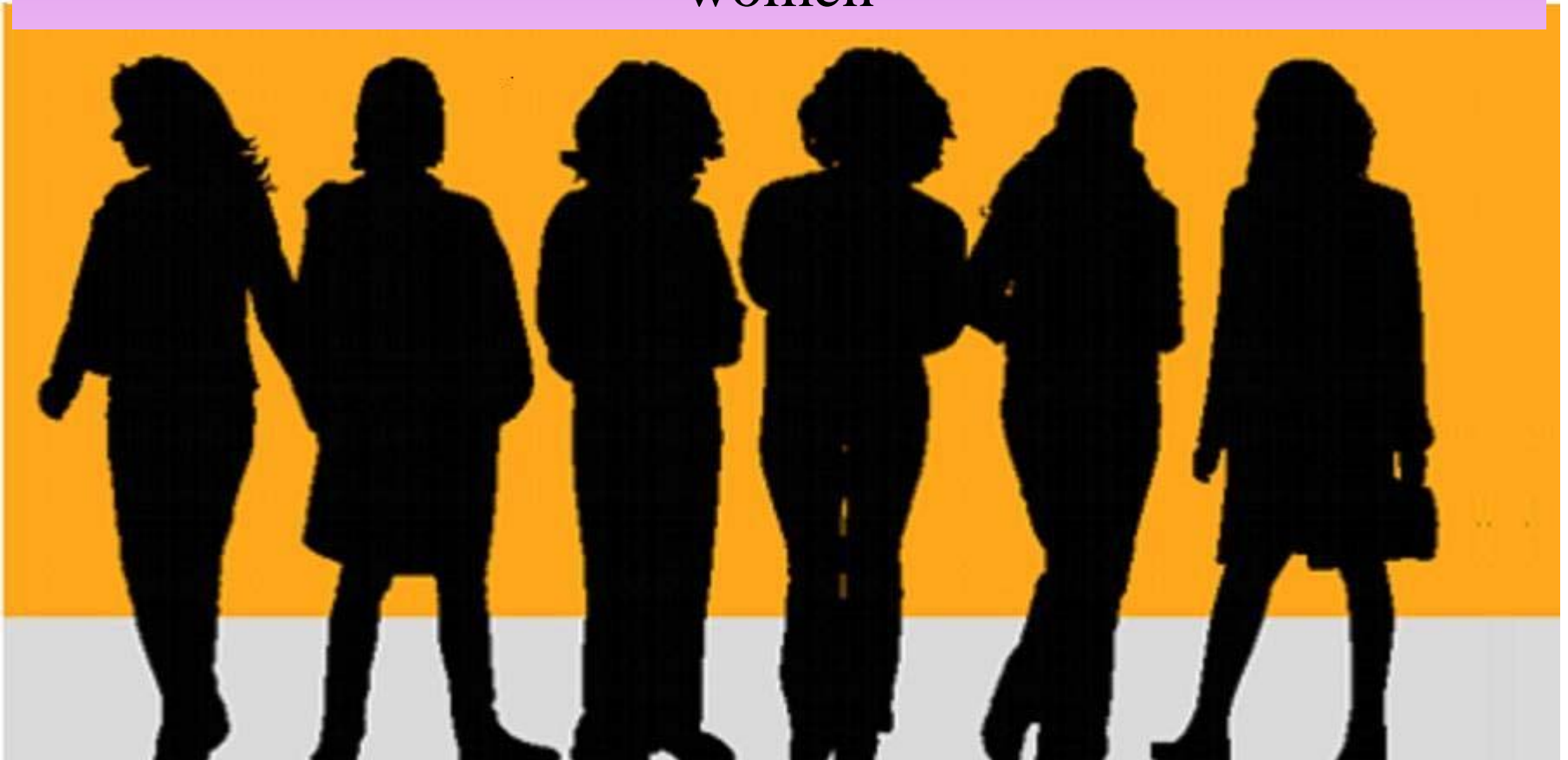


Women and science

Women of science, women in science, science with
women

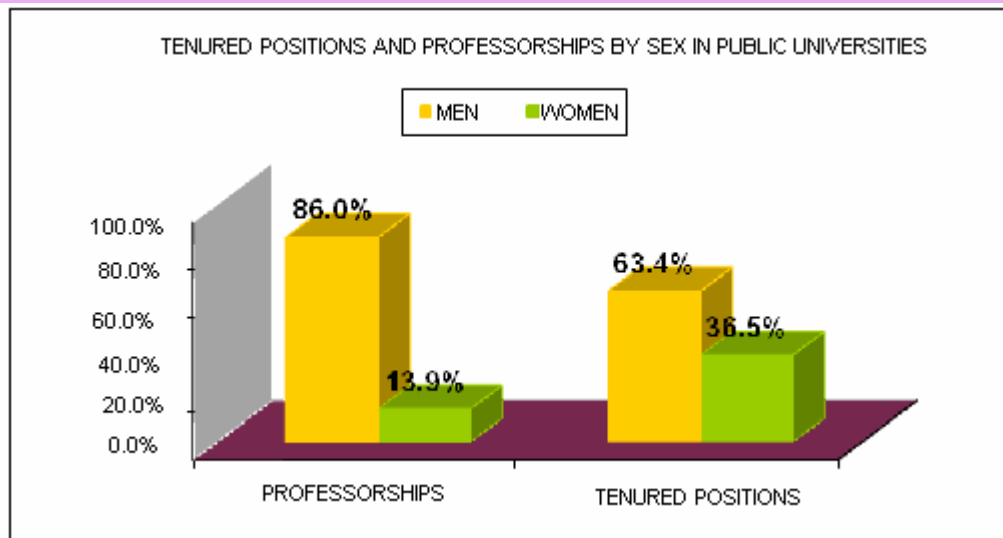


Women and science



1. Women of science: participation of women in science and technology

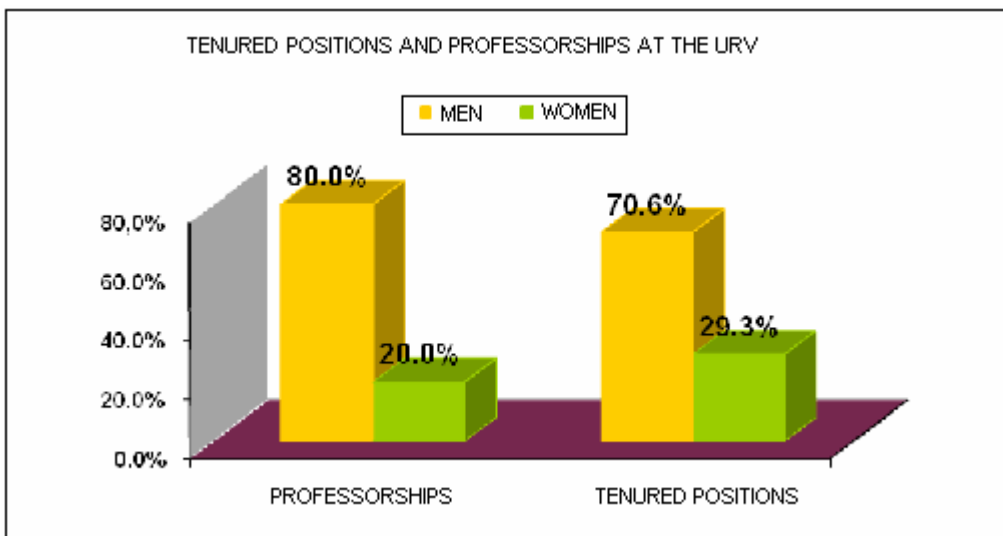
Tenured positions and professorships by sex in Spanish universities and at the URV



For TENURED POSITIONS:

-Relatively balanced presence in Spanish universities

-At the URV this presence isn't even half; an imbalance between the genders for teaching positions



For PROFESSORSHIPS:

-Imbalance in the gender ratio for all of Spain

-At the URV, the percentage of women holding professorships is above the Spanish average, but there is still a marked degree of imbalance

Imbalance by job category at the URV

There are differences between men and women in terms of job categories: women are a bit more prevalent among tenured university teaching positions and personnel in training.

| | CU | CEU+TU | TEU | Associates | Teaching assistants | Total R+T staff |
