



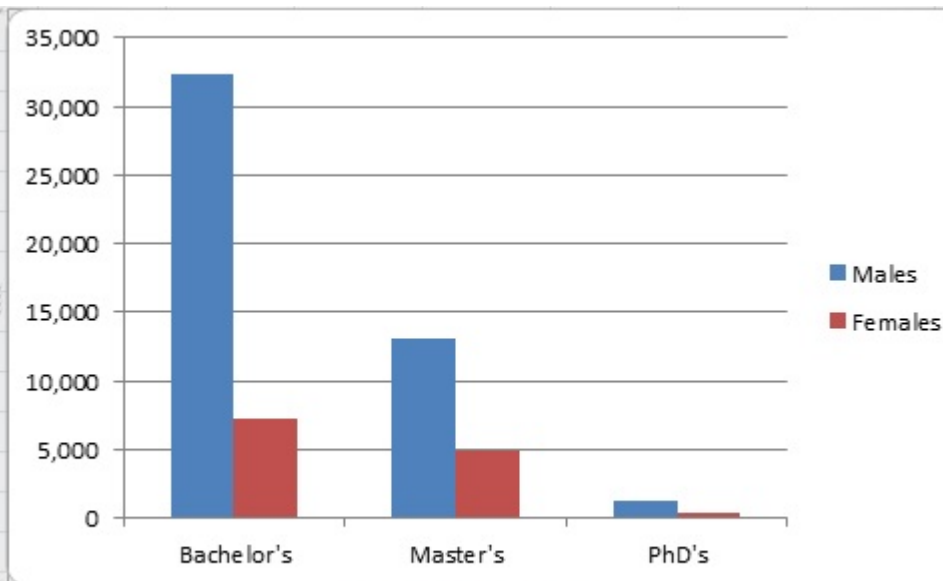
과학기술의 융합적 이해 2013년 2학기 제11주

# 남성과 여성의 과학

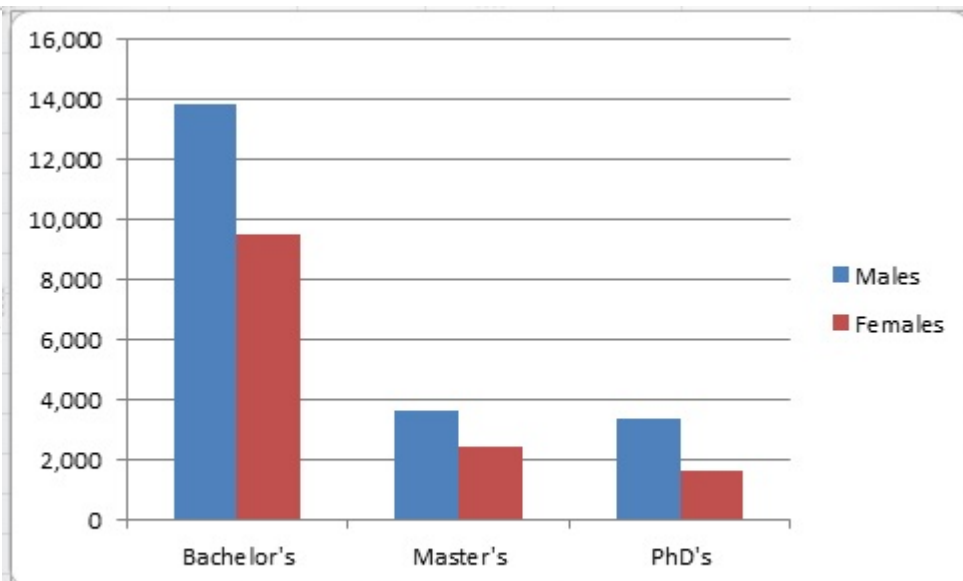
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2013년 11월 14일 정동욱

