SYLVIA OLGA FEDORUK
1927 - 2012, CANADA
• Helped develop the first cobalt-60 unit and one of the first nuclear medicine scanners.
• Was the Lieutenant Governor of Saskatchewan, Canada from 1988 to 1994.
• Her personal coat of arms has pictures of atoms.

SALLY RIDE
1951 - 2012, USA
• She was the first American woman in space.
• Also the youngest astronaut, as well as the earliest known LGBT astronaut.
• Advocated for NASA to focus on problems directly facing humanity.

EUPHEMIA HAYNES
1890 - 1980, USA
• First African-American woman to earn a PhD in math (she also had a Masters in Education).
• Taught elementary and high school.
• First woman chair of the Washington D.C. school board.

ALICE BALL
1892 - 1916, USA
• First woman and African-American Masters graduate from the University of Hawaii.
• Developed a leprosy treatment that was still in use until the 1940s.
• However, after her death, the president of the university took credit for the treatment.

MAUD MENTEN
1876 - 1960, CANADA
• Helped develop the Michaelis-Menten equation in biochemistry.
• Earned a medical degree (one of the first women in Canada) as well as a PhD.
• Had to move to Germany, as at the time, women were not allowed to do research in Canada.

ROSALIND FRANKLIN
1920 - 1958, ENGLAND
• Made key contributions (which were not acknowledged at the time) to the discovery of the structure of DNA.
• After her death, 2 Nobel Prizes were awarded to her collaborators.

HEDY LAMARR
1914 - 2000, AUSTRALIA
• Co-invented spread spectrum and frequency hopping technology, which are now used in WiFi, GPS and more.
• Was a glamorous Hollywood film star, having starred in 35 films.

ANNE EASLEY
1933 - 2011, USA
• Was a rocket scientist at NASA (Centaur rocket stage).
• Developed important computer code that is used in alternative energy, solar, and wind projects.
• Was one of the first African-Americans in her field.

MARIA SIBYLLA MERIAN
1647 - 1717, GERMANY
• First to observe and document the metamorphosis of a butterfly.
• One of the most significant contributors to entomology.
• Was an accomplished botanical artist.
Representation is everything.

Women are consistently underrepresented in science and engineering workplaces. This is especially so in senior management positions, where they face a high attrition rate.

You can play immediately or keep in your hand. Place this card on anybody’s active scientist card. Doing so, means that the affected player will need one extra discipline card (of the same type*) to complete that scientist hand.

*Note: Players can choose which discipline for scientists with two discipline requirements. If there are no active scientist cards, you can discard this in the BURN pile.

Girls don’t see themselves as scientists.

Women are consistently underrepresented in science and engineering workplaces. This is especially so in senior management positions, where they face a high attrition rate.

Immediately play this card when drawn. Place this card on one of your active scientist cards. Doing so, means that you will need one extra discipline card (of the same type*) to complete that scientist hand.

*Note: You can choose which discipline for scientists with two discipline requirements. If you don’t have any active scientist cards, you can discard this in the BURN pile.

Mentors are awesome.

Women have blazed this trail before you, and many of them want to help others succeed.

Immediately play this card when drawn. You may look through the BURN pile and remove one card of your choice to place in your hand. Discard this modifier card in the BURN pile.

Diversity makes better science.

Evidence has shown that mixed-gender teams produce research articles perceived to be of higher quality than single-gender teams.

Immediately play this card when drawn. All players draw a card from the resource pile. MODIFIER cards must be discarded in BURN pile. All other cards can be kept in the player’s hand.

Sexism delays science.

Charles Darwin delays publishing the Origin of Species by 20 years in part because mentor Adam Sedgwick writes that evolution is an idea that “could have been written by a woman.”

You can play this card immediately or keep in your hand. Give this card to any player. If that player has a GROUNDBREAKER resource card(s) in their hand or in active play, they must discard one into the BURN pile.

The leaky pipeline.

Women are half the population but hold only about a quarter of the science and engineering jobs in the US. As well, despite women receiving roughly half of the PhDs, they only hold less than a quarter of professorships.

Play this card immediately and then place in the BURN pile. You must discard a scientist in progress: however the resource cards can be returned to your hand.
Stupid patriarchy.

“The main stumbling block in the way of any progress is and always has been unimpeachable tradition.”

~ Chien-Shiung Wu

Play this card immediately and then place in the BURN pile. Choose one RESOURCE card from another player’s Scientist hand and BURN it.

Stupid patriarchy.

“I didn’t succumb to the stereotype that science wasn’t for girls.”