|--------------|------------|---------------|------------|-------------------|----------------------------|------------------------|
| Men | 400 | 218 | 99 | 150 | 91 | 139 |
| Women | 100 | 100 | 100 | 100 | 100 | 100 |

LEGEND FOR SPANISH LECTURER GRADES:

| | | |
|-------------|--|---|
| CU: | Catedrático de Universidad | University professor |
| CEU: | Catedrático de Escuela Universitaria | University-school professor |
| TU: | Profesor Titular de Universidad | Tenured university lecturer |
| TEU: | Profesor Titular de Escuela Universitaria | Tenured university-school lecturer |

Gender breakdown of departments of the URV

The departments with the highest percentages of men and women are:

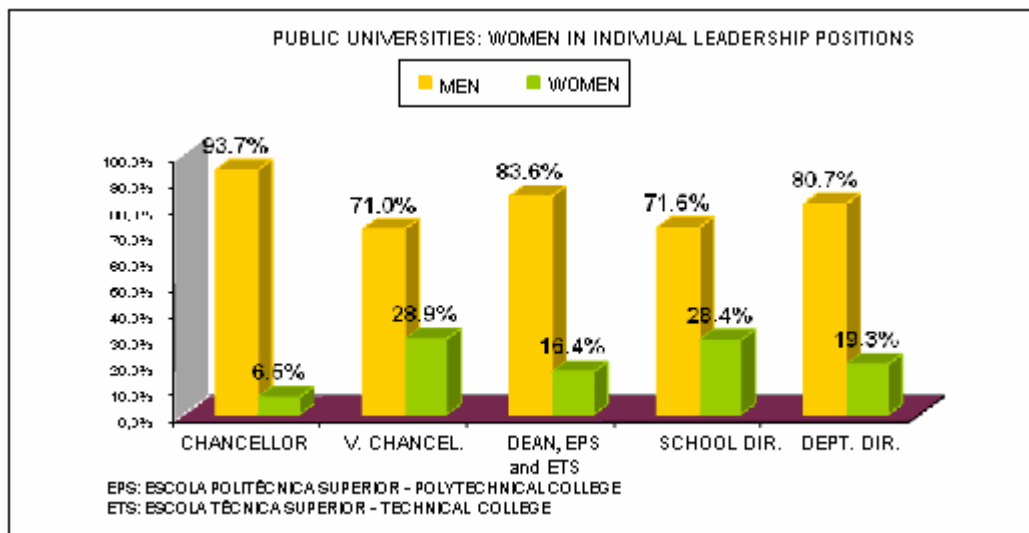
Male-dominated (% men)

- **Electronic, Electric and Automated Engineering 90.9**
- **Mechanical Engineering 89.7**
- **Computer Engineering and Mathematics 80.6**
- **Chemical Engineering 74.3**

Female-dominated (% women)

- **Nursing 91.7**
- **Analytical and Organic Chemistry 66.7**
- **Pedagogy 58.7**
- **Roman Philology 57.7**