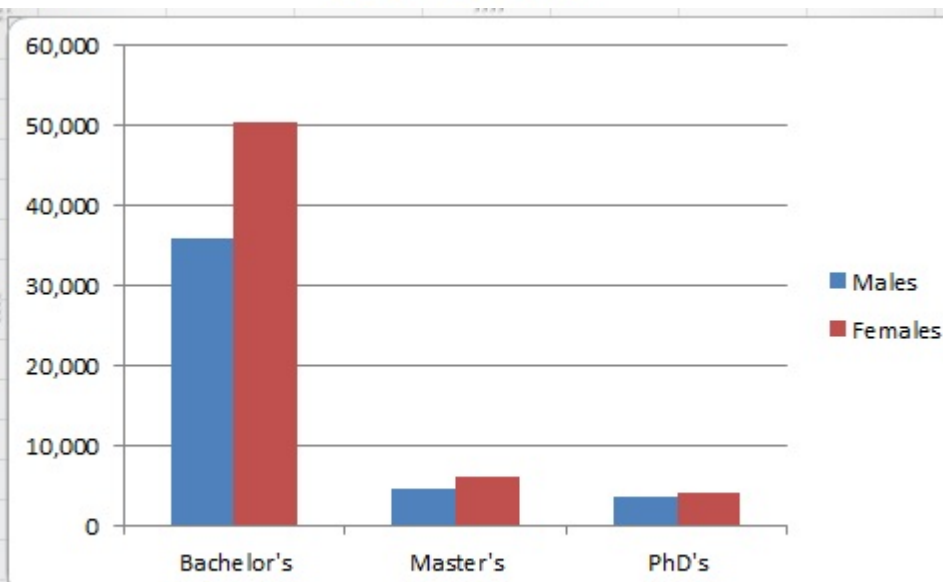
# 2009-2010 미국 대학의 졸업자 현황



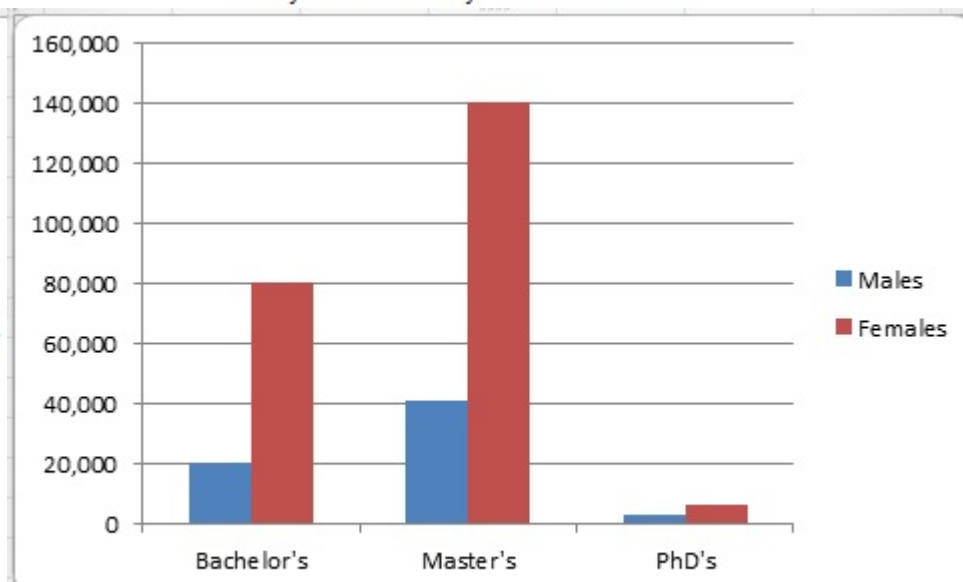
Computer Science



Physics and Physical Sciences



