* to 4798 for *S. aciditolerans*. *In silico* tryptic digestions of these proteins resulted in ~200,000 to >300,000 possible peptides for each organism, for a total

Datos

Argumentos

Gráficos

the availability of sequenced genome information, (2) the accurate measurement of peptide mass and elution time, (3) constraints on mass and separation time data quality, and (4) the abundances of distinctive peptides relative to different community members. Evolution has provided many potential peptide sequences, and the abundance of data that can now be rapidly generated for the characterization of increasingly complex communities.

We envision that the use of peptides for probing a microbial community will not only help to address the disparate heterogeneity of speciation, but also allow for a more detailed assessment of the lifestyles of the organisms by way of protein identification. We conjecture that this dual role has the potential to bridge systems biology and microbial ecology, especially if proteins can be classified by function or biological pathways. Once unique peptide identifiers are confidently assessed and verified, relative abundances of these peptides (and their parent protein) may be used to investigate alterations in lifestyle relative to organisms in the community, resulting from perturbations and organism relationships, e.g., symbiotic, competitive, etc. Similarly, changes in protein abundance may be used in concert with other types of

Referencias

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Otros artículos

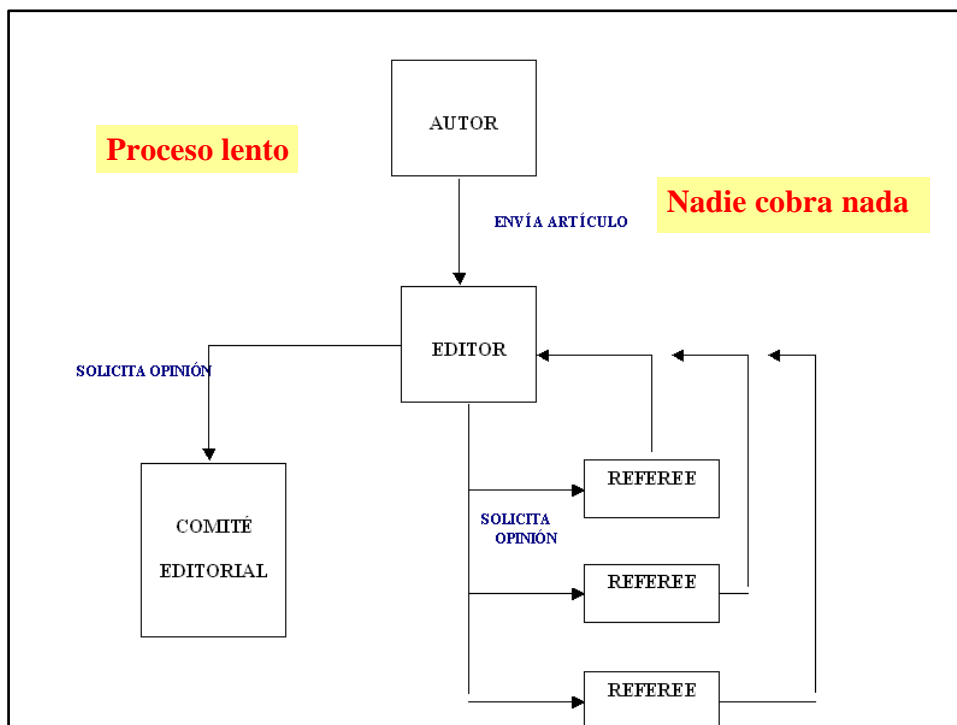
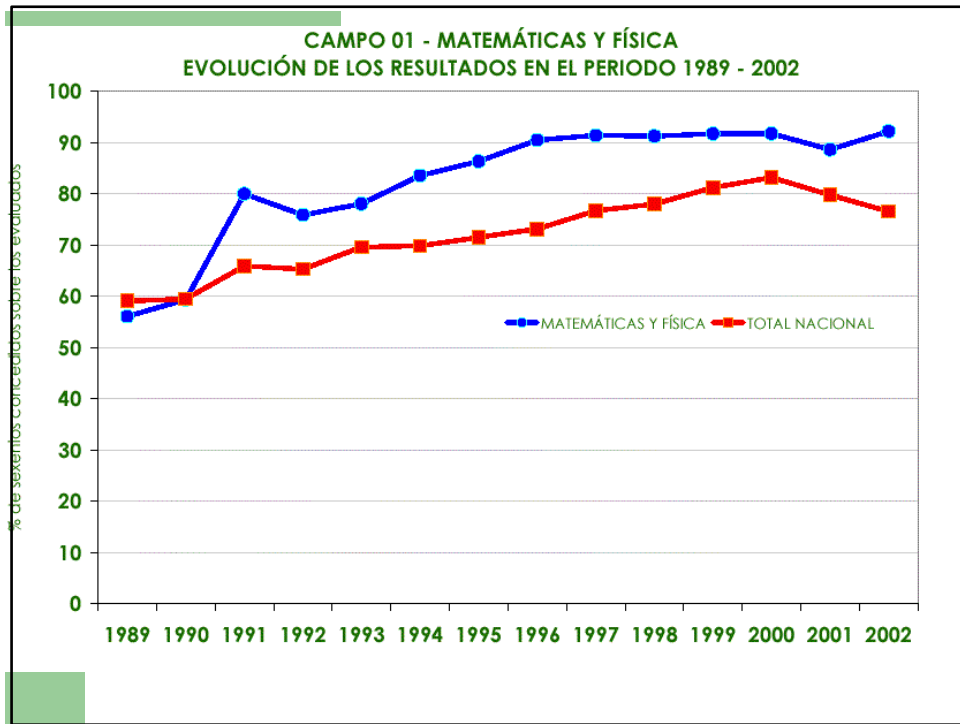
CNEAI

