# 32nd TBI Winterseminar 2017

universität wien

## Interspecies Gene Co-Expression Networks

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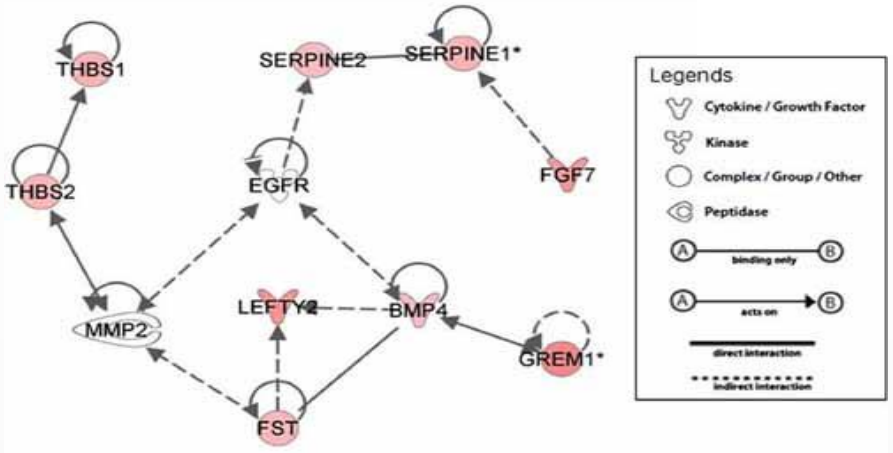
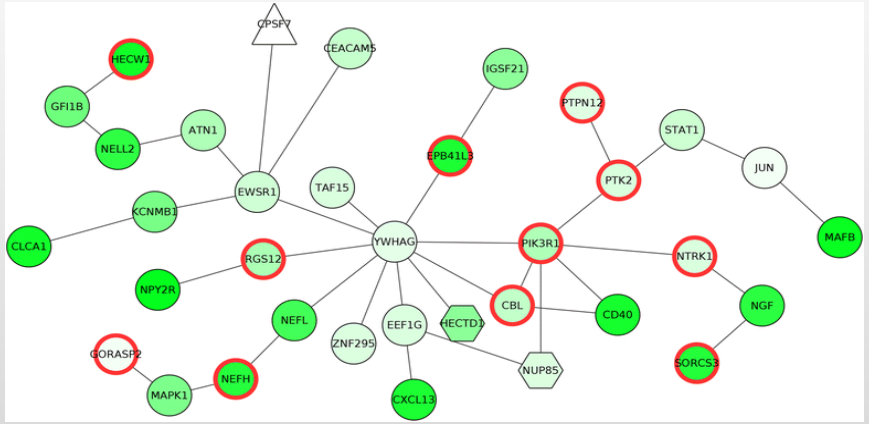
February 2017

# Why Interspecies Co-Expression Networks?

Study human diseases




Identify functional relationships among genes



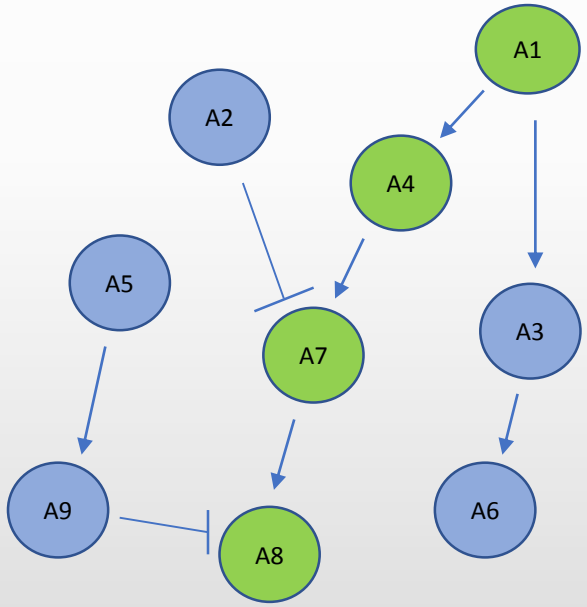

Identify condition specific modules

# Constructing Co-Expression Networks

- Nodes: Genes
- Edges: Interactions
- Highly connected genes in the thresholded network are grouped into modules.
- Hub gene of the module identified