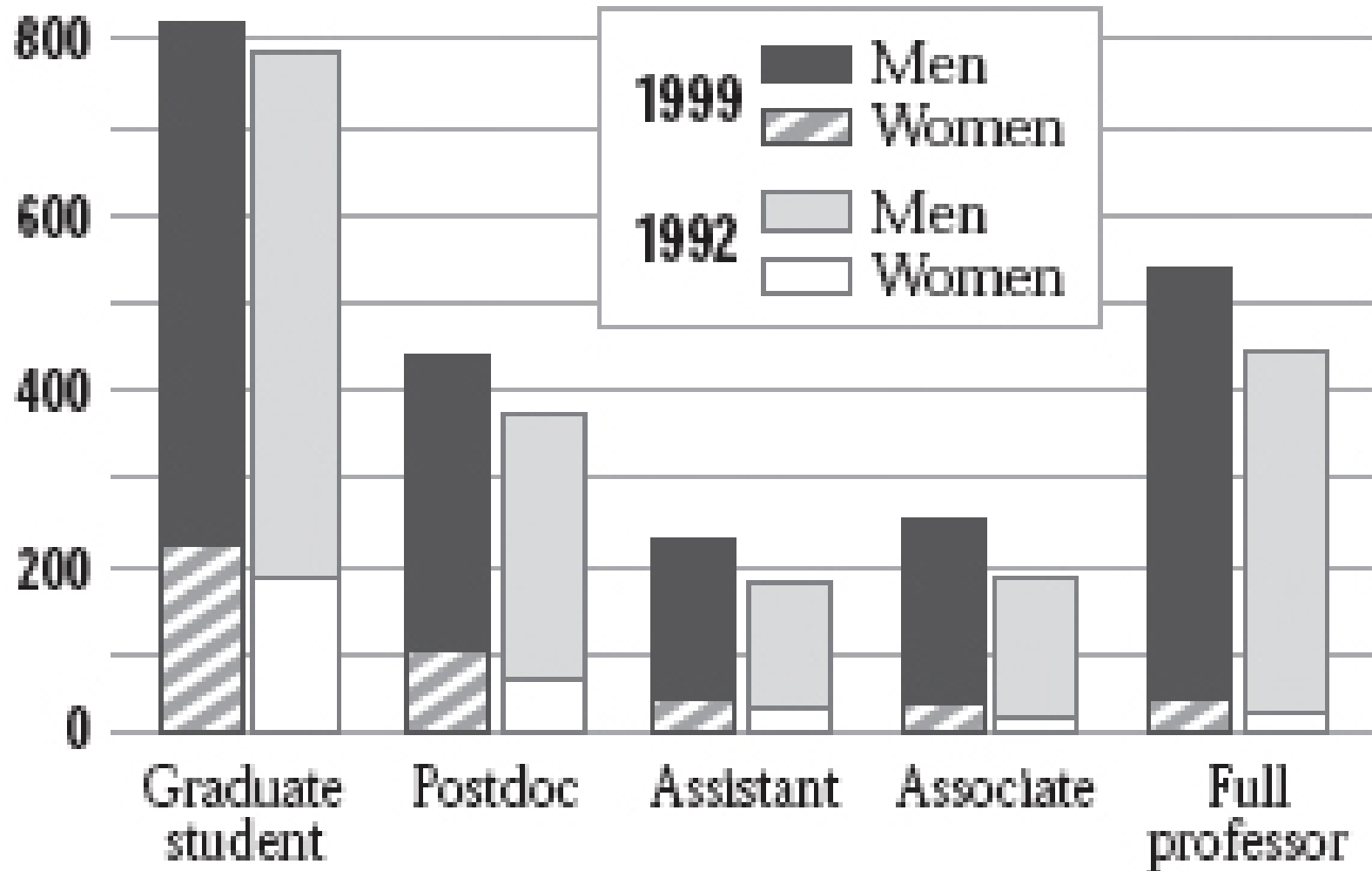
Biology



Education

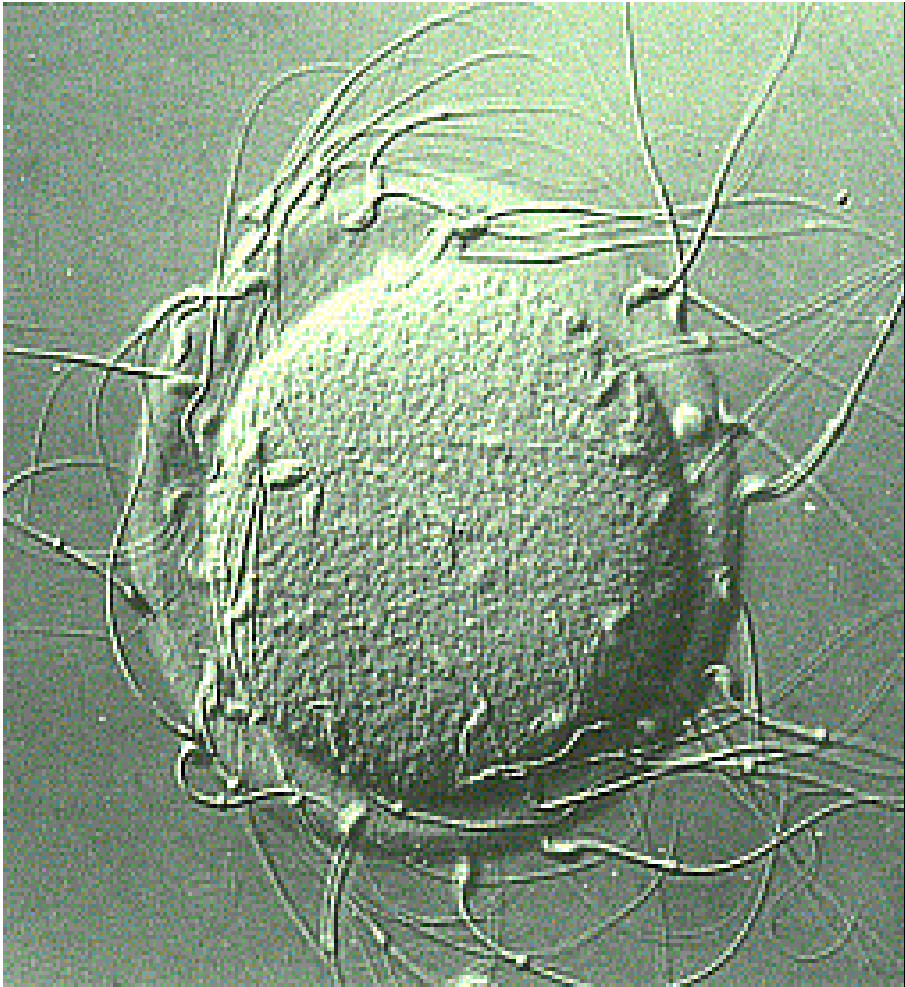
# Astronomy graduate students and faculty, 1992 vs. 1999

