

# Women in Physiology:

Development of an educational resource to improve awareness of the contributions of historical female physiologists.

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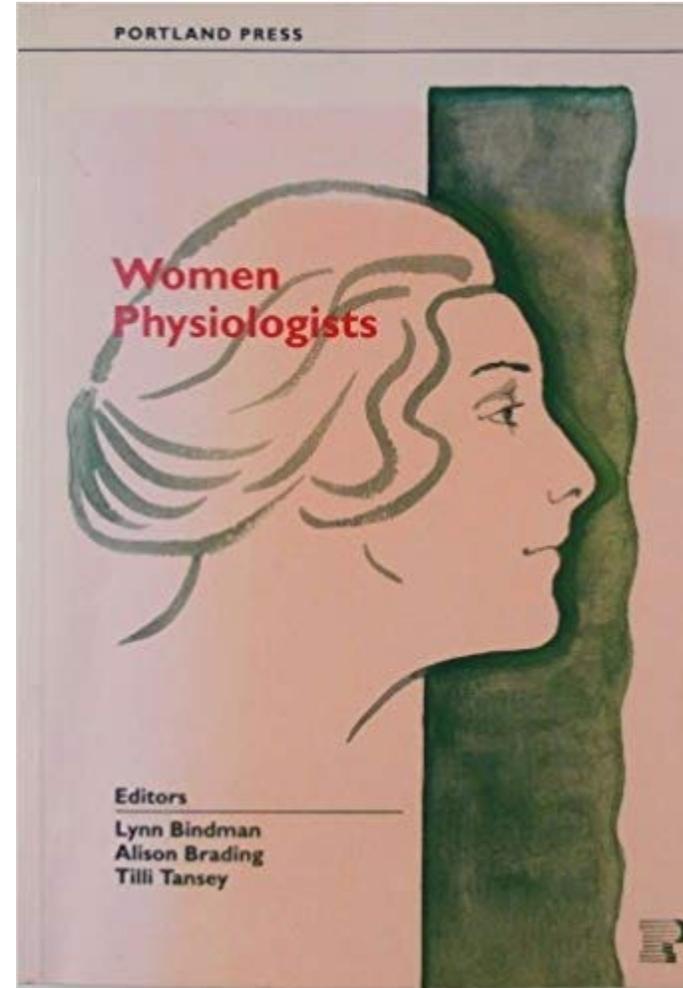
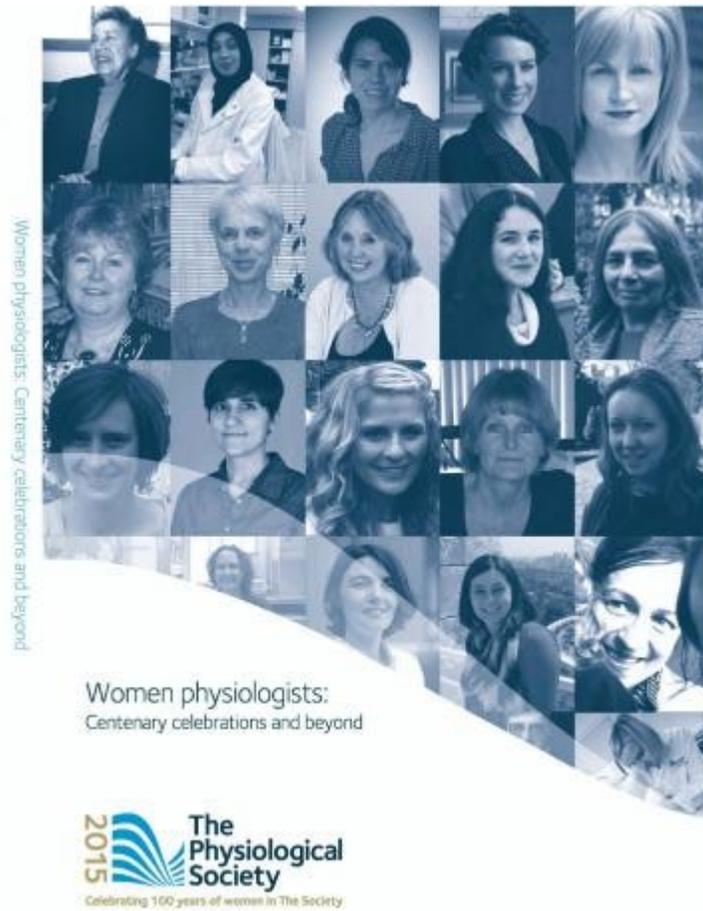
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# Background

- The history of our subject may often receive limited coverage in our curricula, and perhaps only included by a few enthusiastic teaching staff.
- We do cover history of medical sciences in our students' first ever course, but staff were concerned about how few female scientists appeared within the course material, and that we perhaps had too much of a focus on the UK and Europe.
- Anecdotally, our students' (and staff!) seemed to have real problems naming an important female physiologist when asked.
- We wanted to find out more about our student's knowledge and perceptions of women in physiology.