~ Sally Ride

Play this card immediately and then place in the BURN pile. Choose one RESOURCE card from another player’s Scientist hand and BURN it.

Biased family leave.

STEM women’s careers suffer disproportionately from taking family leave. Many fathers do not take paternal leave even when it is available.

Play this card immediately and then place in the BURN pile. When given to another player, that player must skip their next two turns.

Ways of the Queen Bee

This phenomenon is complex and involves a variety of unconscious biases, but the general idea is that this describes situations where a successful woman will undermine her female colleagues.

Play this card immediately and then place in the BURN pile. Take an achievement card from another player and play it on one of your own Scientists.

FTW!

Congratulations! Your achievements and contributions to science and humankind are being recognized.

You may use this MODIFIER card as a resource (achievement or discipline) wildcard.

Trailblazer!

Although there is still much work to be done, things are better than they used to be. For this, we owe a huge thanks to the trailblazing efforts of many women in STEM.

Play this card immediately and then place in the BURN pile. Pick up two extra cards from the resource pile and place in your hand for play. Note that negative MODIFIER cards (for either you or other players) are ignored and immediately placed in the BURN pile.

Tokenism and Marie Curie.

Why is it that Marie Curie is almost always the one person that is brought up over and over when talking about women in STEM?

Play this card immediately and then place in the BURN pile. If you have more than one Scientist in progress, you must DISCARD all of them - and their cards - except for one.

Tokenism is not inclusion.

The Oxford Dictionary defines this as: The practice of making only a perfunctory or symbolic effort to do a particular thing, especially by recruiting a small number of people from under-represented groups in order to give the appearance of gender or racial equality within a workforce.

Play this card immediately and then place in the BURN pile. If you have more than one Scientist in progress, you must DISCARD all of them - and their cards - except for one.

I’m with her.

Allies, the ones who are actively engaged, are so important.

You can keep this card in your hand. Playable at any time - blocks the negative effects of one MODIFIER CARD. Burn after use.
We got your back.

Many successful women scientists have been supported by great organizations. For example, check out WWest (Westcoast Women in Engineering, Science and Technology - www.wwest.ca

You can keep this card in your hand and burn after use. The next scientist you complete can give their resources to any of your other scientists. Resources not needed by your current Scientists are burned.

Back handed compliment.

Unfortunately, this happens a lot. Said Voltaire of Emilie du Chatellet (physicist and mathematician), “She was a great man whose only fault was being a woman.”

Play this card immediately and then place in the BURN pile. Discard all your cards from your hand this round.

Credit where credit is due.

Congrats! You’ve made a major breakthrough! However, credit is disproportionately given to a male colleague or advisor.

Play this card immediately and then place in the BURN pile. Discard a resource card from one of your scientists.

Prove it again and again...

Women in STEM, particularly women of colour, often have to provide more evidence of being competent to be treated as equally capable as men.

Play this card immediately. Add this card to any active scientist who is a woman of colour (if yours is the only one, you have to play on your own). This scientist now requires an extra resource card to complete (it can be any of the ones required). If there are no active women of colour scientists, you may BURN this card.

Mistaken for a janitor.

Almost half of black and latina women in STEM fields have been mistaken for a janitor or admin staff in their own offices.

Play this card immediately and then place in the BURN pile. Play on any active scientist who is a woman of colour (if yours is the only one, you have to play on your own). This scientist must discard one of their resource cards. If there are no active women of colour scientists, you may BURN this card.

Good girls play nice.

Women in STEM report pressure to fill traditionally feminine roles. Asian-Americans report the most backlash for assertive, self-promoting behaviours.

Play this card immediately and then place in the BURN pile. Play on any active scientist who is a woman of colour (if yours is the only one, you have to play on your own). This scientist must discard one of their resource cards. If there are no active women of colour scientists, you may BURN this card.

- PHYSICS discipline card
- PHYSICS discipline card
- PHYSICS discipline card
**RULES**

**The Women in Science and Engineering Starter Deck**

Although patriarchy's stronghold on science and engineering is ever-weakening, it still causes significant hurdles for scientists and engineers worldwide. You have the chance to support groundbreaking women in science and technology by securing resources for their careers. Advance science by completing as many careers as possible!

**Objective**

The objective of the game is to obtain as many points as possible. The player with the most points at the end of the game is the winner. Points are gained by completing Scientist/Engineer Cards. In order to complete a Scientist/Engineer Card, the appropriate combination of Resources must be collected. Points from any incomplete Scientist/Engineer Card is subtracted from your total score at the end of the game.

Note that this deck also has a few blank cards for you to create and add your own DIY Scientist Card and/or your own DIY Modifier Card. If you tweet or Instagram these DIY cards with the hashtag #WISEDex, we'll take a look in case there are future expansion decks!