1  
과



# 잠자는 미녀/완벽한 왕자 모델

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왕자(정자)가 잠자는 미녀(난자)를 깨운다?

난자에서 정자로 뺄어나오는 작은 미세융모에 대한 관찰(1895)은 왜 최근까지 무시되었을까?

# 영장류학의 새로운 발견

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- 남성 영장류학자:  
남성이 영장류 사회 지배
- 최근 여성 영장류학자:  
여성의 사회적 역할 부각
- 왜 서로 다른 입장?



# 인간의 진화는 누구 덕분?



[남성은] 그들의 아이들뿐 아니라 여자들을 모든 종류의 적들로부터 보호해야 했으며, 공동의 생계를 위해 사냥을 해야 했다. 그러나 성공적으로 적을 피하거나 공격하고, 야생 동물들을 잡고, 무기를 만드는 일은 높은 정신적 능력, 즉 관찰이나 추론, 발명, 상상력 등의 도움을 필요로 한다. 따라서 이러한 다양한 능력은 [남자]어른으로 있는 동안 지속적으로 시험에 부쳐져 선택되었을 것이다.

찰스 다윈, <인간의 유래>

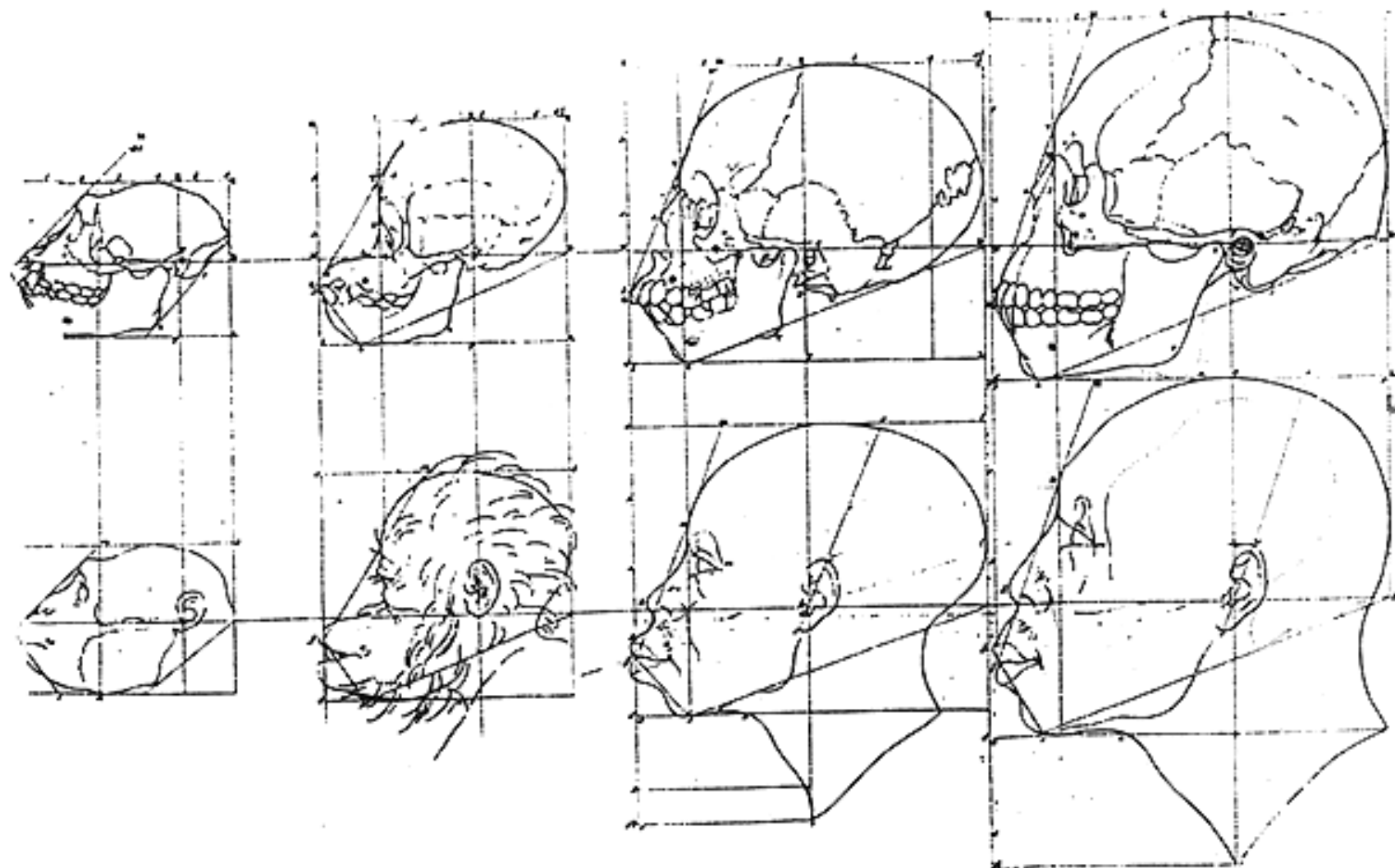