# Our Approach to Interspecies Co-Expression Network

Find modulated sub-paths from human pathway



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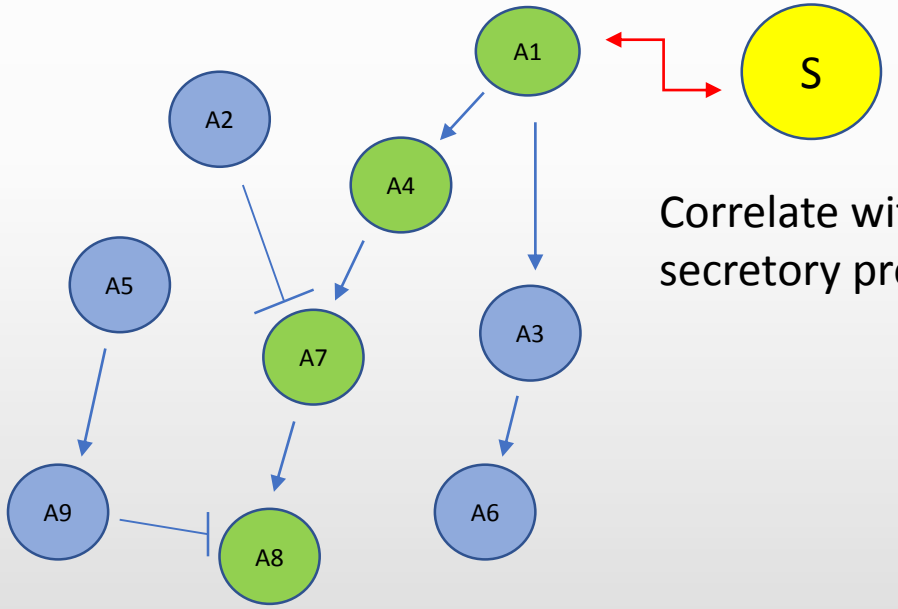
Find modulated sub-paths from human pathway