Women in leadership positions at the URV



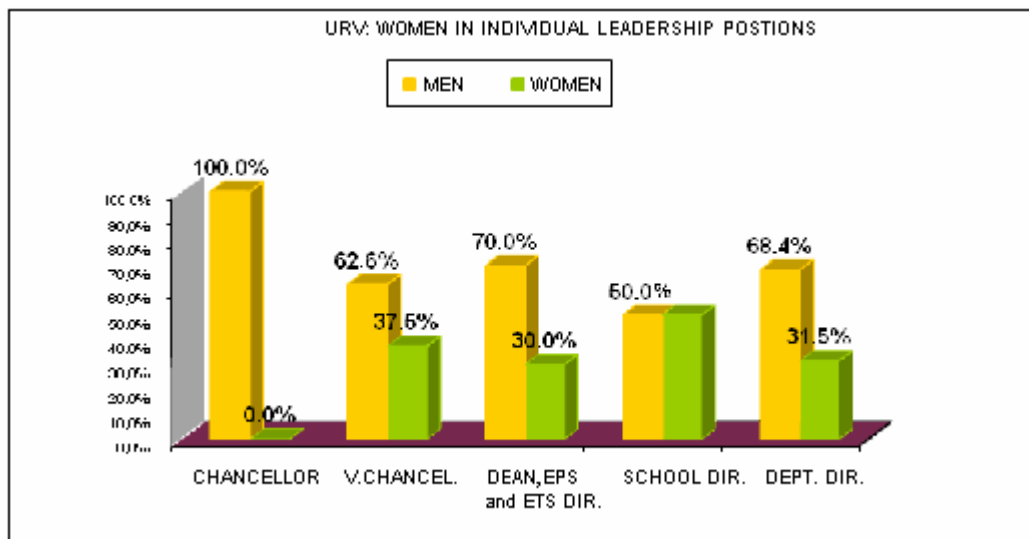
Variables analysed:

- Appointed positions
- Elected positions (deans, school and department directors, etc.)

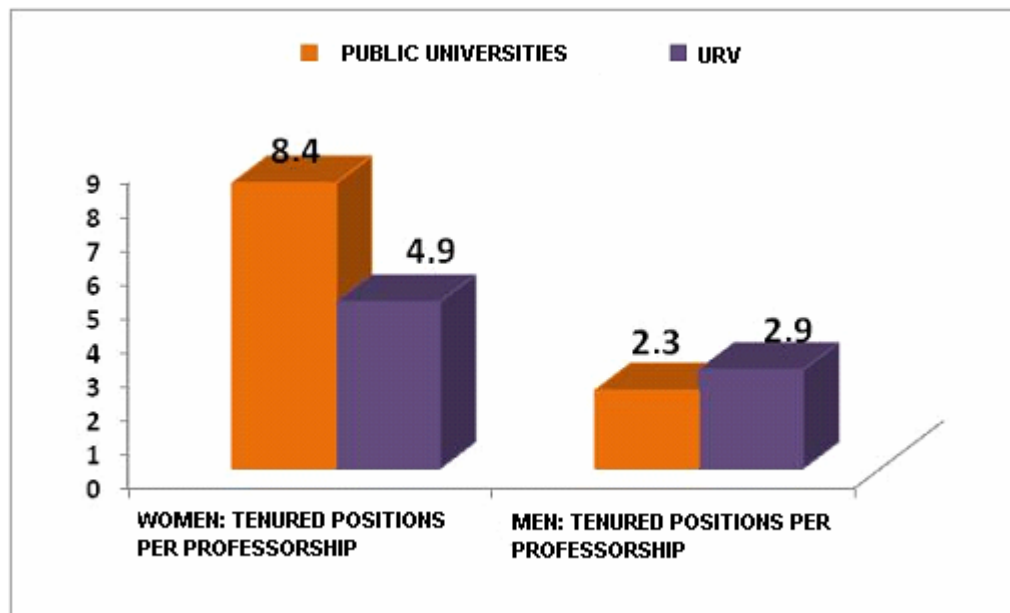
- Observable differences:

1. Low presence of women in governance teams

2. Women in leadership positions at the URV exceeds Spanish average



Proportion of teaching positions to professorships



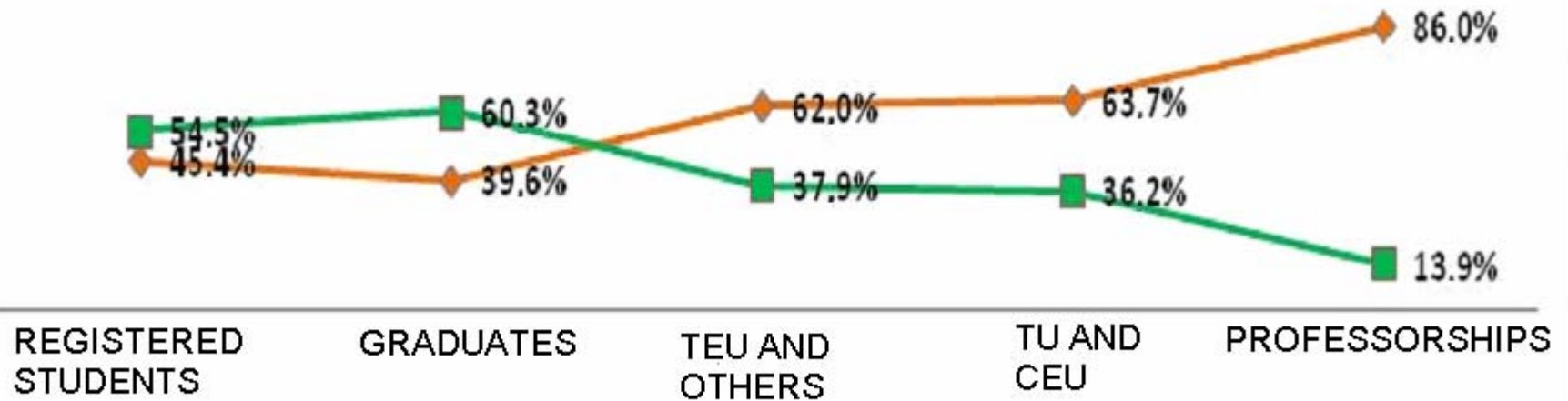
KEY DIFFERENCES:

1. THE PERCENTAGE OF WOMEN HOLDING TENURED POSITIONS AT THE URV (29.4%) IS BELOW THE SPANISH AVERAGE (36.5%).
2. THE PERCENTAGE OF WOMEN HOLDING PROFESSORSHIPS AT THE URV (20%) IS ABOVE THE SPANISH AVERAGE (13.9%).