# 여성중심적 대안 가설

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도구 사용의 발달은 여성들이 임신 기간에 겪는, 그리고 임신 후 젖과 주변 사바나에서 채집한 음식을 이용해 아이를 먹이는 과정에서 겪는 더 큰 영양상의 압력에 대한 대응으로 볼 수 있다!

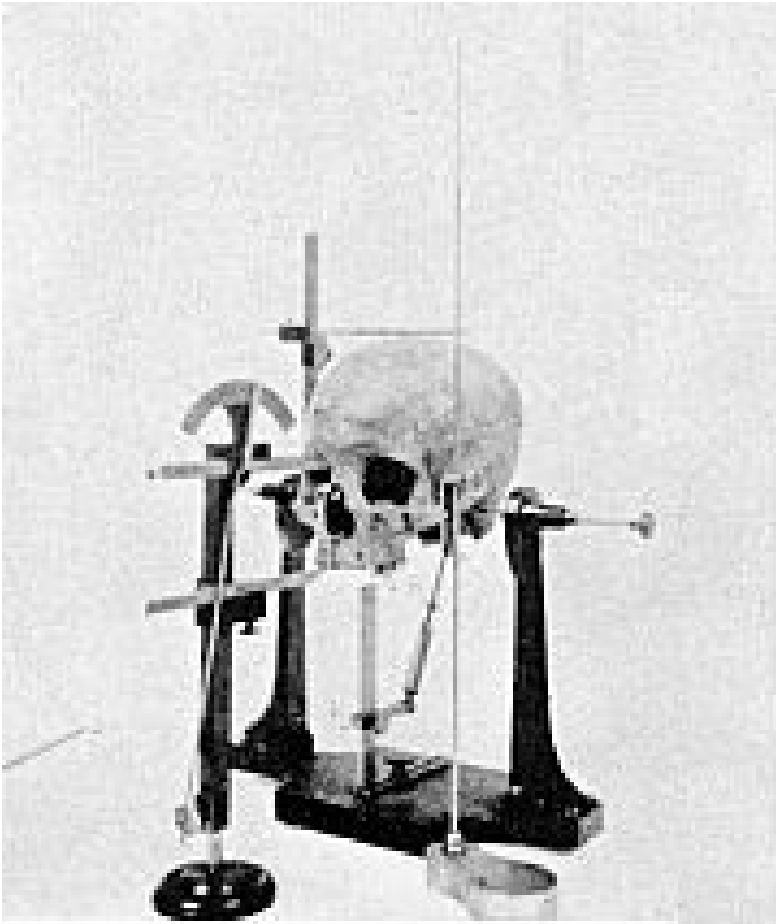


*Fig. 2: from left to right, comparative facial angle in monkey,  
orang-outang, Negro, and Kalmuck, from Camper  
Reproduced courtesy of the History of Medicine Division, the National Library of Medicine*



# 19세기 두개계측학과 지능

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- 두뇌가 클수록 지능도 좋다?
- 코끼리의 경우는?
- 두뇌/신체가 클수록 지능도 좋다?
- 여성과 황인종의 경우는?
- 전두엽? 두정엽?
- 여성의 큰 두정엽은?