# Example material



# Aims & Hypothesis

- The aim of this study was to investigate the perceptions of students and academic staff regarding key historical female researchers in physiology.
- It was hoped that this study would raise the profile of women in medical science, and help students learn about the history of physiology.
- We also hoped it would help us in our review of our 1<sup>st</sup> year course 'Introduction to Medical Sciences', and rest of curriculum.
- Development of a 'Women in Physiology' public exhibit will increase student awareness of women in physiology and provide us with information to enhance our students' education.

# Methods

- Honours project broad topic ‘What have the medical scientists of the past ever done for us?’ selected by a student who chose to focus on Women in Physiology.
- Student researched and ten historical female physiologists were selected from a variety of physiological specialities and infographic pull-up posters developed.
- Designed to be attractive and understood by broad audience.
- Posters produced using PowerPoint and displayed in central atrium of Medical Sciences Building.
- Paper-based feedback surveys were available so visitors could provide their views in relation to the use of infographics to communicate the information, and their perceptions of key female medical scientists.
- The survey included a series of 5 point Likert scale questions to assess level of agreement with various statements, and a free text area for additional responses.
- This initial pilot study sampled over two weeks.



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### Edith Bülbring F.R.S. (1903-1990)



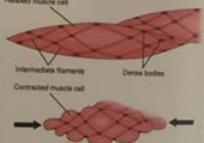
- Born in Bonn, Germany.
- Originally enrolled into university in Munich for her musical talent but developed a passion for science.
- Moved to the UK in 1933, leaving Germany due to her Jewish heritage to work alongside Prof Joshua H Burn in the Pharmaceutical Society (1933-1938) and then Oxford University (1938-1981) (Wellcome Library, 2017).

#### What Did I Research?

Although she had published work on the actions of hormones and neurotransmitters, the focus of Edith's research was directed towards understanding the finer details of the mechanisms behind smooth muscle contraction.

Her decision to study smooth muscle physiology was based on the poor understanding of the tissue. She found the behaviour of smooth muscle "incomprehensible" when used in assays (Bindman et al., 1993).

This drove her to examine the tissue more closely using microelectrodes, and later with the double sucrose-gap technique and electron microscopy. This helped to define the underlying mechanisms of both contraction and relaxation of the tissue (Bülbring et al., 1958).



#### Why Is This Important?

Bülbring's work on smooth muscle revealed previously unknown facts about this tissue, both about the mechanical and electrical events of contraction. Her work uncovered that the fast Na<sup>+</sup> channel was not used in smooth muscle contraction, but ligand-gated and voltage-gated Ca<sup>2+</sup> channels were (Trading et al., 1969).



The work conducted by Bülbring, although focused on smooth muscle within the intestines, can be applied to the different types of smooth muscle located throughout the human body.

Her work studying smooth muscle refined the equipment and techniques used in experiments used to study smooth muscle. This increased the quality of results she and the many scientists she worked with produced.

#### Key Papers and References

Bülbring was an incredibly active researcher and also an editor of two books on Smooth Muscle and Smooth Muscle: An Assessment of Current Knowledge. Here are a few examples of her work.

Reading, A.F., Bülbring, E. & Taylor, J. (1955). The effect of acetylcholine and calcium on the active potential of the smooth muscle of the guinea-pig ileum. *J. Physiol.* 106, 447-472.

Bülbring, E. (1958). The effect of acetylcholine on the active potential of the smooth muscle of the guinea-pig ileum. *J. Physiol.* 106, 447-472.

Bülbring, E., Burn, J.H. & Burn, J.H. (1938). The effect of acetylcholine on the active potential of the smooth muscle of the guinea-pig ileum. *J. Physiol.* 106, 447-472.