Comisión Nacional Evaluadora de la Actividad Investigadora

Sexenios

Criterios de evaluación:

- “Se valorarán preferentemente las aportaciones que sean artículos en **revistas de prestigio reconocido**, aceptándose como tales las que ocupen posiciones relevantes en los listados por ámbitos científicos en el "Subject Category Listing" del **Journal Citation Reports** del Science Citation Index (Institute of Scientific Information, Philadelphia, PA, USA).”



Lucha por la prioridad

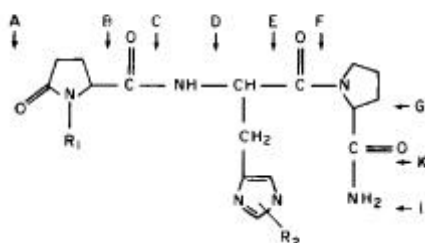
✍ Descubrir y ser el **primero o la primera**

[Artículo recibido en junio de 2001 y aceptado en diciembre de 2001.]

Schally y Guillemin



STRUCTURE OF HYPOTHALAMIC TRF (OVINE)
WITH FRAGMENTATION POINTS IN MASS SPECTROMETRY

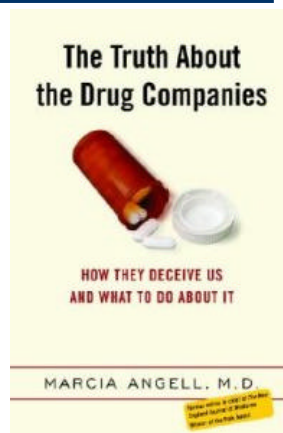


Conflicto de intereses

- ✗ Implicaciones económicas de la investigación
- ✗ Biomedicina: empresas farmacéuticas
- ✗ ¿Matrimonio de conveniencia?
- ✗ Investigador: interés **económico** en el resultado
- ✗ Financiación por empresas farmacéuticas



Conflicto de intereses



Posible conflicto de intereses

- ⌘ Los autores tienen que revelar las afiliaciones, fuentes de financiación y relaciones económicas que pudieran dar lugar a algún sesgo [**Science**]
- ⌘ Relaciones con empresas, propiedad de acciones, trabajo como consultor, implicaciones de patentes, ayudas para viajes y otras circunstancias similares [**The Lancet**]

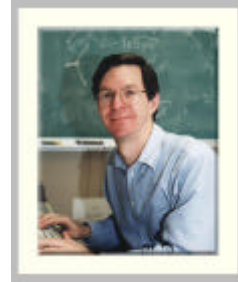
Gamberrada de Peters y Ceci (1982)

- ⌘ 12 artículos de Psicología publicados en revistas prestigiosas
- ⌘ Cambian nombres de autores y afiliaciones institucionales
- ⌘ Vuelven a enviar los artículos a las mismas revistas
- ⌘ Sólo 3 se detectan como “previamente publicados”
- ⌘ Uno fue aceptado
- ⌘ Ocho fueron rechazados por problemas de diseño de la investigación inadecuado, análisis inadecuado, etc.
- ⌘ **Empezamos a preocuparnos**