Correlate with bacterial secretory protein

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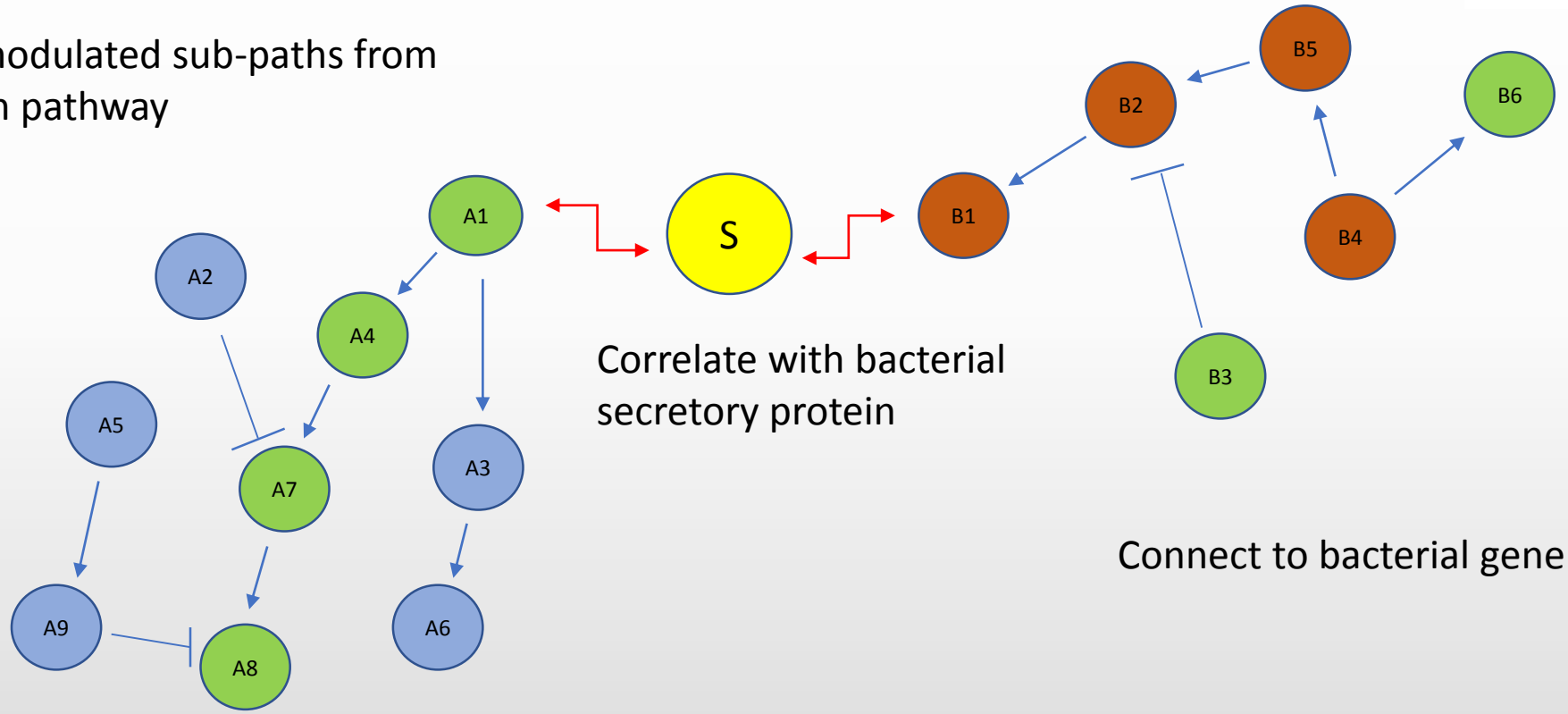
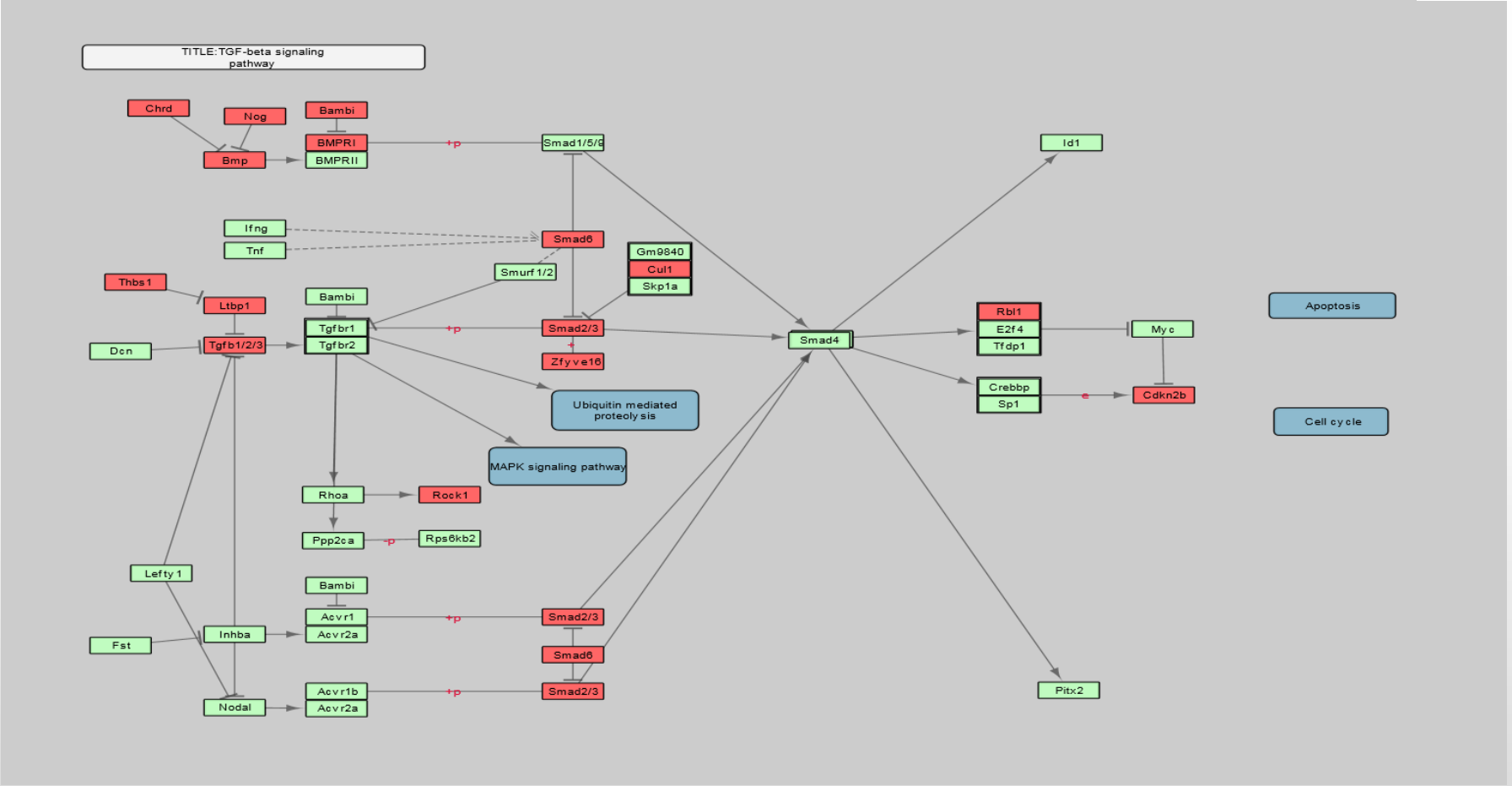
Find modulated sub-paths from human pathway




