



X

**Women in Physics**  
**To a Next Step**



W

**Toshiko Yuasa Laboratory Ceremony**

May 21,2009 Masako Bando

# France and Japan

- May 21,2009
- Tsukuba International C
- Conference Room 406

## Toshiko Yuasa Laboratory Ceremony

May 21,2009

Tsukuba International Congress Center 4F  
Conference Room 406



湯浅年子(1909-1980)はフレデリック・ジョリオ・キュリーの子でコレージュ・ド・フランスに学び、オルセーにある原子核研究所で、30年間CNRS研究者として努めました。同時に日本初の国際的に活躍した女性物理学者としても広く知られています。

Toshiko Yuasa(1909-1980) studied at College de France with F. Joliot-Curie and then worked at Orsay as a CNRS researcher for 30 years. She is the first Japanese female physicist in history and has played a pioneering and decisive role in the Franco-Japanese relations in Nuclear and Particle physics

Toshiko Yuasa (1909-1980) étudia au Collège de France avec F. Joliot-Curie. Elle travailla ensuite à Orsay comme chercheuse CNRS pendant 30 ans. Elle est la première physicienne japonaise de l'histoire et a joué un rôle pionnier et déterminant dans les relations Franco-japonaises en Physique Nucléaire et des Particules

### —PROGRAMME—

16:55 Toshiko Yuasa:Memories

Yuzo Asano

17:15 Ochanomizu University and Dr. Yuasa

Sawako Hanyu

17:45 Woman in Physics

Masako Bando

18:30 ~Banquet~ @ Conference Room 201



National Center  
for Scientific Research



the French Atomic  
Energy Commission



HIGH ENERGY ACCELERATOR  
RESEARCH ORGANIZATION



お茶の水女子大学  
Ochanomizu University



Entry:

<http://www.kek.jp/event/FJPPL.html>

Joint Workshop: 2009 FJPPL WORKSHOP

<http://indico.in2p3.fr/conferenceDisplay.py?confId=1704>

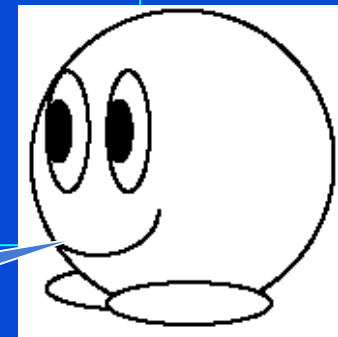
# France blamed USA for not to CO<sub>2</sub> reduction! - 2005/5/18 (Chunichi paper)

EXPO 2005 in Nagoya

At 2005 Aichi International Exposition, the theme of the pavilion is "sustainable development", the French ambassador's residence exhibits movie and appealed to reduce CO<sub>2</sub>, where they blamed the attitude of US against to the Kyoto protocol.

# Question

**Japan and France are  
the courtiers  
whose technology  
for applying nuclear power to  
non-weapons use is in the  
highest level in the World.**



**Why?**

**In order to see why,  
let us trace back the history  
of nuclear physics  
and  
related events.**

# History of Nuclear Physics(1)

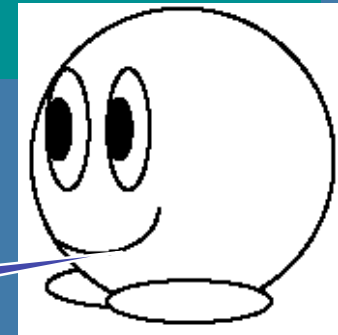
1895 Dec. X ray

Wilhelm Conrad Röntgen

1896年 Feb Becqrel Ulanium

1898年 Curie radioactive elements

1903年 Po Ra



Nuclear energy would  
become very important  
in near future.



# Maria Skłodowska- Curie

**1903 : Nobel prize  
gives spirit of  
romantic adventure.  
To many women in  
the world !**

# History of Nuclear Physics(2)

1938 Otto Hahn, with Lise Meitner

Jean Frédéric Joliot-Curie **Nuclear fission**

1939 letter from Einstein to Roosevelt

→ Manhattan project (1941)

**Nuclear Energy**



This can become the future energy source!  
This can be useful to medical appliance!

**However !**

Nuclear Energy was found just  
before the second world war.

# History of nuclear physics(3)

1942 Aug. Manhattan project

Dec. Fermi Nuclear reactor

1945 Committee of atomic bomb Operation

May Germany surrender

June Frank report

July First Nuclear test at Los Alamos

August 6 Hiroshima 9 Nagasaki

End of war

Scientists were against to its use ....

Frank Report

# Sad story of Physicists

- Jean Frédéric Joliot-Curie
- Niels Henrik David Bohr
- Enrico Fermi
- Oppenheimer
- Einstein
- **Leó Szilárd**
- Sir Joseph Rotblat

France

Copenhagen

to US after receiving Nobel Prize

To US



# Physicists in US

**Under  
Leslie Richard Groves**

**Fermi  
Oppenheimer  
Einstein  
Szilárd  
Rotblat**

**Manhattan Project**

**total members**

**125000**

**total cost  $\$2 \times 10^{10}$**

**(till Aug.1945)**

# A letter from Einstein to the president

In near future

- 1 Nuclear energy is to be explored from U 235
- 2 It can be used to make atomic bomb
- 3 The situation of Europe forces us to do something before Hitler
- 4 The government should control and make appropriate arrangements
- 5 Germany is ready to start such project

# Franck Report

世界の諸政府に彼らの目的が世界戦によって促進されないことを自覚し、そのことを公然と認めるよう勧告する。紛争問題の解決に平和的な手段を見出すよう勧告する

# Physicists wanted to control

**Independence from  
Politics' and  
companies**

**1939 the second war  
1941. 12 US-Japan  
Pearl harbor**



**Franck report to  
Chair of Army, Stimson  
1945.6.12**

Facing the situation where atomic bomb were ready to be completed, 7 scientists made their statement.



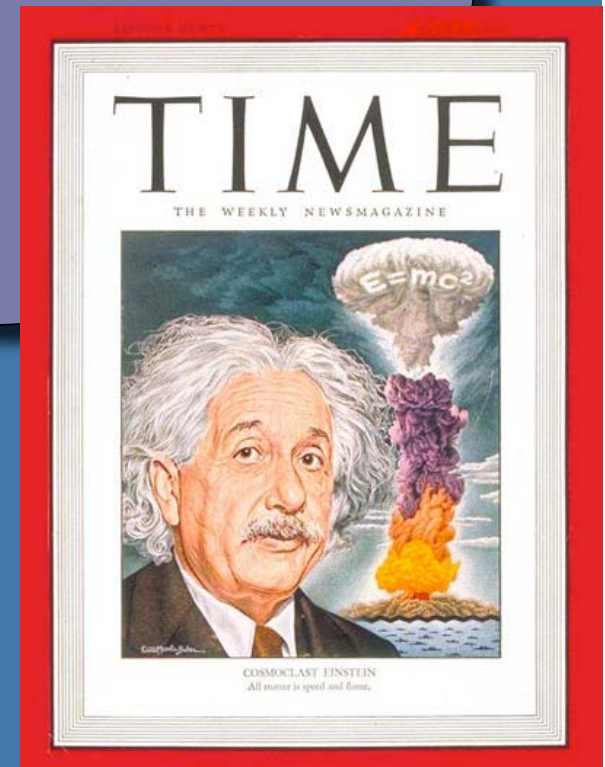
Nevertheless  
Atomic bombs were used !