Gamberrada de Alan Sokal

- ✍ Artículo inventado
- ✍ *“Traspasando fronteras: hacia una hermenéutica transformativa de la gravedad cuántica”*
- ✍ Contenido disparatado
- ✍ Aceptado en la revista Social Text
- ✍ *“Yo no entiendo mi artículo, los editores de Social Text parece que sí” [Sokal]*



Caso Hwang

- ✍ Muy conocido
- ✍ Falsas clonaciones
- ✍ Revista “Science”
- ✍ De héroe a villano



Caso Sudbo

- ✍ Revistas prestigiosas
 - **The Lancet**
 - **New England Journal of Medicine**
 - **Journal of Clinical Investigation**
- ✍ Estudio cáncer boca (The Lancet)
- ✍ 900 sujetos, 445 inventados, 250 misma fecha de nacimiento
- ✍ Otros artículos (15)
- ✍ Tesis doctoral
- ✍ Co-autores no supervisan



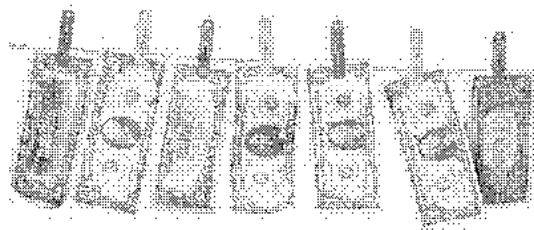
Caso Poehlman

- ✍ Universidad de Vermont
- ✍ Proyectos con material inventado (2.9 millones de dólares)
- ✍ Denunciado por ayudante
- ✍ Investigado (Universidad, fiscal)
- ✍ Acuerdo + **cárcel** (366 días)



Office for Research Integrity

- ⌘ Ciencias Biomédicas
- ⌘ Misión: **“luchar contra la fabricación o falsificación de datos, el plagio y otras prácticas que se apartan seriamente de aquellas comúnmente aceptadas en la comunidad científica”.**
- ⌘ Boletín cuatrimestral y memoria anual (<http://ori.dhhs.gov>)
- ⌘ Incentivo: denuncias + **recompensa**



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SEPTEMBER 2006

Office of Research Integrity

N E W S L E T T E R

The *ORI Newsletter* is published quarterly by the Office of Research Integrity, Office of the Secretary of Health and Human Services, and distributed to applicant or awardee institutions and PHS agencies to facilitate pursuit of a common interest in handling allegations of misconduct and promoting integrity in PHS-supported research. Please duplicate and circulate this newsletter to ori@hhs.gov.

FASEB Begins Effort On Conflicts of Interest

The Federation of American Societies for Experimental Biology (FASEB) received an award from the RCR Program for Academic Societies this summer to improve the education of investigators in academia-industry relationships and to standardize practices governing conflicts of interest of investigators.

The FASEB award was one of three awards made in the final round of the four-year program that is a collaboration between the Association of American Medical Colleges (AAMC) and ORI. The other awards

Biomedical Researcher Sentenced to Prison

Citing severe punishment already endured, complete acceptance of responsibility, deep remorse and ongoing rehabilitative efforts, Eric T. Poehlman, Ph.D., pleaded for probation and community service during his sentencing hearing, but received a 366 days term in a Federal prison because his actions lead to a loss to the government, obstruction of justice, and abuse of a position of trust.

Poehlman, a former professor at the University of Vermont (UVM), was sentenced by Judge William Sessions III on June 28, 2006 in the U. S.

ORI en 2005

- ✍ 36 casos pendientes de 2004
- ✍ 21 investigaciones nuevas
- ✍ 18 casos cerrados + 4 investigaciones institucionales concluidas
- ✍ 8 casos de conductas contrarias a la ética científica
- ✍ Fabricación (2), falsificación (3), ambos (2), plagio (1)



¿Por qué? ¿Qué podemos hacer?

- ✍ ¿Presión por publicar?
- ✍ ¿Afán de notoriedad?
- ✍ ¿.....?
- ✍ Extremar la vigilancia
- ✍ Journal of Cell Biology (2006): control de imágenes



Plagio y apropiación de ideas

- ⌘ Originalidad: valor muy apreciado en la Ciencia
- ⌘ Obligatoriedad de citar antecedentes (referencias)
- ⌘ Apropiación de ideas



Journal of Hospital Infection (2006) 64, 39

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ELSEVIER

RETRACTION NOTICE

Retraction notice to "Handwashing: a simple, economical and effective method for preventing nosocomial infections in intensive care units" [*Journal of Hospital Infection* 2006;62:395–405]

A. Akyol, H. Ulusoy, İ. Özen

Department of Anaesthesiology and Critical Care, Faculty of Medicine, Karadeniz Technical University, Trabzon, Turkey
Available online 9 August 2006

The Editor has recently been made aware that the above paper appears to contain material from a paper that has been published previously, and to which no reference was made. The details of the original paper are as follows:
Jumaia PA. Hand hygiene: simple and complex. *Int J Infect Dis* 2005;9:3–14.