Correlate with bacterial secretory protein

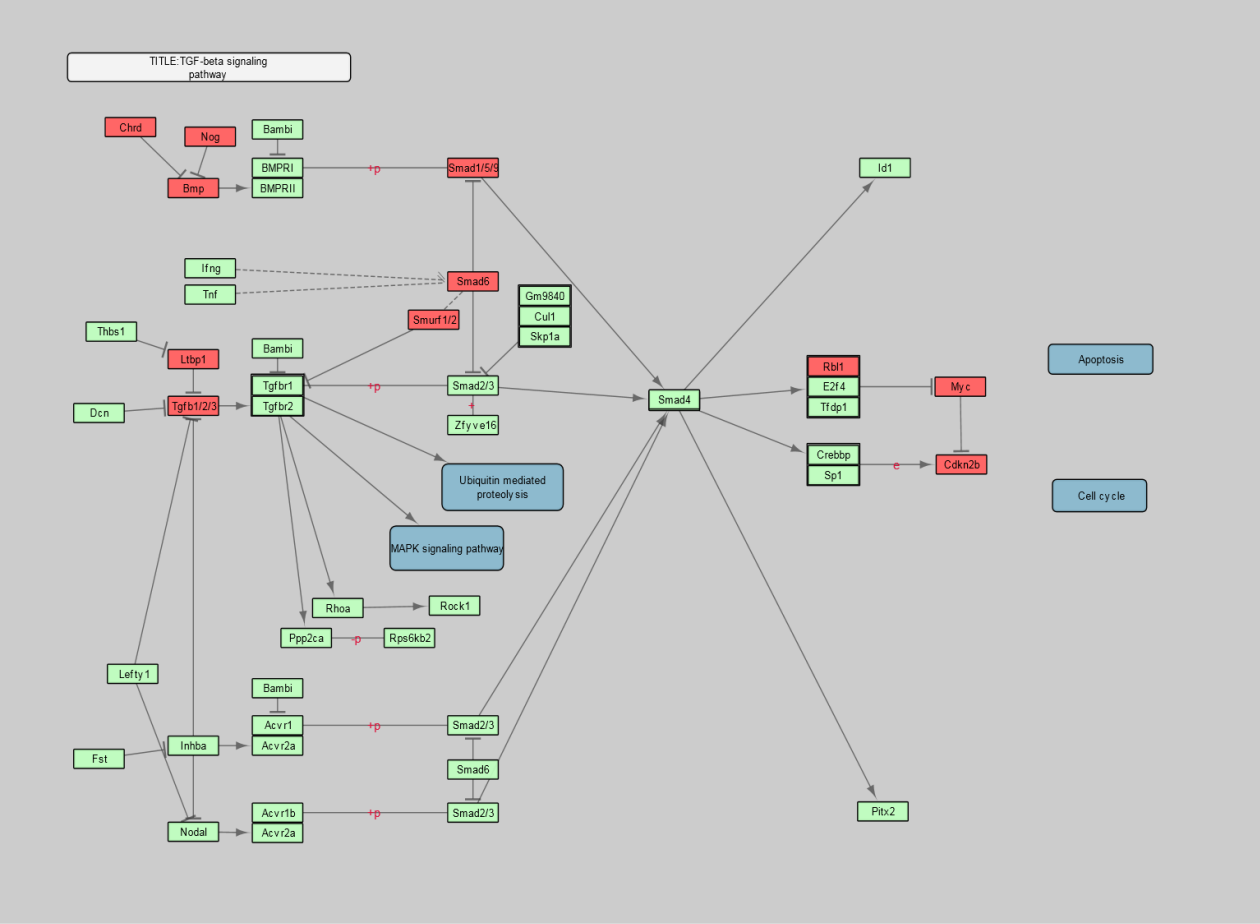
Connect to bacterial gene

# Gtf2ird1 Knockout Data



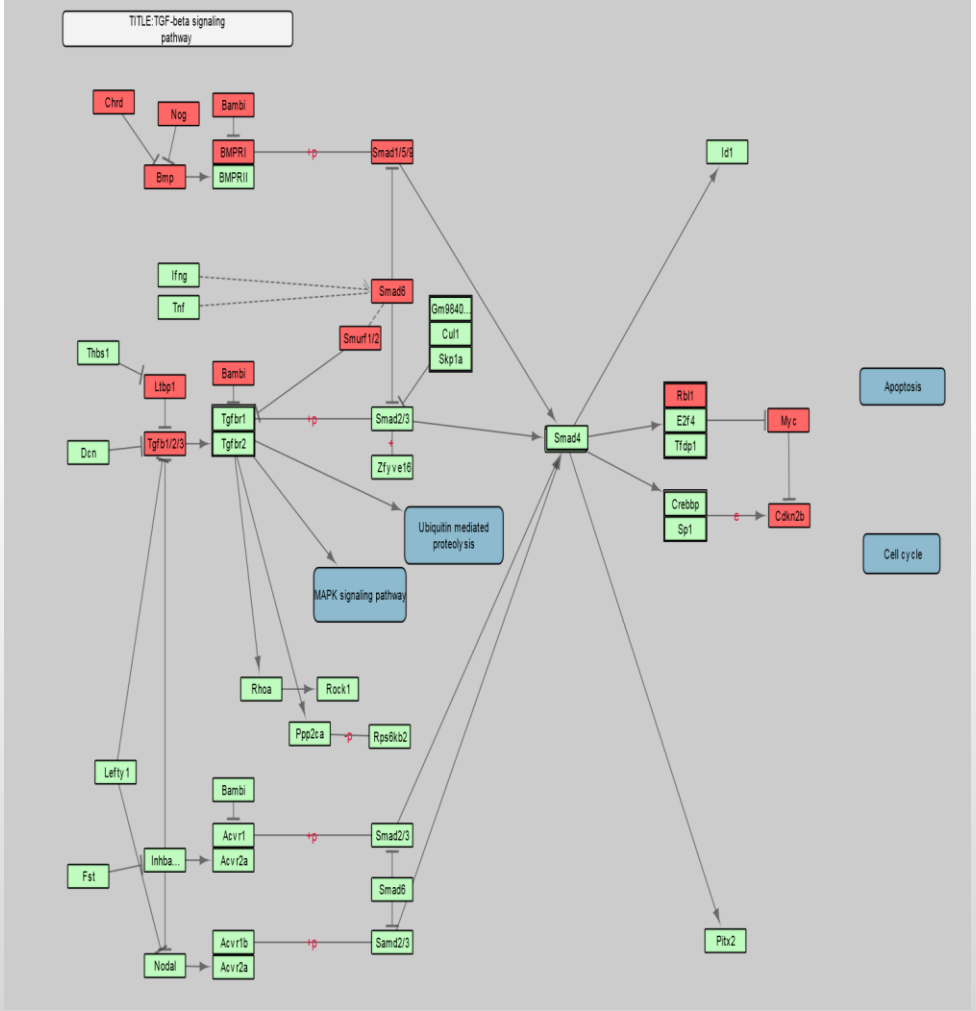

*(Corley et al, 2016)*

# Step 1 : Initial Sub-paths




| | | | | | | |
|---|---|---|---|---|---|---|
| Rbl1 | Myc | Cdkn2b | 2,65387E-08 | | | |
| Bmp6 | Nog | Bmp4 | Chrd | Bmp8a | Bmp7 | 6,32E-11 |
| Tgfb2 | Ltbp1 | Tgfb3 | 2,5843E-07 | | | |
| Smad6 | Smad9 | Smurf1 | 0,002340508 | | | |

# Step 2: Sub-path Extensions




| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| [Nog | Bmp2] | 0.0096105151851880 73 | | | | | | | | |
| Nog | ** | [Bmp2] | ____ | [Bmp6 | Bmp4 | Nog | Chrd | Bmp8a | Bmp7] | 6,32E+04 |
| [Bmp2 | Bmp6 | Bmp4 | Nog | Chrd | Bmp8a | Bmp7] | 6,00E+04 | | | |
| 6,32E+04 | > | 6,00E+04 | TRUE | | | | | | | |
| Parent | Path2 | 2 | [Bmp2 | Bmp6 | Bmp4 | Nog | Chrd | Bmp8a | Bmp7] | |