계속된 반박에도 유지되는 생각은?  
그 생각은 왜 계속 유지되었을까?



Barclay's The Anatomy of the Bones of the Human Body, 1829



왜 암컷 쥐는 실험에 사용되지 않았을까?

# 이 사례들이 과학의 객관성 훼손?

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- 과학자 사회가 남성중심적인 편견을 가지고 있다면, 그들에 의해 확립된 이론은 세계가 작동하는 방식이 아닌 자신들의 편견에 의해 결정된 것일 수 있지 않겠는가?

# 주의할 점

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- 여성적 대안 가설이 참이라는 뜻 아님!
- 남성들이 고의로 꾸며냈다는 뜻 아님!
- 남성적인 과학자사회 내의 암묵적인 편견들이 소위 '객관적' 과학적 지식 뒤에 숨어있을 수 있다는 뜻임!



# 여성주의적 폭로의 함의는?

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1. 몇몇 '나쁜 과학'은 남성중심적이다?
2. 과학은 본성적으로 남성중심적이다?

# 샌드라 하딩의 선택지

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1. 여성주의적 경험주의
2. 관점 인식론
3. 여성주의적 포스트모더니즘

아직 가보지 않은 길은 없을까?

# 객관성에 대한 전통적 입장

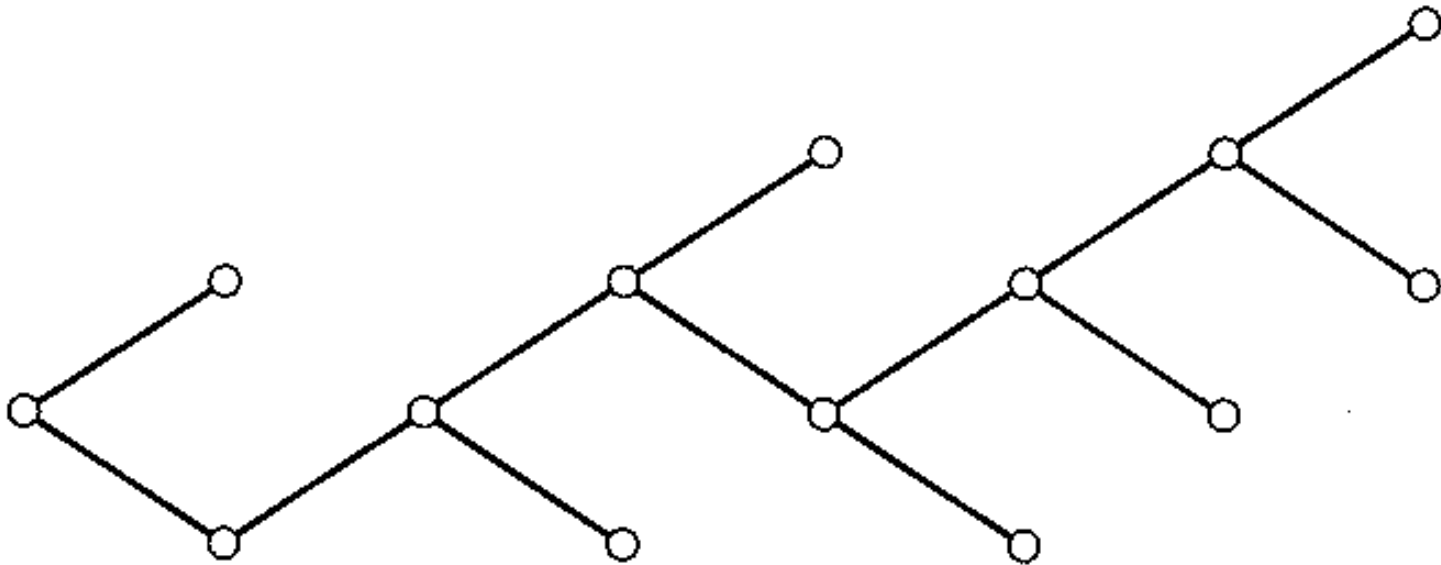
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- 발견의 맥락에서 어떤 사회적, 심리적 요인이 개입되더라도, 정당화의 맥락에서 이루어지는 가설에 대한 시험이 그러한 요인들을 제거할 수 있다.