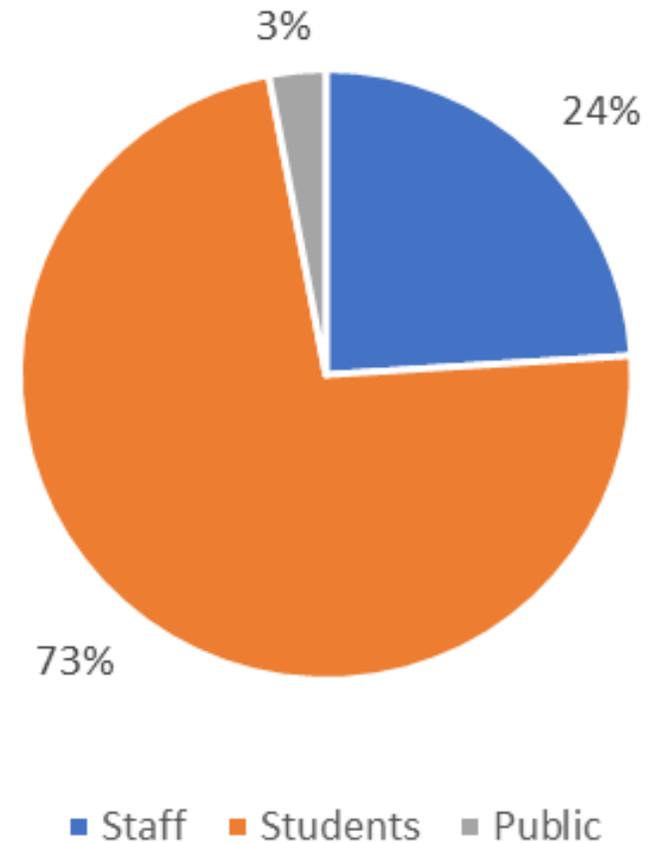
# Who were the Women in Physiology?

- Harriette Chick D.B.E. (1875-1977)
- Janet Vaughan D.B.E. F.R.S. (1899-1993)
- Olga Hudlická (1926-2014)
- Jean Hanson F.R.S. (1919-1973)
- Sheila Sherlock D.B.E. (1918-2001)
- Edith Bülbring F.R.S. (1903-1990)
- Marthe Louise Vogt F.R.S. (1903-2003)
- Grace Eggleton (1901-1970)
- Margaret Mary Alberta Murray (1899-1974)
- Patricia Bath (1942-Present)

# Results

- In first two weeks, 37 responses left in secured post box next to exhibit.
- Only 24% of respondents had heard of the women featured, with 66% saying this knowledge had come from lectures.

## Who were the respondents?



# Results cont.

- All respondents disagreed that women were treated fairly in coverage of the history of medical science.
- 92% per cent of respondents agreed they knew more about male researchers in medical sciences.
- 95% agreed that infographic posters were an effective way to learn about the history of physiology.
- No respondents disagreed with these last two statements.
- In relation to infographic posters, 100% agreed they were an effective way of representing these women and their contributions, and for engaging a broad audience with scientific concepts/information.

# Results

- 89% per cent felt that university courses focused more on the contributions/discoveries of one gender than another (male or female).
- 97% felt teachers should give equal attention to the contribution of males and females in the subject matter they teach.
- None disagreed with the last two statements.
- 97% wanted to learn more about women in physiology
- 100% wanted more of such exhibitions around university locations.

# Other discussion points that came from responses

- What is a physiologist?
- Terms used to describe female physiologists – powerful, professor, ambitious, experienced, older – powerful appeared in 20/37 responses
- Female ‘physiologists’ they had heard of from free text comments:  
Mary Cotter, Lynn Margulis, Virginia Apgar, Florence Nightingale, Gertrude Elion, Barbara McClintock, Sue Black, Frances Ashcroft, Gerty Cori, Nancy Rothwell, Rita Levi-Montalcini

# Public Engagement/Recruitment



# Discussion

- This pilot study has shown that universities may have to do more to raise the profile of the contributions of female medical scientists in their teaching.
- Exhibits such as this may be an effective method of engaging a broad audience of students and staff with such topics, as well as improving how we teach the history of physiology.
- Further exhibits have taken place in other areas of university campus and during public engagement events to increase the visibility of women in physiology –we now have over 2000 responses.
- Results are being used as part of programme review, in partnership with students, regarding the history of medical science that we teach (i.e. do we provide fair coverage to scientists of each gender, do we provide a global perspective, do we consider disability etc).
- A final plea from my student – please can the Physiological Society publish a new edition of ‘Women Physiologists’, without the pink cover!

# Thanks & Acknowledgements

- Tilli Tansey and David Miller from History & Archives, Phys Soc
- Ann Rajnicek for tracking down her copy of 'Women Physiologists' that she was sent to review in 1993.
- Rebecca Mackay, who did all the work



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with greater knowledge  
and learning*