Academic and research evolution

ACADEMIC AND RESEARCH EVOLUTION : SCISSORS MODEL PUBLIC UNIVERSITIES 2005

—◆— MEN —■— WOMEN



Women and science



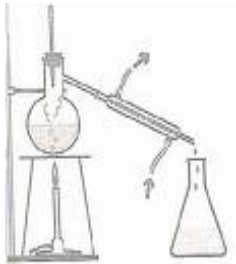
Women and science: names and surnames

Women scientists in history



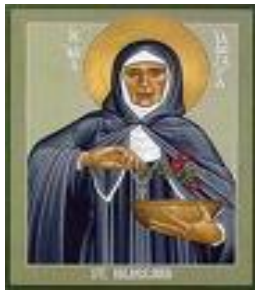
Hypatia of Alexandria (380-415)

Daughter of Theon, a mathematician and head of the Museum of Alexandria in Egypt. She made significant contributions to the mathematical studies of her father. She is considered to be the first women mathematician and astronomer in history as well as a follower of Neo-Platonist philosophy. A crater and an escarpment have been named after her on the moon.



Maria (3rd century?)

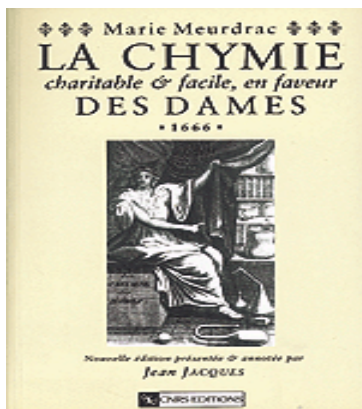
She is believed to be one of the first recognised figures in the tradition of alchemy. According to some sources, she is credited with some of the procedures that are employed today in laboratories: distillation, sublimation, filtration, dissolution, calcination, cupellation and separation of noble metals. She invented several devices, among which the bain-marie is the most well-known.



Hildegard of Bingen (1098-1179)

Born in Bermersheim, Germany, into a noble family of the Palatinate, she was a cosmologist and doctor – one of the most important mystics and intellectuals of her time. She became Abbess of the Benedictine Convent of Disibodenberg and founded other monasteries. She became famous for her cures and medical ability. She brought out the virtues of all that surrounded her from a medical, nutritional and environmental point of view.

Women alchemists



Marie Meurdrac (16th century?)

*Not a great deal is known about the life of this woman or her education. She wrote a book entitled *La Chymie Charitable et Facile, en Faveur des Dames*, with recipes for practical and everyday chemistry (pickling agents and unguents). The book is structured in six parts that deal with the principles, apparatuses and techniques of the laboratory, as well as animals, metals, the properties and preparation of simple and compound medicines and cosmetics. It includes a weight table and 106 alchemical symbols as well as warnings for the use of some substances, such as mercury, used to whiten the skin and considered toxic.*



Marie le Jars de Gournay (1565-1645)

She was born in Paris to a noble family and lived in that city all her life. She got involved in alchemical work as a means of intellectual expansion, but her thirst for knowledge was met with criticism and attacks of all kinds. She became known for presenting her ideas about alchemy and the equality of women in the public salons of the era.

Women in the modern age



Margaret Cavendish (1623-1673)

The Duchess of Newcastle, she played a role in the formulation of the first molecular theories which led to our modern-day theory. She was also active in the most important discourses of the day on material and movement, the existence of space, the nature of magnetism, colour, fire, perception and knowledge. At the same time she criticized the experimentalists and the Cartesian dualism of matter/spirit; she believed that only matter existed.



Anne Finch Conway (1631-1679)

Born into an aristocratic family, she became the Countess of Conway. She studied at Cambridge and was not only an excellent student in classical languages, but also in mathematics and science. She believed in a unity of matter and spirit that was the result of the convergence of masculine and feminine principles.



Anna Maria Sybilla Merian (1647-1717)

The daughter of a well-known artist and engraver, she was the most recognised entomologist of the 18th century and left her mark with the identification of six plants and nine butterflies. She studied the life cycles of insects.

Maria Winkelman (1670-1720)

She was an astronomer who married her professor, Gottfried Kirch, at the age of 22 and became his work colleague. She made the observations and calculations required to create the calendar and in 1702 she discovered a comet. When her husband died, she was denied his position at the Berlin Academy of Sciences so as not to set the precedent of female authority in astronomy.



Lady Mary Wortley Montagu (1689-1762)

An illustrious author and traveller and the daughter of a diplomat, she spent part of her life in Turkey. There she learned to value the knowledge and skills of Turkish women, who had discovered a type of vaccine against smallpox – variolation, a common immunological practise employed for centuries in the Middle East and India. Using this technique she inoculated both herself and her son. She later introduced the practise to the U.K. and Europe.