1945 July Los Alamos  
exp Pu type

1945 Aug. 6 Hiroshima  
U type

1945 Aug.9 Nagasaki  
Pu type

1945 Aug. 15  
end of the War II



# Pugwash Movement



1954 Bikini

1955 Atomic bomb  
hydrogen type

1954.12.23

BBC Broad casting

→Russell Einstein Appe

1955. 7.9 Press  
Release

Rotblat is the  
only scientist  
who quitted the  
project team.

フワ大卒で博士号を取った最初の女性となった。優等の成績であった(図4)。しかし女性化学者にはポストの見込みはなかった。プロイセンで女性に教授資格を認める法令が出るのはこの20年ほど後になる。翌年、電機学で活躍する唯一の女性、ヘンリエッテ・ハーバーからの影響を受け、研究を断りためらった。結婚は、研究が家庭の外でできることではあり、結婚としての活動も必要なかった。ハーバーは全く顧みず、編み物と苦惱に気付か

カイザー・ヴィルヘルム研究所

アドルフ・フォン・ハルナツス・リービッヒの孫)は、神学



図4. 最初の妻、クララ・インマヴァール(学生時代)

ドイツには爆薬もその他の物資も長期戦の備えがなかったため、戦争が始まるまでには物資が尽きた。

**His wife.  
A chemist also but  
Gave up after marriage.  
She was against to his  
behavior and finally she  
killed herself.**

ベルギーのイーブル付近の、3.5マイルの前線にわたって約5000本の円筒で塩素ガスが放出された。英軍は15000人の犠牲者を出し、その1/3が死んだ。毒ガス戦の指導者としてハーバーは後にイギリスやフランスの科学者から嫌悪されることになるが、家庭でも悲劇が起きた。妻クララは夫が毒ガス戦にかかわることに強く反対し、しばしば激しく論争したが、ハーバーが休暇でイーブルから帰還してまもなく、東部戦線へ発つ前日の深夜、

「元素からのアンモニア合によって1918年度のノーベル賞を2年遅れて受賞したが、このときの異議が起こった。その論議はアンモニアから硝酸を作ったことについてのものであった。1919年、水中からの金の抽出に関する企画に取り組んだ膨大な賠償金を稼ぐためだった。ハーバーは「ドイツ科学者として、研究を重視することに努めた。1919年、研究所の再組織にかかわった。ハーバーは一人の科学者が研究所に閉じこもって研究する時代としていたと考えた。そこで研究所には、物理学、物理化学、化学、理論物理学(アインシュタインが支援した)、生理化学、薬学などを設けて、それら相互の学際奨励し、学際研究の先駆者として1920年代後半の全盛時代にも重要な科学研究のセンターとなり、50~60人の研究者の人で完全に国際的だった。研究所に比べると小人数だった。ハーバーと若手研究者は十

# Women scientists hates War.

1868-1934



Fritz Haber  
nitrogen fixation  
Haber-Bosch  
Nobel prize

When she discovered her husband's involvement in chemical warfare – which she regarded as “an abomination of science Clara committed suicide.



1878-1968

Lize Meitner

Sometimes she would write scientific articles and just sign them "L. Meitner". The publisher thought she was a man. She refused to help with the development of the weapon. She wanted her discoveries to be used for peaceful purposes.



!

**How about Europe ?**

**example : Denmark**

# Niels Bohr:1922 Nobel Prize

1921 Copán Hagen Bohr Institute

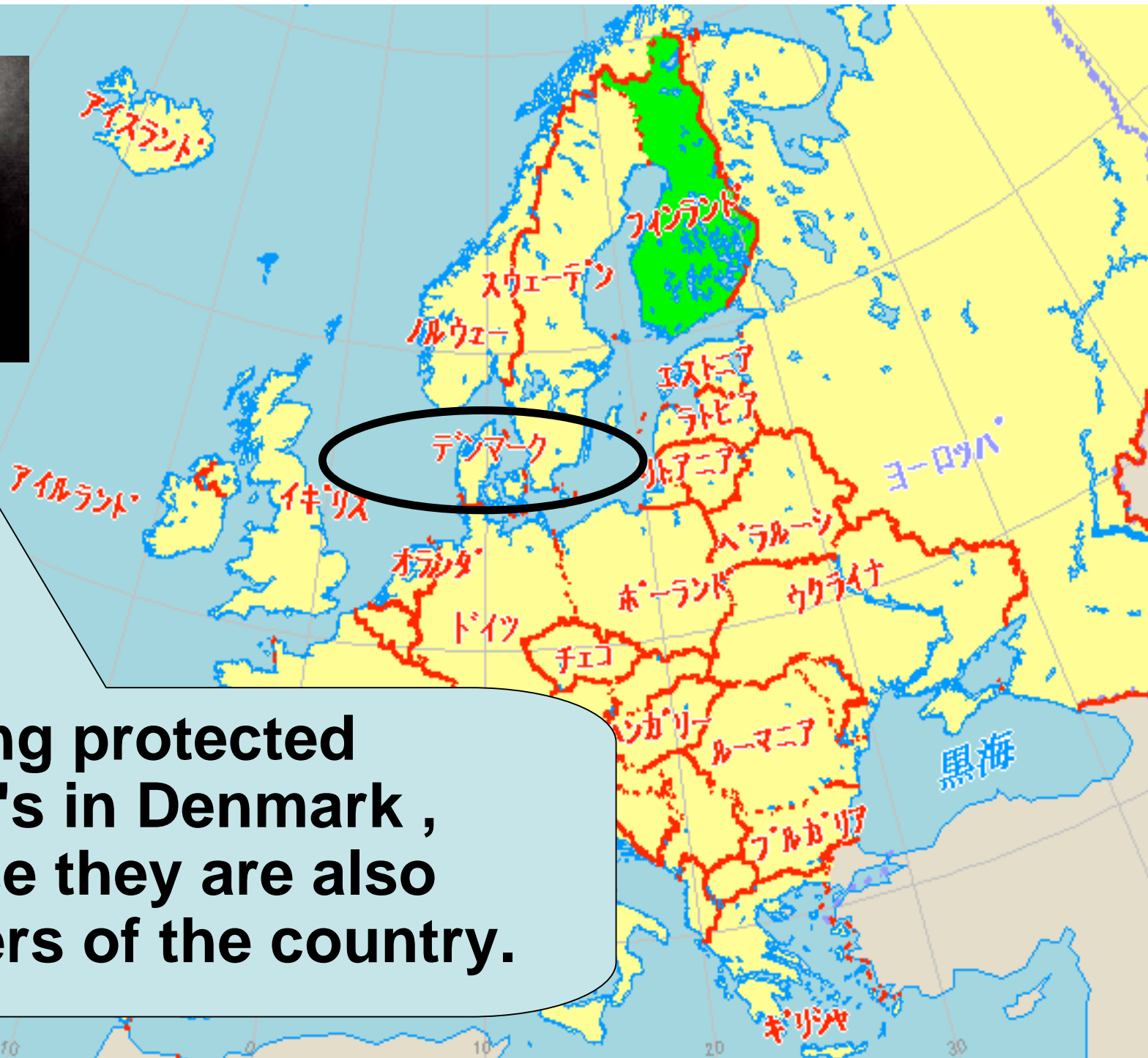
**Niels Bohr Institute is a cooperative  
Institute of scientists from world.**

**Bohr helped and supported them ,  
leading to safe countries.**

# Open minded science without boundary

**Europe has had such  
experiences.  
Without boundary of  
Country, race, sex,  
And created new area  
of sciences.**





**The King protected Jewish's in Denmark , because they are also members of the country.**

# Bohr



Why was he able to  
stay in Europe?