| [Smad9 | Bmpr1a | Bambi] | 0.008626337977276743 | | | | | | | |
| Smad9 | ** | [Bmpr1a | Bambi] | ____ | [Smad6 | Smad9 | Smurf1] | 0.0023405084721562774 | | |
| [Bmpr1a | Bambi | Smad6 | Smad9 | Smurf1] | 4,57E+11 | | | | | |
| 0.00234 | > | 4,57E+11 | TRUE | | | | | | | |
| Parent | Path4 | [Bmpr1a | Bambi | Smad6 | Smad9 | Smurf1] | | | | |
| [Smad9 | Bmpr1b | Bambi] | 0.013371339180364372 | | | | | | | |
| Smad9 | ** | [Bmpr1b | Bambi] | ____ | [Bmpr1a | Bambi | Smad6 | Smad9 | Smurf1] | 4,57E+11 |
| [Bmpr1b | Bmpr1a | Bambi | Smad6 | Smad9 | Smurf1] | 2,09E+10 | | | | |
| 4,57E+11 | > | 2,09E+10 | TRUE | | | | | | | |
| Parent | Path4 | [Bmpr1b | Bmpr1a | Bambi | Smad6 | Smad9 | Smurf1] | | | |

# Step 3: Merging Sub-paths

# What Next!

- Find the anchor gene
- Testing of this Module.
- Correlate anchor gene to bacterial secretory protein
- Connect the bacterial secretory protein to bacterial gene

# Thank you
# Have a nice stay in Bled!