Women scientists of the 18th century

Dones del segle XVIII



Maria Agnesi de Milà (1718-1799)

*An Italian mathematician, she became famous for her book on differential and integral calculus entitled *Instituzioni Analitiche*, published in 1748 and considered then to be the most important treatises on the subject to date.*



Nicole Lepaute (1723-1788)

A French astronomer, she calculated the table of oscillations of pendulums per unit of time and length, all of which was published as the work of her husband.



Marie-Anne Paulze (1758-1836)

A French astronomer, she married the chemist Antoine-Laurent Lavoisier at the age of 14, who took charge of her education. She participated actively in laboratory experiments, creating documents based on laboratory notes and highly detailed illustrations of the experimental devices employed as well as their mountings.



Jane Marcet (1769-1858)

*An English science author, she wrote a book entitled *Conversations on Chemistry*, published anonymously in 1805. It was a dialogue between a professor and her students.*



Elizabeth Fulhame (?)

*An English scientist from a cultured family, she wrote *An Essay on Combustion* (1794). The purpose of the book was to find practical applications for her experiments.*



Sophie Germain (1776-1831)

Born to a wealthy merchant family, she worked on number theory using the methods proposed by Gauss. From 1753 to 1840, the theorem which bears her name was her crowning achievement as it was a major step toward proving Fermat's last theorem. Afterwards the emphasis of her research was the theory of elasticity.



Mary Somerville (1780-1872)

She had an impeccable scientific and professional reputation. When she began doing experiments in her house, her husband was charged with delivering the results.



Mary Anning (1799-1847)

One of the most famous English geologists of her time, she came from a humble background. From the age of 12 she dedicated herself to the collection of fossils as a way to contribute to the family's finances, later she acquired a solid scientific background.

Women scientists of the 19th century



Ada Augusta Byron (Lady Lovelace) (1815-1852)

Daughter of the mathematician Annabella Milbanke and the poet Lord Byron, she was an important figure in the world of mathematics. Influenced primarily by her mother, she was an assistant to the British mathematician and inventor Charles Babbage with whom she collaborated to develop the Difference Engine, a precursor to the first calculator. This machine could solve any algebraic equation. Ada Byron is considered to be the first programmer in history. The programming language ADA developed at the end of the seventies was named in homage to Ada Byron.



Maria Mitchell (1818-1889)

She was the first lady of astronomy of the United States, the first librarian of the Nantucket Atheneum, the first woman to be admitted to the American Association for the Advancement of Science, the first professor of astronomy in the Northern United States and the first woman to be accepted to the Academy of Arts and Sciences. Her interest in mathematics and science led her to study astronomy. In 1847 she discovered a comet using a telescope (Comet Mitchell 1847 VI). In the political arena, she took part in educational reform for women in 1873, and was later elected head of the commission.



Sofia Kovaleskaya (1850-1891)

A Russian mathematician born in Moscow to a family with large land holdings, she had to enter into a marriage of convenience in order to study abroad. She made significant contributions on the topic of differential equations, Abelian integrals and the rings of Saturn. In 1881, she became the first woman to become a tenured lecturer and in 1889 she received an award from the Swiss Academy of Sciences and was elected to the Russian Academy of Sciences.

Henrietta S. Leavitt (1869-1921)

She began her career working as a volunteer at the Harvard Observatory in 1895, as most assistants did at the time. She rose to become head of the Department of Photographic Photometry. Her most important theoretical contribution was establishing the period of illumination of some variable stars with regular intervals.

Irene Curie (1897-1956)

A French physicist who specialised in the field of nuclear physics, she studied artificial radiation and nuclear transmutations using particle bombardment. She was awarded the Nobel Prize in 1935, which she shared with her husband Frederic Joliot (1900 -1958). Their scientific papers were signed as if there had been only one researcher, using the surname Joliot-Curie. She worked for the French government as Undersecretary of State for Scientific Research. She was a member of the Commissariat à l'Energie Atomique and director of the Radium Institute. She was awarded the title of Officer in the Legion of Honour and received many honours for her contributions to nuclear physics.



Women scientists in the 20th century



Barbara McClintock (1902-1992)

McClintock began her scientific career at Cornell in 1919. She is considered to be one of the 20th century's leading specialists in genetics. Her research on the transfer of corn gene positions was pivotal for the comprehension of hereditary processes. In 1944 she received the prestigious National Academy of Sciences Award. In 1983 she was awarded the Nobel Prize for Physiology and Medicine.



Rachel Carson (1907-1964)

An American biologist, she worked for the US Bureau of Fisheries. In 1962 she published Silent Spring, one of the first studies of the deleterious effects of certain human activities (especially in industry and agriculture) on the environment. She was also one of the first people to raise the alarm about the dangers of pollution. Her book contributed decisively towards the creation of a public ecological conscience. Some of her other works include Under the Sea Wind (1941) and The Edge of the Sea (1955).



Virginia Apgar (1909-1974)

An American anaesthesiologist, she invented the Apgar Test, a method for expressing the results of initial observations to verify the vitality of an infant. The result is expressed in terms of the sum of points obtained from observation of the infant one minute after it is born. The following aspects are taken into consideration: Appearance (colour of the skin), Pulse, Grimace (reflex response), Activity (muscle tone) and Respiration. Depending on the infant's score, different reanimation techniques are applied. Neonatal mortality is inversely proportional to the Apgar score obtained in the first minute. An additional observation made at five minutes indicates the development of the infant's condition and is important for determining its prognosis.



Rosalind Franklin (1920-1958)

An English scientist, she studied at Cambridge and researched applications for X-rays, and the structure of glass, DNA and viruses. Her discoveries on the diffraction of X-rays later played a crucial role in the discovery of the helical structure of DNA, which led to Watson and Crick being awarded the Nobel Prize for Medicine in 1962. She died prematurely at age 37.