# 가설 생성과 시험에 대한 재고

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1. 가설의 시험은 항상 대안가설을 상대로 이루어짐
2. 이론 선택의 궤적은 아래와 같은 그림을 따름



## 표준적인 가설 시험의 과정을 통해 과학의 내용에서 사회적 영향은 차단될 수 있는가?

---

- 이론 생성에서의 영향을 인정한다면, 이미 생성된 대안 가설 사이에서밖에 이루어질 수 없는 아무리 엄격한 이론 시험 방법으로는 그 영향을 차단할 수 없다.
- 성차별적이지 않은 대안 가설이 생성되지 않는 한, 시험을 통과한 이론은 최선의 성차별적 이론일 것이다.



# 암묵적 배경이론과 보조가설

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- 자료를 이론의 증거로 간주할 때, 많은 암묵적 배경이론과 보조가설들이 사용되지만, 많은 경우 이들의 존재는 그와 경쟁하는 대안 가설이 나타난 후에만 인식.

# 우리에게 남은 선택지는?

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- 이론 평가의 기준이 사회적 요인에 의해 오염되어 있지 않다 하더라도, 사회적 가치는 과학의 내용에 스며들어 있을 수 있다.
1. 합리성의 적용 영역을 제한하고, 과학의 객관성에 대한 주장은 약화해야
  2. 합리성의 모델을 이론 생성의 맥락까지 포함시킬 수 있도록 확장해야

# ‘객관적’ 과학을 위해서는?

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- 주의 깊게 편견을 버리고 가설을 세워야 한다?



No!

# ‘객관적’ 과학을 위해서는?

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- 오히려 편향의 존재 가능성을 인정하고, 다양한 편향에 기초한 가설이 나오도록 권장해야.
- 그러한 여러 대안 가설을 인지할 수 있는 과학자 공동체는 그렇지 않은 공동체보다 인식론적으로 우월!

# 대안 가설의 중요성

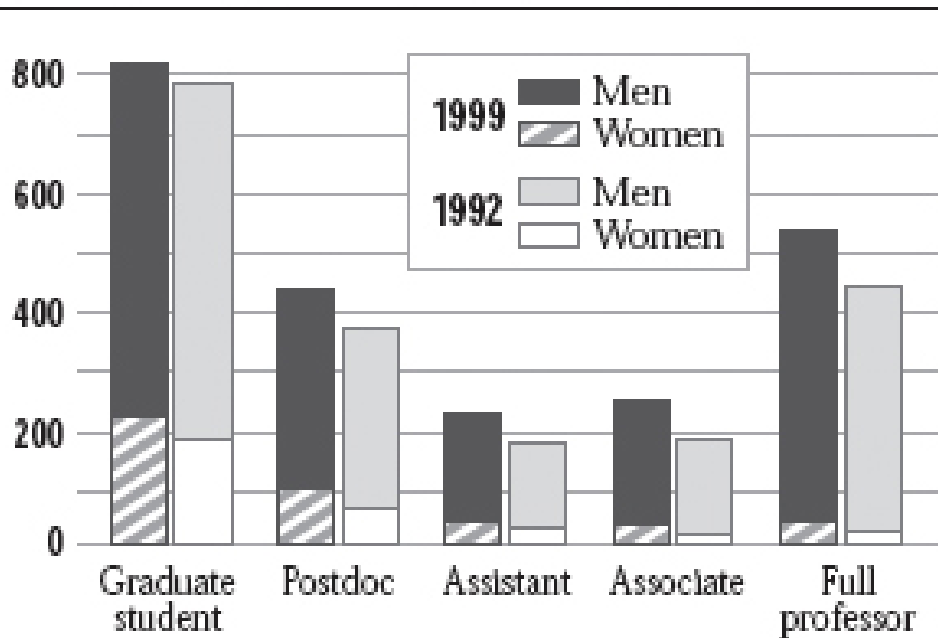
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- 대안 가설의 존재를 모른 상태에서는 (한쪽 편향에 기초한) 기존 가설을 입증된 이론처럼 간주하기 쉽다!
- 대립하는 편향에 기초한 대안 가설이 있어야만, 기존 가설에 대한 더 엄격한 시험을 고안할 수 있다!



# 왜 여성의 수는 올라갈수록 적어질까?

Astronomy graduate students and faculty, 1992 vs. 1999



여성의 능력 부족?  
연구 실적이 적기  
때문?