This paper was received by the *International Journal of Infectious Diseases* on 5th April 2004, revised and resubmitted on 22nd May 2004 and finally accepted on 24th May 2004. There is a high degree of similarity between the two papers and it is the Editor's opinion that the paper from Akyol et al. demonstrates plagiarism. This contravenes the *Journal of Hospital Infection's* submission assurance regarding originality.

The Editor is now retracting this paper from publication and hereby issues this notice. Both the Editor-in-Chief of the *International Journal of Infectious Diseases* and the Editor of the authors' institution have been informed.

Stephanie Dancer
Department of Microbiology,
Southern General Hospital,
Glasgow
G51 4TF, UK

“...el artículo parece contener material de otro artículo publicado previamente...”

“...existe un alto grado de similitud entre los dos artículos...”

Caso Park

- ✍ Yung Park
- ✍ Korea y Universidad de Cambridge
- ✍ 80 artículos (1995-2002)
- ✍ 8 artículos plagiados de otros publicados en revistas rusas
- ✍ Abril 2002: se descubre el asunto y Park se da a la fuga
- ✍ En paradero desconocido
- ✍ **Hay 4 artículos retirados,**
- ✍ **Otros 4 SIN retirar, nadie ha informado**

Abstract

It is a long-accepted dogma in ophthalmology that the lens is a tumor-free tissue. Yet, in the lens, there is lifelong mitotic activity in the subcapsular epithelium. Therefore, these subcapsular epithelial cells must have the potential for cellular transformation. How then can we explain the fact that no scientist has ever seen a naturally occurring primary tumor of the lens *in vivo*? This review discusses the early work of Mann, von Halkemann, Conforti and others who addressed the issue of tumor resistance of the lens.

The Enigma of Lenticular Oncology Digital Journal of Ophthalmology 2002

Chit M. Saugel, PhD | University at Buffalo, the State University of New York
Ari Kanner | University of Rochester School of Medicine and Dentistry, Rochester, NY

ABSTRACT INTRODUCTION DISCUSSION ACKNOWLEDGEMENTS REFERENCES

Abstract

Objective

It is a long-accepted dogma in ophthalmology that the lens is a tumor-free tissue. Yet, in the lens, there is lifelong mitotic activity in the subcapsular epithelium. Therefore, there should be the potential for cellular transformation in these subcapsular epithelial cells. So, how can we EXPLAIN that, to our knowledge, no scientist has ever seen a naturally occurring primary tumor of the lens *in vivo*? In this review, we will discuss early work of Mann, von Halkemann, Conforti and others who addressed the issue of tumor resistance of the lens.

Copia literal,
palabra por
palabra,
incluyendo
dos figuras

Errores científicos

- ✍ Los investigadores se equivocan
- ✍ Los editores de las revistas se equivocan
- ✍ Los revisores (referees) se equivocan
- ✍ Frontera del conocimiento
- ✍ “La mitad de la ciencia que enseñamos a nuestros alumnos es errónea”



Caso del “poliagua”

- ✍ Años 60
- ✍ Agua circulando por tubos vidrio muy estrechos
- ✍ Supuesto polímero de agua
- ✍ Modelos teóricos
- ✍ Muchos estudios, proyectos
- ✍ Contaminación del agua con silicio del vidrio

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2: [Rogers RG, Kumpster-Deak D, Darrow A, M... C, Oken A, Barber M](#) [Related Articles](#) [Links](#)

Does sexual function change after surgery for pelvic organ prolapse? A multicenter prospective study. *Am J Obstet Gynecol*. 2006 Nov;195(5):e1-4. PMID: 17074540 [PubMed - in process]

Medicina:
338 artículos retirados en los últimos 5 años

Artículos defectuosos publicados

Table 1. Summary of Empirical Evidence of Prevalence of Methodological Problems in Published Reports of Randomized Trials*