Catalan scientists

- **REGINÓ**, a Jewish woman from Barcelona who was authorised to practise medicine on Pere III the Ceremonious
- **CETI DE VALÈNCIA**, Jewish doctor (1368)
- **FRANCESCA DE BARCELONA** (Francesca ça Torra), authorized by Joan I to administer medicine to any sick person
- **BLANCA**, the wife of Bernat de Bages, also authorized by Joan I to administer medicine to any sick person
- **SANÇÀ**, Barcelona healer who was very popular in the middle ages
- **BEATRIU DE PINÓS** (~1433-1485), great defender of the teachings of Ramon Llull
- **JULIANA MORELL** (1594-1653), doctor of sciences and letters and the only woman to be listed in the auditorium of Barcelona University
- **MARIA ELENA MASERAS I RIBERA** (1853-1900), the first woman accepted to the department of medicine at the University of Barcelona (1872-73)
- **DOLORS ALEU I RIERA** (1857-1913), first woman to obtain a degree in medicine from the University of Barcelona (20 April 1882) and the first woman doctor of the Spanish state (6 October 1882)
- **MARTINA CASTELLS I BALLESPÍ** (1852-1884), the second female doctor of medicine of the state of Spain (9 October 1882)
- **MANUELA SOLÍS I CLARÀS** (1862-1910), a gynaecologist and the first woman to receive a doctorate in medicine from the University of Valencia
- **MONTSERRAT GARRIGA CABRERO** (1865-1956), botanist, student of Dr. Pius Font i Quer
- **ROSA SENSAT I VILÀ** (1873-1961), proponent of pedagogical reform in Catalonia
- **ROSA VIÑALS I LLADÓS** (1883-1945), surgeon and midwife at the Beneficència Municipal of Barcelona
- **MARIA MONTSERRAT CAPDEVILA D'ORIOLA**, mathematician and professor at the department of sciences at the University of Barcelona during the Second Spanish Republic (1931-1939)
- **MARGARITA COMAS CAMPS** (1892-1973), biologist and teacher, vice chancellor of l'Escola Normal de la Generalitat Republicana.
- **MARIA DELS ÀNGLES FERRER I SENSAT** (1904-1992), naturalist and educator
- **CREU CASAS I SICART** (1913-2007), introduced bryology to Catalonia and Spain
- **ADELA SIMÓ I PERA** (1919-1979), nurse and director of the nursing department at the Santa Creu i Sant Pau hospitals in Barcelona
- **MARGARITA BRENDER RUBIRA** (1919-2000), architect, for many years she was the only woman in her field in Barcelona
- **MARIA LLUÏSA CANUT RUIZ** (1924-2005), physicist, worked for the CSIC (Consejo Superior de Investigaciones Científicas – supervisory board for scientific research)
- **MARIA ANGELS CARDONA I FLORIT** (1940-1991), plant biologist, specialist in cytotaxonomy

Women and science



2. Scientific knowledge and women: absence and invisibility

Women in the sciences

Women have traditionally been absent from sciences as an area of study. Some of the indicators of this include:

. In **medicine**: women have been excluded from clinical trials to such an extent that men have been and continue to be the universal standard. An example of this is the poor rate of diagnosis of myocardial infarction in women.

. In **literature**: women have been companions, but rarely protagonists. In an article on biographies featuring 60 names, only 2 were women's.

. In **the media**: in headlines, in references and in the way in which people are referred to. Women make up 46% of the professionals in the field and only 24% of management.

. In **the arts**: from 2000 to 2006 only 7% of films were directed by women. Of 43 exhibitions organized by the State Corporation for Spanish Cultural Action Abroad only 2 were by woman (5%).

In the first 10 years of National Awards (for essays, poetry and narrative), only 3% were awarded to women; in the past 10 years, 13% have been.

Women in the sciences



A Guerrilla Girls Slogan:

“Do women have to be naked to get into the Met. Museum?”

Less than 5% of artists are women in the modern art section of the museum but 85% of the nudes are women.

Women in the sciences

What's behind this?

- Men represents all humans, the universal
- Men are defined as a social and cultural beings: statesman, businessman, spokesman
- Being masculine is seen as intrinsically positive
- Men are defined in terms of abstract values: “an Islamist, his wife and her sister die in an attack”
- Women only represent themselves: women's literature
- Women are identified with nature and sexuality: woman of the night
- Being feminine is seen as intrinsically negative
- Women are defined in terms of their relationship to men.

Women and science



3. Policies of gender equality

Gender is expressed on four levels:

Secondary biological characteristics: These are not simply dual, that is to say, they do not only correspond to two radically divergent types.

Personal identity: As with secondary physical features they are not dichotomic, rather they form a continuum, the human psychological traits of femininity and masculinity also have this same characteristic.

Social roles: In every society there are female and masculine roles and every society decides which tasks are the responsibility of men and are to be considered masculine and which are those of women and to be considered feminine.

Social environments: In modern industrial and urban societies the organisation of the gender system is expressed through a gender-based division of labour which encourages further separation in the private sphere, with the privacy of the home being the realm of the woman and public space being predominantly masculine. The public arena is given financial, social and prestige value, while the private sphere is assigned only a symbolic value.

Strategies for gender policies

Several types of anti-discriminatory policies have been implemented over the years. They have been adapted to respond to different political concepts and differences between political systems and traditions in different countries. The primary strategies employed include:

Equal opportunity. These anti-discrimination policies have become standard in Western countries. The main problem with these policies is that they do not address the social organisation which sustains discrimination against women, especially in terms of their role in the family.