1921 Copenhagen

1943 Sweden

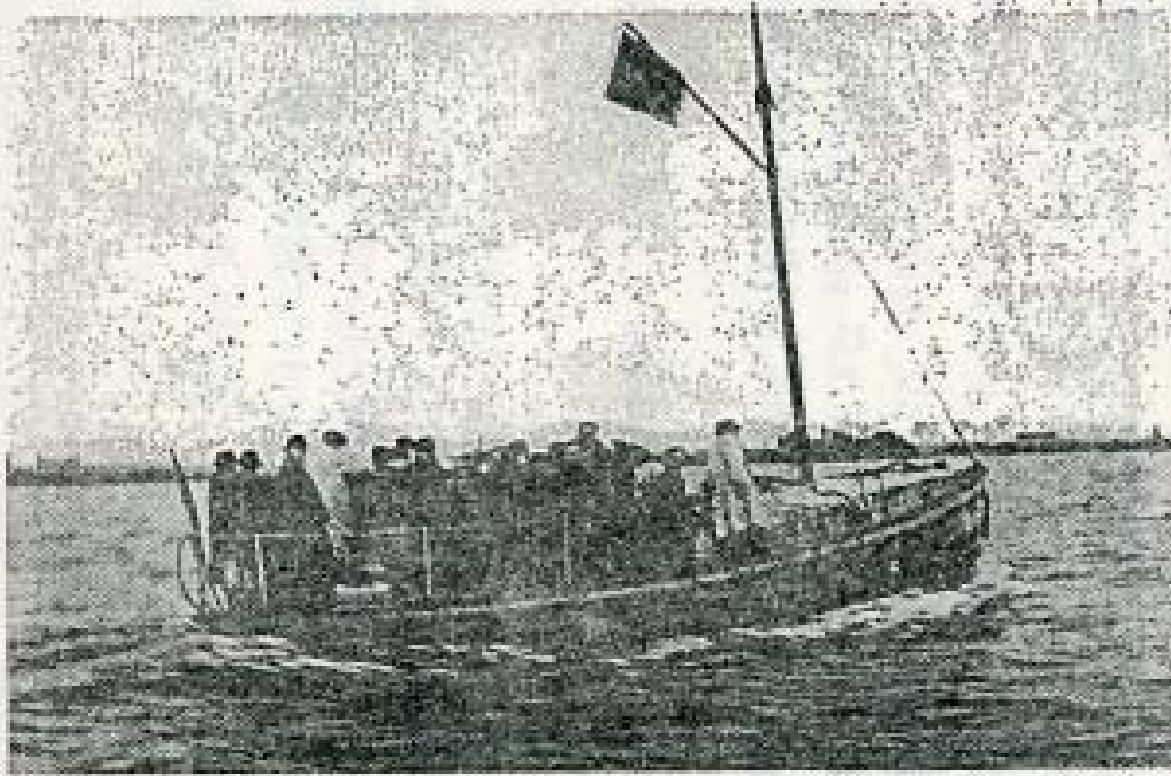
1945 back to Denmark

1950年 Letter to the United Nations

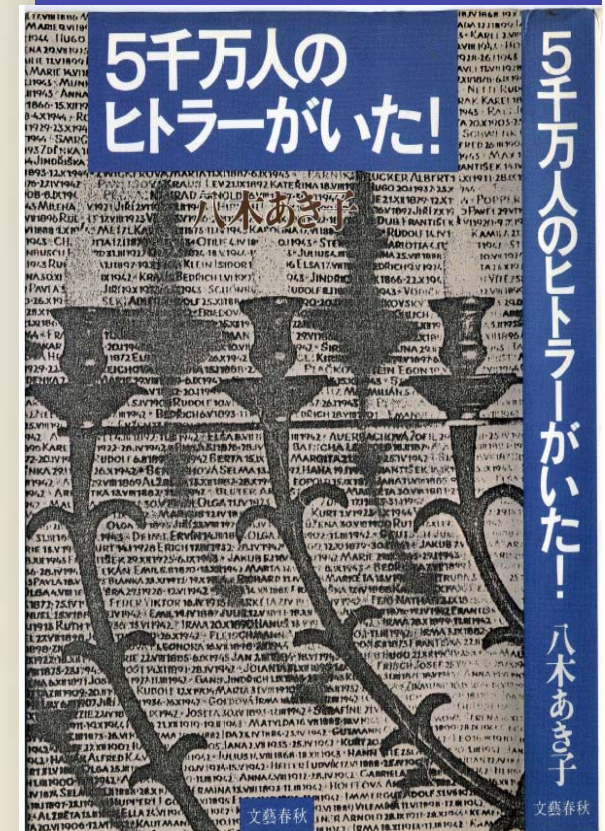
**Social Opinions can protest to  
unreasonable behaviour ! !**

**During 3 days  
7500 Jewish people  
disappeared  
from Denmark.**

# Denmark is the country where the government itself always protect Jewish people from Hitler.



ナチの目をかすめて、スウェーデンにユダヤ難民を運ぶデンマークのボート（一九四三年。二五八頁参照）



**How about Japan ?**

# For or Against War?

国に捧ぐ いのち尚ありて  
今日も行く 一筋の道  
限りなき道 (1941)

雑誌「世界文化」購読者  
新新子→国際的名声  
文化勲章→黙る自由

Resistance ?  
Science or war

Not?

# A way to Peace

Einstein



# Russell Einstein Appeal

1954 Bikini H type

1954. 12.23 BBC broadcast → shock wave

→ Russell Einstein Appeal

Russell wrote the draft and sent it to Einstein  
who were passing away.

→ Pugwash activity



# Conscience and affliction of scientists

Abolition of nuclear weapons.  
We will find solution of a way  
without war and settle a dispute  
by peaceful means

**Originated from Pact of Paris 1928**

**How about France ?**

# I & J Curie

## 1935 Nobel prize



キュリー夫妻の娘イレーヌと結婚

This is a kind of nuclear reaction. If it occurs as a chain reaction, it yields a tremendous amount of Energy. We should be very careful to treat these nuclear energy.

They were asked to go to US.

I have to stay in France  
before they invade us!

1940: Deuteron (D2O), U →

hid into Bank → Prison building

→ England

He was asked to say where they are.

At last he hid himself to resist Hitler.

# J Curie was the leader of policy of nuclear energy control.

After the war he became a president of nuclear energy office (CEA) and reconstructed the system of CNRS as a president.

CNRS for basic sciences

1950,3,19 Stockholm Appeal

「Abolishment of nuclear weapons」

**Unfortunately Government decided to push the project of atomic bomb in 1955, resigned him from the president of CEA.**

**Still initial condition is very important to the future direction of science.**

# History of nuclear physics(4)

age of “cold war” Atomic bomb

Japan has been in a particular position

Suffering Hiroshima, Nagasaki, Bikini.

JSC (Japan Science Society)

Appeal To keep 3 principles of nuclear physics research

Three principles in atomic energy

Independence

Democracy

Open Information



Only those countries has given a little bit better situation ..