Deficiency	Evidence
Failing to specify eligibility criteria	25% of 364 reports in surgery journals
Not reporting an adequate method for generating random numbers	68% of 206 reports in obstetrics and gynecology journals; 52% of 80 reports in general medical journals
Not reporting the mechanism used to allocate interventions	89% of 196 reports in rheumatoid arthritis journals; 48% of 208 reports in obstetrics and gynecology journals; 44% of 80 reports in general medical journals
Failing to state whether blinding was used	51% of 506 reports in cystic fibrosis journals; 33% of 196 reports in rheumatoid arthritis journals; 38% of 68 reports in dermatology journals
Incorrect analysis of multiple observations	63% of 196 reports in rheumatoid arthritis journals
Inadequate information on harmful consequences of interventions	61% of 192 reports in 7 medical areas
Incorrect method of comparison of subgroups	58% of 50 reports in general journals

Altman, D. (2002) Poor quality medical research. What can journals do? *JAMA*, 287, 2765-2767

Los científicos también cometemos errores

Dogmatismo

- ✍ Idea común, pero errónea: “la ciencia es una actividad completamente abierta a nuevas teorías, propuestas, resultados”
- ✍ Realidad: los científicos son conservadores
- ✍ **El cambio de teorías en la ciencia es un proceso difícil y complicado**

THE JOURNAL OF CLINICAL INVESTIGATION
 Published and Edited by The American Society for Clinical Investigation
 622 WEST 168TH STREET
 NEW YORK 32, NEW YORK

No es aceptable para su publicación

Dr. Solomon A. Berson
 Radiolotope Service
 Veterans Administration Hospital
 130 East Kingsbridge Road
 Bronx 68, New York

Dear Dr. Berson:

I regret that the revision of your paper entitled "Insulin-¹³¹I Metabolism in Human Subjects: Demonstration of Insulin Transporting Antibody in the Circulation of Insulin Treated Subjects" is not acceptable for publication in THE JOURNAL OF CLINICAL INVESTIGATION.

The second major criticism relates to the dogmatic conclusions set forth which are not warranted by the data. The experts in this field have been particularly emphatic in rejecting your positive statement that the "conclusion that the globulin responsible for insulin binding is an acquired antibody appears to be inescapable". They believe that you have not demonstrated an antigen-antibody reaction on the basis of adequate criteria, nor that you have definitely proved that a globulin is responsible for insulin binding, nor that insulin is an antigen. The data you present are indeed suggestive but any such positive claims seem unjustifiable at present.

Sincerely,

Stanley E. Bradley

Stanley E. Bradley, M.D.
 Editor-in-Chief

SEB/mcn
 Encl.

campanario_fig3

Fleming y la penicilina

"En 1929 publiqué los resultados y sugerí que podrían ser útiles para el tratamiento de microbios... Me referí de nuevo a la penicilina en un par de publicaciones hacia 1936, pero poca gente me prestó atención."



Glashow y la Física de partículas

“Cuando hablábamos en 1974 de la unificación de todas las fuerzas fundamentales entre partículas elementales en un único grupo y de la inestabilidad del protón, nos consideraron locos... ¡Cómo cambian las cosas!”



Gell-Mann



Karl



Michell



Kroemer



Mullis



Von Klitzing



Ochoa



Perl



Zerwin



Yalow



Robdell



Wigner



Prusiner

I.G. Nobel

- ✍ Instituto de Tecnología de Massachussets
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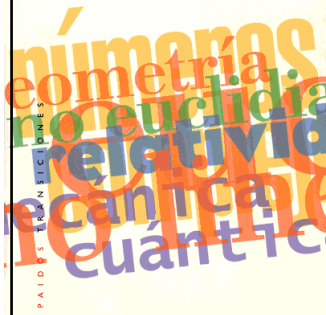
Conclusiones y perspectivas

- ✍ Tomar conciencia: alfabetización científica
- ✍ La ciencia tiene aspectos ocultos, desagradables, poco conocidos
- ✍ La ciencia es una actividad **humana**
- ✍ La mayor parte de los científicos son honrados
- ✍ Enseñar ética científica a los futuros investigadores
- ✍ Seguir investigando

Lecturas recomendadas

IMPOSTURAS INTELECTUALES

Alan Sokal
Jean Bricmont



FALSOS PROFETAS

Fraudes y errores en la ciencia

Alexander Kohn



Robert K. Merton
La sociología de la ciencia I.
Alianza Universidad



¿Cómo sería el mundo **SIN** la
Ciencia?



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