Affirmative action. Some examples of this are quota systems that balance the proportions of the sexes who take part in certain activities or other types of support for organisations that encourage equal opportunities. These are implemented, for example, by providing credit lines especially for businesses that hire women or through governmental legal initiatives to ensure that women are not discriminated against, etc.

Strategies for gender policies

Transversality. New methods of public gender policy developed in the nineties aim to increase public intervention beyond equal opportunity, using the idea of mainstreaming activities and parity. These proposals can be defined by and applied to the logic of equal opportunity and affirmative action and may begin to address the need for the structural reform of the gender system. Although “mainstreaming” may be a more vigorous policy than the more traditional strategies, it does not necessarily contradict or substitute them.

Women and science



4. EU science policies on gender

History of Gender Issues in the EU

1. *1988: EUROPEAN PARLIAMENT RESOLUTION ON WOMEN AND RESEARCH recognising the under-representation of women in academia*
2. *1993 and 1998: EUROPEAN COMMISSION: CONFERENCES ON WOMEN AND SCIENCE*
3. *1997: AMSTERDAM TREATY*
2. *1999: BRUSSELS representatives of the European associations of women scientists create the DECLARATION OF EQUALITY*
3. *1999: EUROPEAN COUNCIL report on the role of women in science and technology*
4. *1999: WORLD CONFERENCE ON SCIENCE in Budapest*

OBJECTIVE: open the sciences to more women

1993 CONFERENCE

European Commission

The issue:

FEW WOMEN IN THE SCIENTIFIC SPHERE

| <u>DANGERS:</u> | <u>KEY QUESTIONS:</u> | <u>RECOMMENDATIONS:</u> |
|--|--|---|
| EQUITY: Discrimination based on gender constitutes a violation of human rights. | EQUAL ACCESS to the decision-making process | INTEGRATION of female members in committees |
| EXCELLENCE: The meagre representation of women is detrimental to scientific excellence. | FUNDING for research | COMPILATION OF STATISTICAL DATA related to the level of participation of women in science and technology |
| EFFICACY: The aging of the population requires the incorporation of younger generations in the scientific community. | LACK OF FLEXIBILITY of professional structures | Adoption of AFFIRMATIVE ACTION initiatives |
| YIELD: Any investment in educating and training women in the sciences is useless if women's abilities are later questioned. | POSITIVE ACTIONS | SUPPORT FOR WOMEN SCIENTISTS using EC resources |
| | EQUAL OPPORTUNITY POLICIES FOR SCIENCE AND TECHNOLOGY | PROMOTION OF EQUAL OPPORTUNITY FOR RESEARCH , using programmes such as the Fourth Framework Programme. |
| | | IMPROVEMENT OF THE POSITION OF WOMEN IN RESEARCH through finance networks |
| | | MONITORING by the EC and the European Parliament |

AMSTERDAM TREATY 1997

PROMOTION OF EQUAL OPPORTUNITY,

a central tenet of scientific policies established by the European Commission

MEASURES:

- 1. EQUAL TREATMENT*
- 2. AFFIRMATIVE ACTION*
- 3. MAINSTREAMING*

CONFERENCE 1998

European Commission

TOPIC:

MAINSTREAMING IN COMMUNITY SCIENTIFIC POLICY

STRATEGIES:

1. 1999: FIFTH FRAMEWORK PROGRAMME

- *Promotion of research by, for and about women*
- *Development of better indicators of inequality*
- *Creation of Genderwatch: a collection of and forum for experiences*

2. 1999: RESOLUTION of the EU council urging the member states to:

- *Compile statistic data according to sex*
- *Pursue gender equality in science*

RECOMMENDATIONS:

- *In education (for example, including equal opportunities in the training of teaching staff)*
- *In work environments (for example, measures to coordinate work and family life)*

History of Gender Issues in EU Countries

- *GERMANY, 1989: first national report on the promotion of women in the scientific community*
- *UNITED KINGDOM, 1994: The Rising Tide*
- *DENMARK, 1995: Excellence in Research*
- *FINLAND, 1998: Women in Academia*
- *GERMANY, 1998: Recommendations for Equal Opportunities for Women in Science*

OBJECTIVE: to contribute to improving the quality of science through improving the situation of women in the scientific community by means of formulating considered and radical proposals that national authorities must take into account when defining their policies

ETAN report 2000: A starting point for gender-based science policies

INSTITUTION: EUROPEAN COMMISSION

TOPIC: to promote excellence in science through the integration of gender equality

OBJECTIVES:

- *To integrate equality into the different institutions which teach and promote science*
- *Achieve equity in professional structures, academic leadership, and other spheres*

CONTRIBUTIONS:

- *Making gender inequality more visible*
- *Creating measures for equal opportunity*
 - *Facilitating access for women to scientific careers*
 - *Promoting the participation of women in decision-making settings*

ETAN REPORT 2000

European Commission

RECOMMENDATIONS:

1. TO PROMOTE CHANGES IN LEGISLATION
2. TO COMPILE STATISTICS BY SEX
3. TO INTEGRATE EQUALITY INTO THE FIFTH AND SIXTH FRAMEWORK PROGRAMMES
4. TO PROMOTE AFFIRMATIVE ACTION MEASURES TO SUPPORT SCIENTISTS IN THE SIXTH FRAMEWORK PROGRAMME
5. TO DEVELOP EQUAL OPPORTUNITY POLICIES
6. TO TRACK ALL PROGRAMMES RELATED TO GENDER EQUALITY
7. TO REORIENT FUNDING TO HELP ENSURE PROGRESS IN COUNTRIES DEALING WITH GENDER ISSUES

In order to achieve success in the European arena, the report suggests that the scientific and executive organisations of the EU, the member states and the scientists themselves must all be involved in the process.