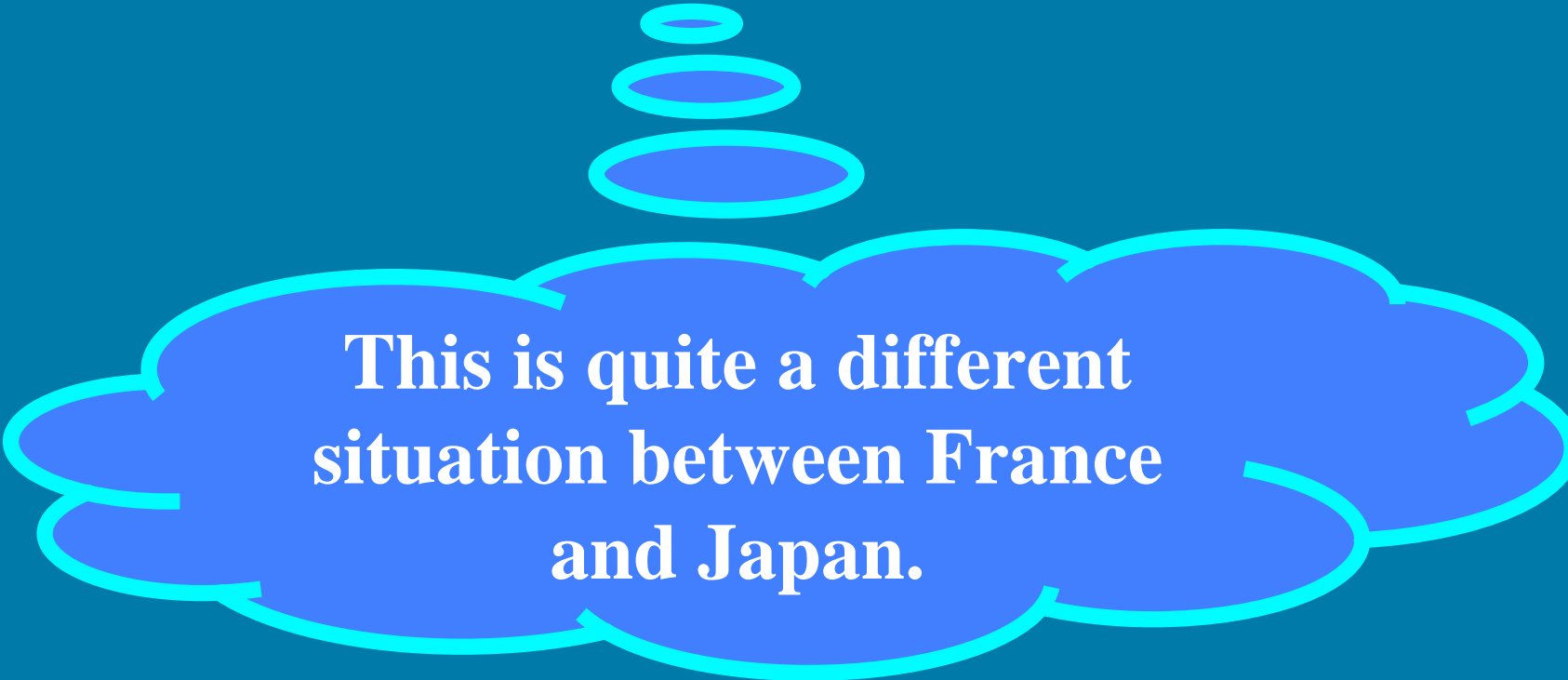
**France**

**Because of resistance  
to atomic bomb**

**Japan**

**Sad experience of  
victim of radiation**

# Historical background of Women scientists since Marie Curie



This is quite a different  
situation between France  
and Japan.



**Then how about  
Dr. Ttoshiko Yuasa?**

1933-34 (23-24 years)



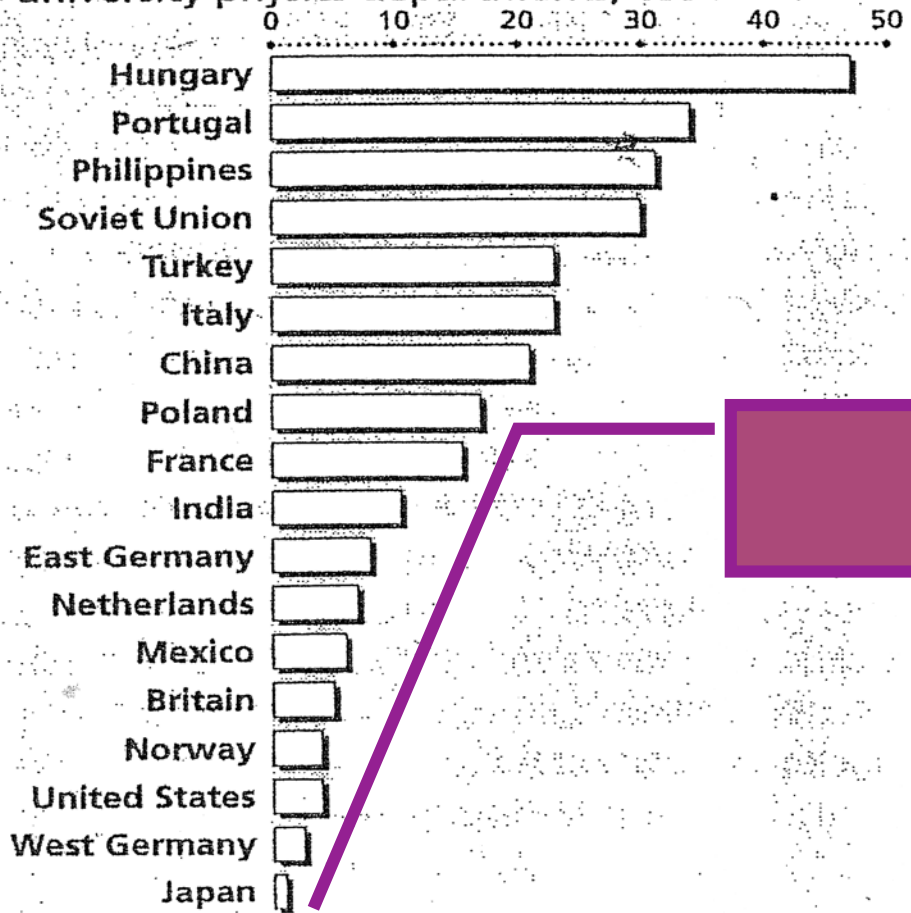
This is what I dreamed of.  
Without any boundary of  
sex, race, I have only to  
think about science, vivid  
science

Science is above all  
,beyond authority, and I  
can enjoy science itself.

This, I have never  
experienced in Japan.