# 같은 논문 다른 이름의 평가 결과는?

John M. Kay

J. M. Kay

Jane M. Kay

## Organic Environmental Technology / SCD Probiotics in the remediation of water contaminated with Pathogenic Bacteria and Copper in Reseda Lake, Los Angeles, California, U.S.A

Dr. Margarita Corrao\*, Lilí Schmidt\*\*, Mahmoud Ismail\*\*\*

### Abstract

Interest in the utilization of probiotics has significantly increased in recent years not only in human and animal health, but also in environmental as well as agricultural industries. Organic Environmental Technology (OET), is a Los Angeles based bioremediation and distributor of MCD Probiotics, partnering with clients to improve various aspects of the environment. The objectives of using our Probiotic Technology at Reseda Lake in Los Angeles, California was to treat specific targets of inducing pathogenic bacteria and heavy metals, specifically copper. The primary purpose of the trial is to observe the effectiveness of "OET's" products in improving the water quality of Reseda Park Lake.

### INTRODUCTION

The Reseda Park Lake which is operated by the City of Los Angeles, Recreation and Parks will be used as a pilot study in the use of probiotic technology. This study is planned to examine its application in improving the water quality in urban lakes and in preventing odors and septic conditions.

In the recent past there has been an interest in using probiotics to carry out the remediation of pathogenic bacteria and heavy metals contaminating and/or ground water and the results have been encouraging both in terms of time frame for the treatment and the cost involved<sup>(1)</sup>.

In this research we describe our experience in using the OET/SCD Probiotics<sup>(2,3)</sup> solution to effectively decompose pathogenic bacteria and copper in Reseda Lake, Los Angeles, California, U.S.

### BACKGROUND INFORMATION

Reseda Park is located at the intersection of Victory and Reseda Blvd and is shown here (Fig.1). The lake is approximately 2.1 acres and 6 feet deep and is a concrete lined/operational watershed.

\* MCD Probiotics - Co-Author, under whose guidance this investigation was carried out, and to whom all correspondence regarding this paper should be addressed - [margarita.corrao@MCDProbiotics.com](mailto:margarita.corrao@MCDProbiotics.com)  
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# 여성의 연구실적에 대한 새로운 설명

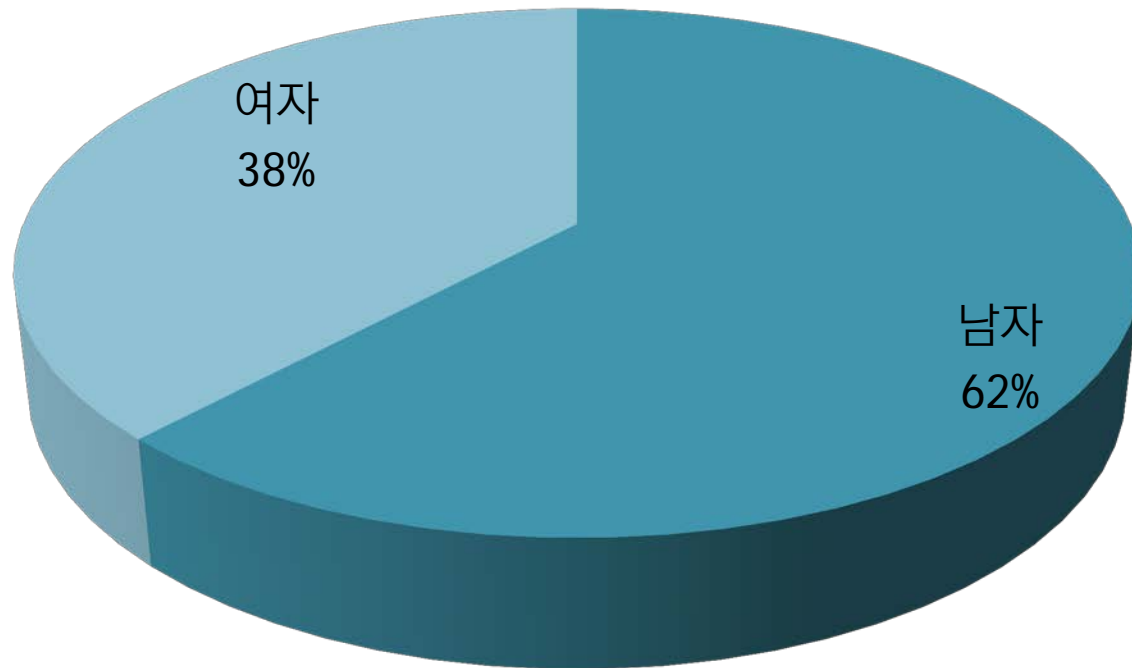
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- 암묵적인 저평가로 인해 논문의 질에 주력
- 논문의 피인용률 : 여성>남성

# 수리능력의 남녀 차이는 어디서 비롯?

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2005-2009학년도 수학능력시험 수리영역 1등급



수학적 능력 차이는 생물학적으로 결정된 것일까?



THANK YOU!