Evolution of equality policies in science

National reports, from the CSIC
(Consejo Superior de Investigaciones
Científicas – supervisory board for
scientific research). :

- *On WOMEN RESEARCHERS*
(2005, 2006 and 2007)



Reports and international
conferences:

-2007: *Women in Science: The
Way Forward (Germany)*

-2003-2006: *"She Figures"*

<http://www.csic.es/mujerCienciaInformes.do>

Women and science



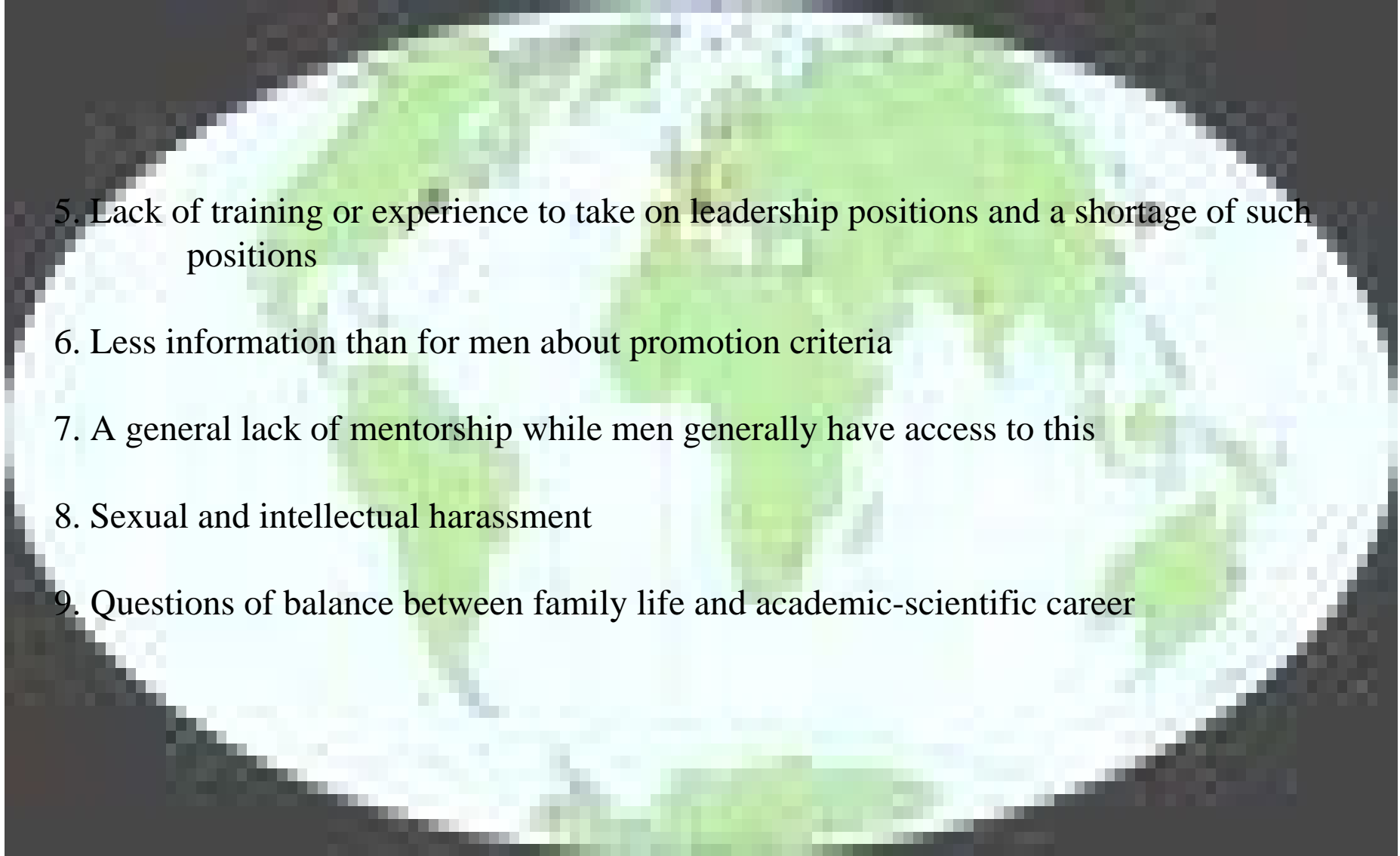
5. Quality and equality in scientific professions

Obstacles for the progress of women

According to studies conducted by the Harvard Medical School (HMS), the American Association of Medical Schools and the Massachusetts Institute of Technology

1. Discrimination in evaluation methods: publication prolificacy is used as a measure of quality. Considering that men publish more than women, the quantity of work produced better predicts the success of men than women. However, citation rates are also a measure of quality and these are higher for women than for men, but rarely bear any influence on promotions, salary, or the granting of permanent positions.
2. Discrimination in funding, space, hiring and granting of permanent positions
3. Marginality related to invisibility and the lack of acceptance of female employees by their male colleagues
4. Fewer invitations to participate in professional activities such as conferences, presentations or congresses, which impedes the access to acknowledgement for their work

Obstacles for the progress of women

- 
5. Lack of training or experience to take on leadership positions and a shortage of such positions
 6. Less information than for men about promotion criteria
 7. A general lack of mentorship while men generally have access to this
 8. Sexual and intellectual harassment
 9. Questions of balance between family life and academic-scientific career

Women and science



6. The “degenderization” of science

Science and science with women

Science with women means science with gender analysis,
i.e. including women

Degenderizing science:

What does it mean?

- Revising science
- Removing gender bias
- Not discriminating against women or their experiences
- Remembering that science is changing
- Doing science as feminists

What has to be done?

- Remember that it is not a question of sex, but of gender
- Revise educational models and practices
- Include women in research
 - Make women's contributions visible