## Science and culture

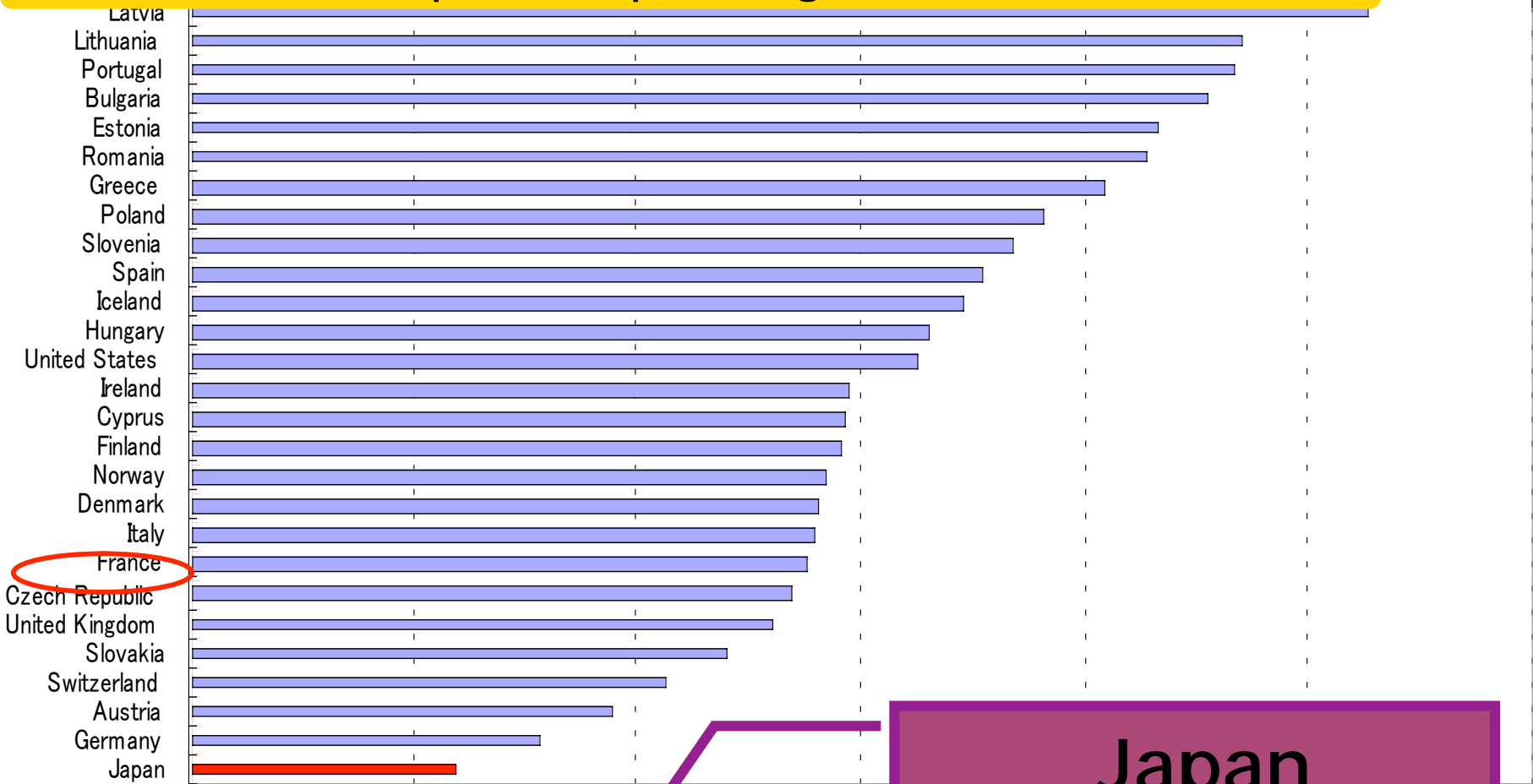
Women as % of academic staff in university physics departments, 1990



Source: Jim Megaw, York University, Ontario 97

Japan

# International comparison of percentage of female researchers



Japan

11.9%

- (note) 1. The data come from "FY2004 Annual Report on the State of Formation of a Gender-Equal Society."
- 2. Japan's data come from the Ministry of Internal Affairs and Communications, "2005 Survey of Research and Development."
- 3. The figure for the U.S. represents the percentage of female scientists.