**The Deck**

This deck contains a total of 74 cards which includes 21 Scientist/Engineer Cards, 77 Resource Cards, and 22 Modifier Cards. This game is best played with 3 to 5 players, but can be played with 2. Length of playing time is approximately 30 to 45 minutes, but this can be easily adjusted by lowering the number of Scientist/Engineer cards used (see below).

**Scientist/Engineer Cards:**

Players obtain points upon completion of Scientist/Engineer Cards. Each of these cards requires a specific combination of Resource Cards which must be assigned to the scientist/engineer in order to be completed. Usually, the number of Resource Cards required to complete a project is the number of points collected by the player upon completion. At the end of the game, incomplete Scientist/Engineer Cards result in negative points equal to the point value of the card.

Note that some of the scientists/engineers are women of colour (WoC), and therefore may have additional obstacles in game. Because of this, their cards may be more difficult to complete and are consequently worth an extra point.

**Resource Cards:**

Resource Cards include Discipline cards, and Achievement Cards which contribute towards completing Scientist/Engineer Cards. They also include Modifier Cards, which can affect gameplay in special ways.

**Discipline Cards:** The field(s) of research that the woman was involved in.

**Achievement Cards:** These cards reflect additional activities that the woman may have been involved in.

**Modifier Cards:**

These cards generally reflect issues related to gender equity and have effects (explained in the card text) that can impede or help a player complete their Scientist/Engineer Cards. Note that some Modifier Cards are specifically aimed at women of colour scientists/engineers (WoC).

**Set Up**

**The Playing Field**

There are 4 main card “piles” in the game.

1. Resource Card pile – contains the shuffled up Resource Cards face down.
2. Scientist/Engineer Card pile – contains the Scientist/Engineer Cards face down.
3. Discard pile – contains discarded cards face up (at the beginning, this will be empty).
4. Burn pile – (also empty at the beginning) contains face down Discipline and Achievement Cards that were used to complete Scientist/Engineer Cards as well as used Modifier Cards.

Once the Resource Card pile is completely used up, the Burn pile and Discard pile (minus the top card) are combined, shuffled and used to replenish the new Resource Card pile.

**To start the game, place all the Resource Cards and Scientist/Engineer Cards face down in two separate piles between the players.** As the game progresses, a Discard pile and a Burn pile will be generated. Position the piles as below:

**Resources face down**

**Project face down**

**Discard face up**

**Burn face down**

**Playing**

Each player starts with a hand of two Resource Cards, and one Scientist/Engineer Card. If you try to add a Modifier Card at the beginning, return it to the middle of the Resource pile – unfortunately, this also means you will be starting with a smaller hand.

Every turn consists of three basic phases: A draw phase, an action phase and a discard phase.

1. **Draw:** At the start of their turn (youngest player goes first), the player draws two cards, in any combination, from the Scientist/Engineer Card pile, the Resource Card pile or the Discard pile (i.e. 2 cards from the Resource Card pile or 1 card each from the Resource Card pile and Discard pile).

2. **Action:** The player can now choose to do as many of the following actions during their turn.

   i) **Start and/or work on a scientist/engineer.**
   
   ii) **Complete a scientist/engineer.**

3. **Discard.** The at the end of your turn, you must discard cards from your hand into the Discard pile face up. If your hand size is LARGER than the number of Scientist/Engineer Cards you have in progress. For example, if you are working on one Scientist/Engineer Card, you can only hold one card at the end of your turn. If you have no active Scientist/Engineer Cards (completed Scientist/Engineer Cards do not count), you must discard your entire hand. Note that Scientist/Engineer Cards can only be discarded if they are in your hand (e.g. active ones on the table cannot be discarded).

**Ending the Game**

When the last Scientist/Engineer Card* is drawn from the Scientist/Engineer pile, the next player to complete a Scientist/Engineer Card ends the game. After this player finishes a Scientist/Engineer Card, all players get one more turn before the game ends. Then, players tally up all their points: positive points for completed Scientist/Engineer Cards and negative points for unfinished Scientist/Engineer Cards left on the field. The player with the most points wins the game.

For example: Dave completed a 4-point card, a 2-point card, and has an unfinished 3-point card. He gets 4 + 2 + 3 = 9 points at the end of the game.

*Note that you can play with fewer Scientist/Engineer Cards to start. This can be done to adjust the total playing time.

**CREDITS**

**Credits**

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For more information about the WWEST, please visit http://www.wwest.ca

For more information about the PHYLO card game, please visit http://jtp/jogame.org