# Quick Survey women in physics of JPS and JSAP



# Dr. Saruhashi

**1958: Japan Women Science  
Association**

**1980 :Elected as  
a first member of JSC  
commiteeof empowerment  
of women scientists**

**1981: saruhashi prize**

**1920-2007**

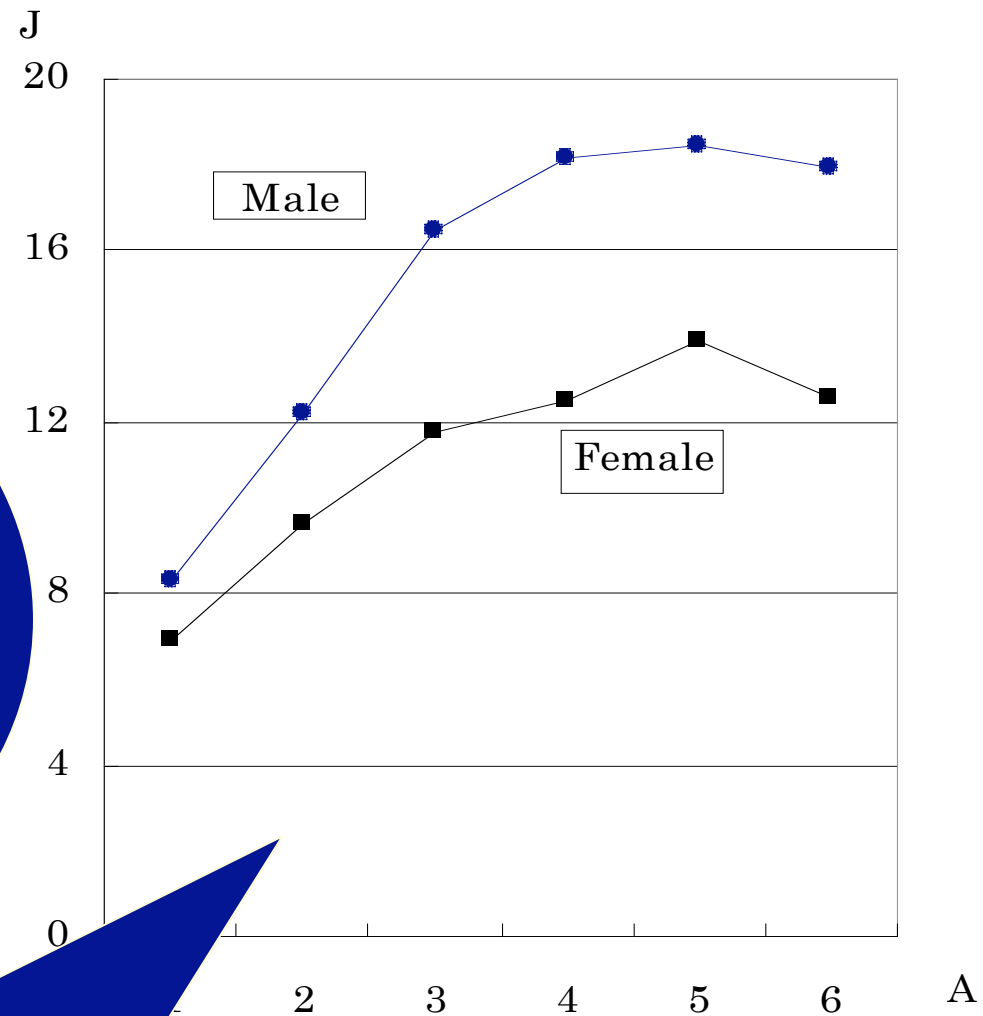


**1975  
Lifecycle study**

**The reason  
why women  
scientists are  
in low  
positions.**

**The data clearly  
showed 「NO」 !**

Figure 11: Values of J for Each Rank of A



Source: Reference 2

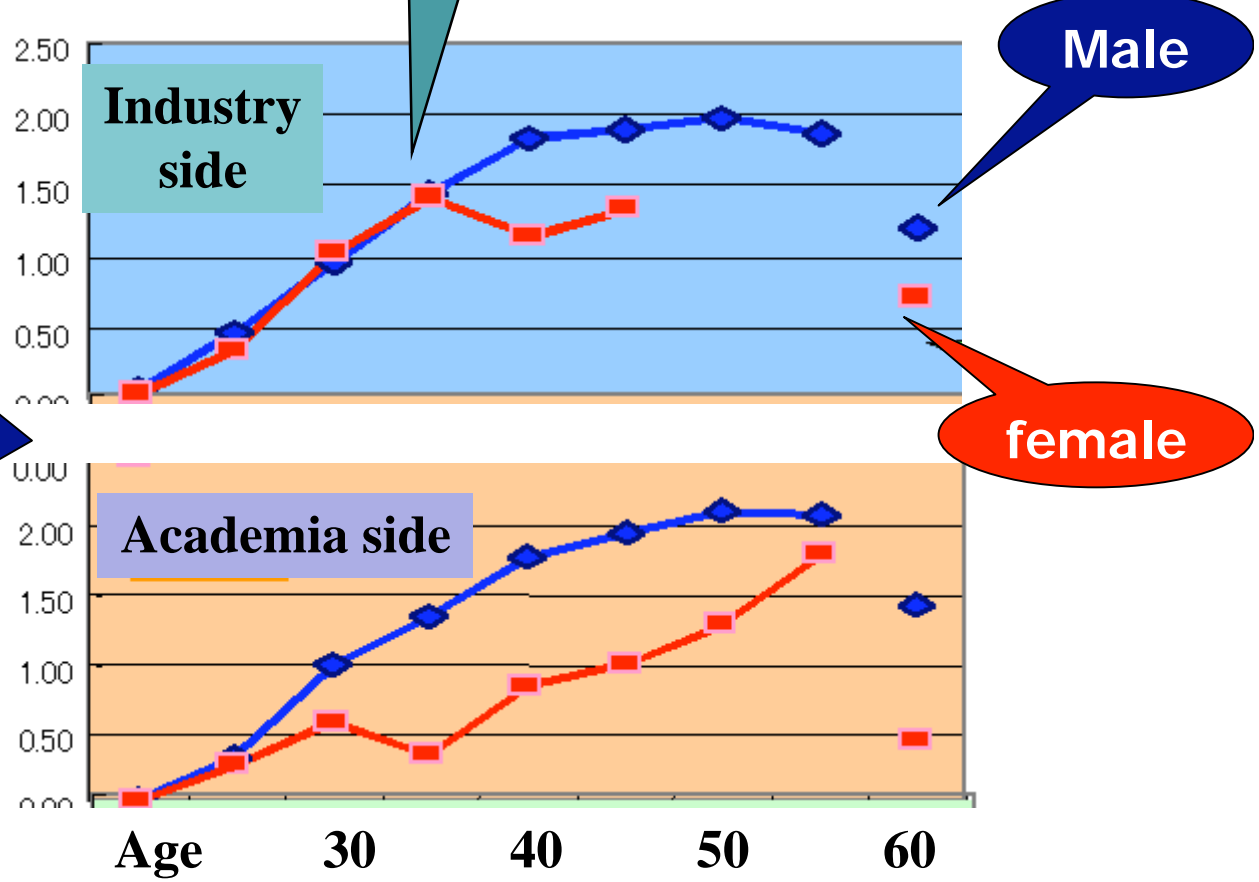
# Average number of children

Typical example of findings of 2003 investigation

Findings In university the children care leave didn't work.

We need some supporting system at university side

Critical age Children care leave works well





# Joint organization of women scientists connecting academic societies

2002.10.7

Symposium

Appeal from

JPS, JSAP and JCS

2003.10.7 Statistics

2004.10.7 Proposals

more than 50 societies

We required to the government the fund to support children care system in Universities.

After all we succeeded in.

The IUPAP International Conference on Women in Physics was held in Paris, France, from March 7 to March 9, 2002.



**Drastic change**

★ **Status of**

**Women in science**

★ **Communication in**

**Academic societies**



Judy Frantz

In addition to her research in condensed matter physics, she has made important contributions to the physics community at large, in education and promotion of international cooperation, particularly through her work as Executive Officer of the American Physical Society, in her presidency of the American Association of Physics Teachers, and as Secretary of the United States Liason Committee of the International Union of Pure and Applied Physics.

The IUPAP International Conference on Women in Physics was held in 2002.

**Drastic change**

★ **Status of  
Women in science**  
★ **Communication in  
Academic societies**

- Dr. Judy Franz  
c/o American Physical Society  
One Physics Ellipse  
College Park, MD 20740 USA  
Fax: 1 301 209 3946  
Phone: 1 301 209 3946  
[beamon@aps.org](mailto:beamon@aps.org)



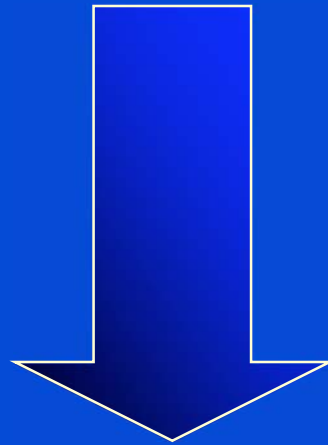
**This is remarkable.**

**But**

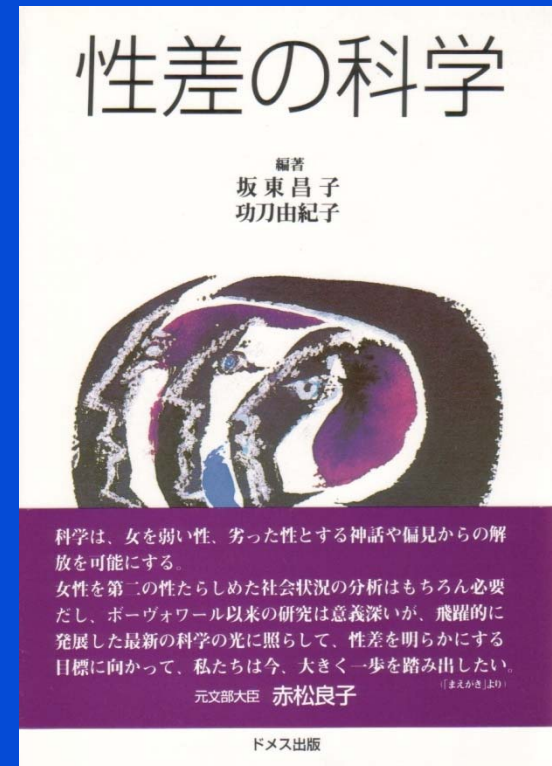
**more remarkable fact . . .**

**We realized that  
if scientists cooperate each other for  
changing society,  
we can produce a great effect  
on the change of political situation.**

# Science on Sex difference



Get the Fact!



## 性差の科学

編著  
坂東昌子  
功刀由紀子

科学は、女を弱い性、劣った性とする神話や偏見からの解放を可能にする。

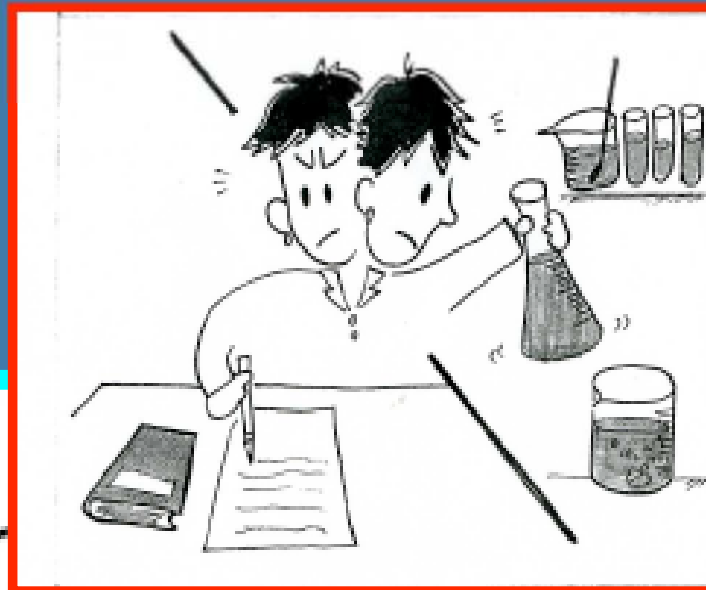
女性を第二の性たらしめた社会状況の分析はもちろん必要だし、ポーヴォワール以来の研究は意義深いが、飛躍的に発展した最新の科学の光に照らして、性差を明らかにする目標に向かって、私たちは今、大きく一歩を踏み出したい。

元文部大臣 赤松良子

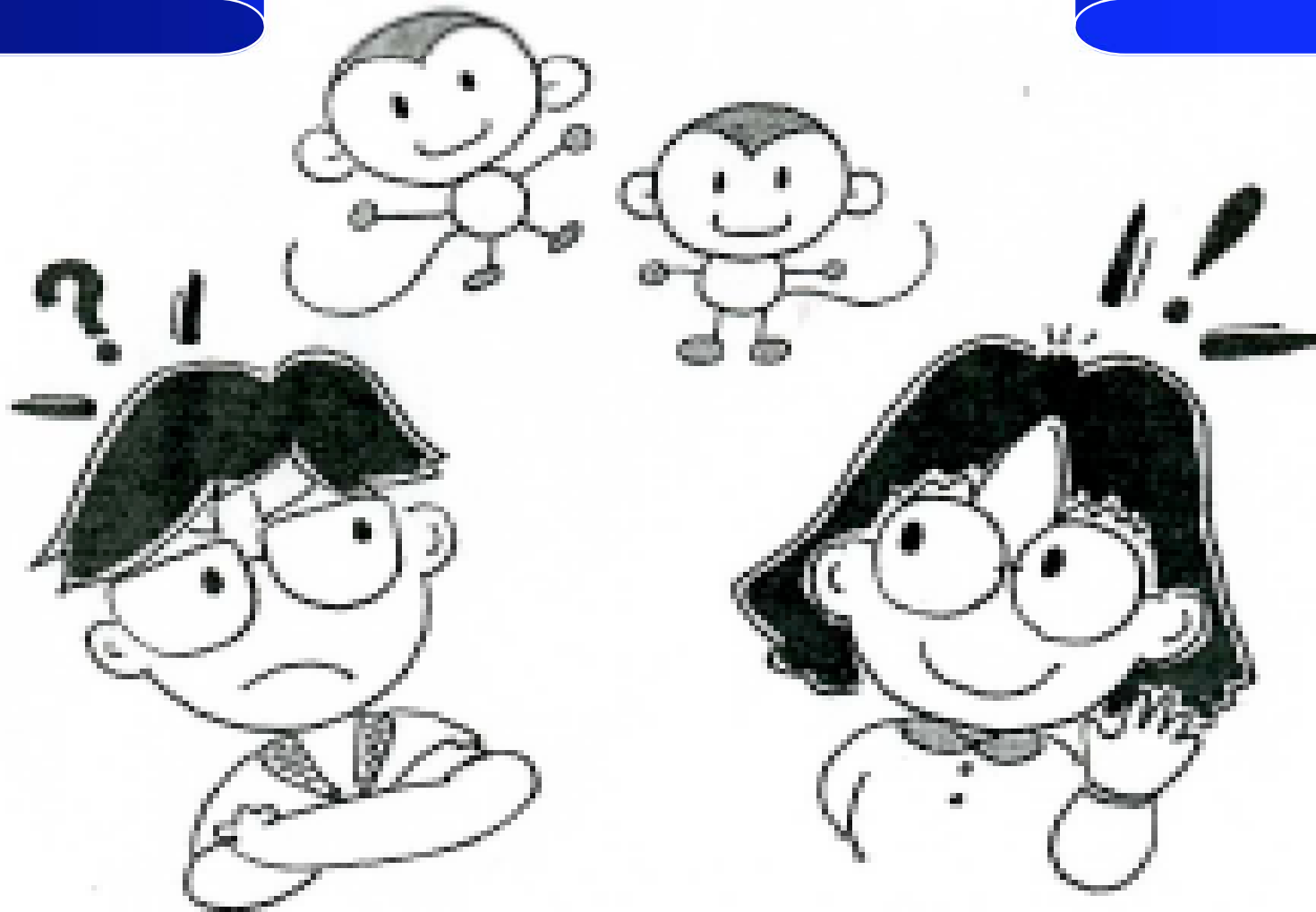
〔まえがきより〕

ドメス出版

# Women live in multi-style



**Women can recognize  
what man cannot**



**Can women do  
science?  
Intelligence**

**Brain difference 14%  
smaller weight of brain sells  
Of women is on the average**



**Women love  
Both  
Human beings  
and science**

**Multi style  
Love their family**

**Such character may change the  
atmosphere of academic societies**

# Famous Korean Drama “Chan Gum”

I recommend her to be our leader



**Her medical care  
attitude is  
based on  
mother's love**



# **Women in Physics**

**Several real examples**

# Woman living sense



– Right and left brains



1907-1964 Ecologist  
**Rachel Carson**

**Silent Spring**

**The more clearly we can focus our attention on the wonders and realities of the universe about us, the less taste we shall have for destruction.**





## Theo Colborn

1927: born

1947: Rutgers University

1978: graduate course (51 years old)

1985: PhD

1988- WWF-US

### **Endocrine disruptors**

**1991 Wingspread appeal**

**1996 [Our Stolen Future]**

She is Director of the Wildlife and Contaminants Program, and Senior Program Scientist, at the World Wildlife Fund. Colborn was a grandmother with a background in pharmacy when she returned to school and got her Ph.D. at the age of fifty-eight. She is the co-author of *Our Stolen Future* (1996) and organizer of a groundbreaking 1991 meeting at the Wingspread conference center in Wisconsin that brought together scientists to discuss the evidence on endocrine disruption.

# Lucy Deane

One of the first Women Inspector of  
Factories in the UK

Her findings (Deane, 1898)

Not only was it hazardous to those  
who worked with it, but that it was  
worse than other kinds of dust  
because the particles are sharp.

2 observations by women Inspectors  
(1909/1910)

# **First warning on the Asbestos hazard**

**She was not a doctor and her observation was neglected without any criticism, because she is not considered to be a professional doctor.**



# The European Environment Agency's core task is to provide....

Late lessons from early warnings:  
the precautionary principle  
1896–2000



**Dr. Alice Hamilton**  
**“Exploring the Dangerous Trades”**  
**(1943)**

**The early stage of her career, she visited many lead companies and appealed lead’s dangerous trades without any backup authority.**

**No one of the companies did listen to her.**

# *Another woman*

**Alice Hamilton**



**1869**  
-  
**1970**

**The founder of occupational medicine, first woman professor at Harvard Medical School and the first woman to receive the Lasker Award in public health**

# *Florence Nightingale* (1820-1910)

イギリスの看護専門職の創立者。  
ひたすら「母性愛」と「忍従」と「奉仕」  
の社会的ステレオタイプを  
押し付けられる看護従事者

→

「統計データ」を理論的武器に、  
権威主義的軍医たちに対し戦いを挑む

→

ついに一つの専門職の確立を勝ちとる  
元「お嬢様」  
彼女は数学・統計好きだった！！  
お金があったから出来た！！



# Florence Nightingale (1820-1910)

**nurses' training  
school.  
Professional identity  
of Nurse**

**Nursing Reserch and Education**



**Arguments Using statistics  
among medical doctors**



**she is good at math and  
statistics.**



# Japanese Women Scientists

# Katsuko Saruhashi

1920.3.22- 2007.9.29



Radioactivity  
in sea

Earth envelopment  
science

Women in science

# *Junko Nakanishi*

## *3 characteristic Points*

- **Outside of main stream in academic society**
- **Her Science written by understandable words**
- **Get the fact independent of any authority**





A blue background with a white scroll graphic. The scroll is horizontal and has a white outline. The text "last Question!" is written in white, serif font inside the scroll. The scroll has a small white circle at the top right end and a small white circle at the bottom left end, suggesting it is a scroll.

**last Question!**

# What is the most important thing in your life





フランス国家学位記 理学博士(1943年12月6日)(1947年交付)

# In Japan (1945/7~1949/2)

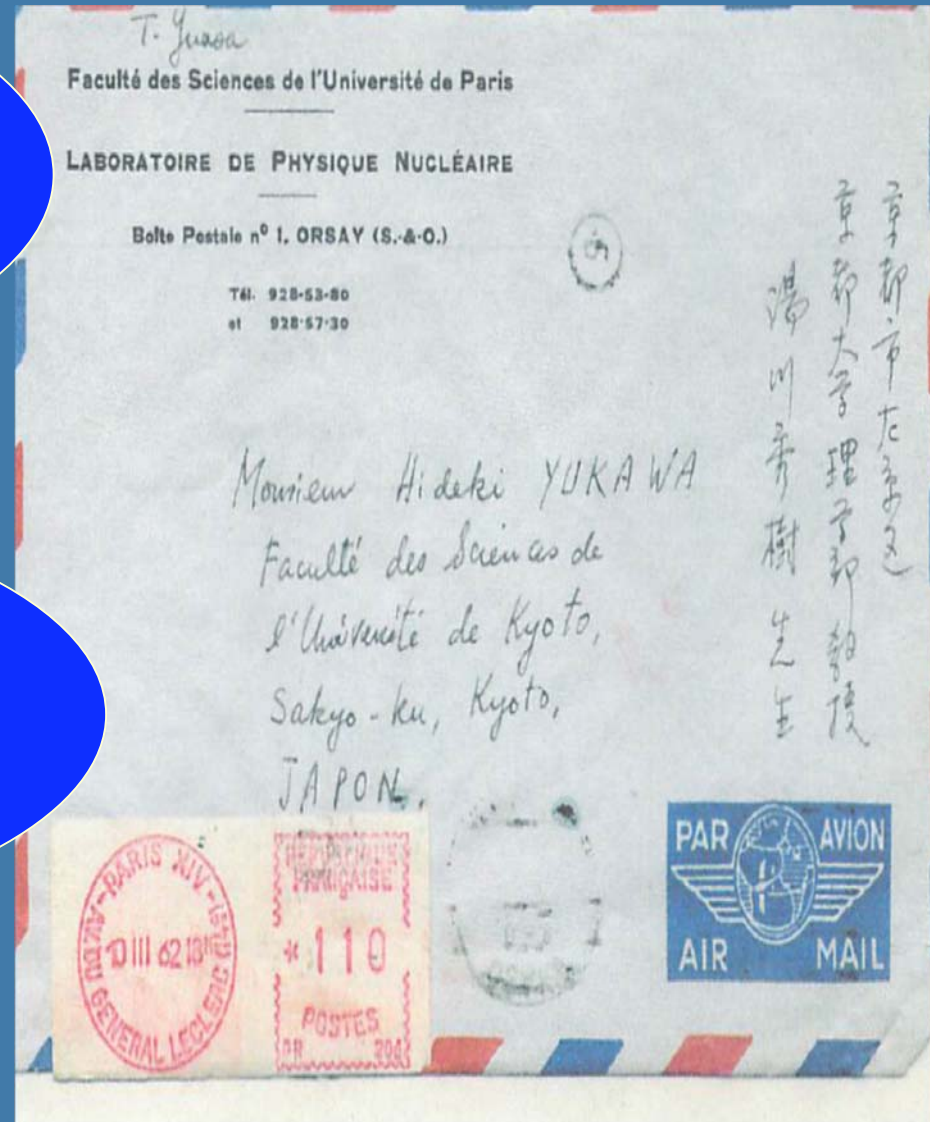


物理学講義中の湯浅 (1948年頃)  
東京女高師本館3階物理学講義室で

# Yuasa to Yukawa

A letter from Yuasa to Yukawa, expressing her thanks to his arrangement for her PhD thesis.

The letter ended by the words, "Kasiko".  
Very old women's fashion, expressing "Sincerely".



漸く春の陽射しにさうさうとあたたかくなる。平素の如く

市成輝より師事していらした。先日本村毅一先生が  
市成輝氏に申された通り、先日本村毅一先生が  
市成輝氏に申された通り、先日本村毅一先生が  
市成輝氏に申された通り、先日本村毅一先生が

此の頃は一五〇HvのプロトンによるCの中の振  
彈性散乱を研究するの軌跡としてCの核子の運動量  
分布を研究するに必要である。先日本村毅一先生が  
市成輝氏に申された通り、先日本村毅一先生が  
市成輝氏に申された通り、先日本村毅一先生が

いふに、先日本村毅一先生が市成輝氏に申された通り、  
先日本村毅一先生が市成輝氏に申された通り、  
先日本村毅一先生が市成輝氏に申された通り、  
先日本村毅一先生が市成輝氏に申された通り、

三月十日

湯浅 謙一

### 湯川秀樹先生

信中人

直伸。四月下旬にウイーンに用事を済ませ、民主婦人世界大会  
に出席してマダム・コトシキに依頼された。この会議の主題は  
軍備撤廃である。戦争と軍備の是非が議論される危険な

野村胡堂の「十編中」の「先王の御遺徳」の  
「朝永の御遺徳」の「先王の御遺徳」の  
「朝永の御遺徳」の「先王の御遺徳」の  
「朝永の御遺徳」の「先王の御遺徳」の

# History of Dr. Yuasa

1909.12.11 Born in Tokyo

1940 to France F. J. Curie

1943 PhD

1946 Japan (till 1949)

1949.2 return to France CNRS

1962 PhD from Kyoto University

1980 Passed away



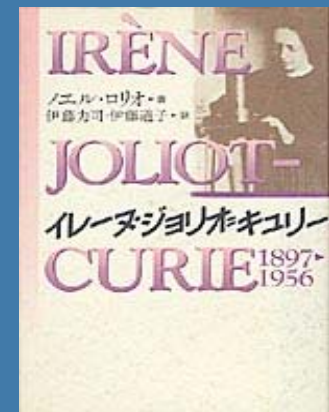
Love of science?

Love of people?

# Memory of Prof. J. Curie

He was in all sense a teacher.

The happiness of my life is that I was given a  
Gift to be taught by Prof. J. Curie.





Thank you for your attention!