

# Renske Vroomans

*Curriculum Vitae*

## PERSONAL DETAILS

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**Name** dr. Renske Maria Anna Vroomans  
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**Nationality** Dutch  
**Visa** not required

## CURRENT POSITION

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### Postdoctoral research fellow

May 2019  
June 2021

*Origins Center, Netherlands*

*funding: NWO Nederlandse WetenschapsAgenda StartImpuls*

I am working with a cell-based model to study under which conditions differentiated multicellularity can evolve. I want to understand how the regulatory processes in the unicellular ancestor evolved to orchestrate cell differentiation in early multicellular organisms. I also supervise two students, Coen Honingh and Koen Greuell, with projects on formation of the secondary body axis in the early-branching starlet anemone *Nematostella vectensis*.

## CAREER HISTORY

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### Postdoctoral researcher

2018-2019

*University of Helsinki*

I used Embryomaker, a 3D physical model of epithelia, to study developmental systems drift. Identified how much, and in what way, the gene regulatory networks and dynamical processes that generate complex morphologies can evolve.

### Research assistant

2016-2017  
2017-2018

*Utrecht University*

I participated in a project on predicting the immunogenicity of epitopes. I performed bioinformatic analysis on a database with t-cell receptor and epitope sequences (VDJdb, <https://vdjdb.cdr3.net/>), and added existing data to this database. I also aided in the supervision of a master student, Wannisa Ritmahan.

### PhD candidate

2011-2017

*Utrecht University*

Of clocks and waves, stripes and shapes: evo-devo models of sequential segmentation. I researched diverse aspects of animal segmentation, such as the coordination between tissue pattern and tissue movement, the combined evolution of growth and tissue patterning and the left-right symmetry of vertebrate somitogenesis. For this, I worked with a physical model of adhering and migrating cells, evolutionary models of tissue growth and pattern development, and phenomenological models of oscillating cells. I also supervised a master student, Sophia Scheper, on a related project.

## PUBLICATIONS

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- Hagolani PF, Zimm R, Vroomans RMA, Salazar-Ciudad I. 2020. *On the evolution and development of morphological complexity: a view from gene networks* accepted in PLoS Comput Biol
- Colizzi ES, Vroomans RMA, Merks RMH. 2020. *Evolution of multicellularity by collective integration of spatial information*. ELife
- Ritmahan W, Kesmir C, Vroomans RMA. 2020. *Revealing factors determining immunodominant responses against dominant epitopes*. Immunogenetics, 1-10
- Li XR, Vroomans RMA, Fox S, Grieneisen VA, Østergaard L, Marée AFM. 2019. *Systems biology approach pinpoints minimum requirements for auxin distribution during fruit opening*. Molecular plant, 12:6
- Bagaev DV, Vroomans RMA, Samir J, Stervbo U, Rius C *et al.*, 2020. *VDJdb in 2019: database extension, new analysis infrastructure and a T-cell receptor motif compendium*. Nucleic Acids Research 48 (D1), D1057-D1062
- Vroomans RMA, Hogeweg P, Ten Tusscher KHWJ. 2019. *Around the clock: gradient shape and noise impact the evolution of oscillatory segmentation dynamics*. EvoDevo 9:24
- Shugay M, Bagaev DV, Zvyagin IV, Vroomans RMA, Crawford JC *et al.*, 2018. *VDJdb: a curated database of T-cell receptor sequences with known antigen specificity*. Nucleic acids research 46 (D1), D419-D427
- Vroomans RMA, Ten Tusscher KHWJ. 2018. *Chapter: Modeling Evolution of Developmental Gene Regulatory Networks*. In *Evolutionary Developmental Biology*, Springer Reference
- Vroomans RMA, Ten Tusscher KHWJ. 2017. *Modelling asymmetric somitogenesis: Deciphering the mechanisms behind species differences*. Dev Biol 427(1): p21-34
- Vroomans RMA, Hogeweg P, Ten Tusscher KHWJ. 2016. *In silico evo-devo: reconstructing stages in the evolution of animal segmentation*. EvoDevo 7:14
- Vroomans RMA, Hogeweg P, Ten Tusscher KHWJ. 2015. *Segment-specific adhesion as a driver of convergent extension*. PLoS Comput Biol 11(2): e1004092
- Vroomans RMA, Marée AFM, de Boer RJ, Beltman JB. 2012. *Chemotactic migration of T cells towards dendritic cells promotes the detection of rare antigens*. PLoS Comput Biol 8(11): e1002763
- A public outreach video explaining my field of research within the Origins Center for a broad audience: <https://www.youtube.com/watch?v=4itrKBv5p9A&t=1s>

## TEACHING

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### Workshop day

2018

*ImageInLife, Horizon 2020 Marie-Curie Innovative training Network*

Modelling and simulation of biological development Summer School: section on modeling development with Cellular Potts Model – theoretical underpinnings and practical applications

### Guest Lecture

2017

*Multiscale Mathematical Biology, Leiden University*

Explaining evolution of development and modelling thereof, using my own research as example

<b>Guest Lecture</b>	2014
<i>Third year course of Developmental Biology and Genetics, Utrecht University</i>	
Showing how models can be used to study development, using somitogenesis as an example	
<b>Guest Lecture</b>	2014
<i>Third year course of Computational Biology, Utrecht University</i>	
Discussing insights from models on both Drosophila and vertebrate somitogenesis	
<b>Teaching Assistant</b>	2008-2016
<i>First year course of Systems Biology, Utrecht University</i>	
Helping students with exercises during practical sessions	

## SUPERVISION

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<b>Koen Greuell</b> <i>Master student, University of Amsterdam</i>	2020
<b>Coen Honingh</b> <i>Master student, University of Amsterdam</i>	2020
<b>Levi van Doorn</b> <i>Master student, Utrecht University</i>	2020
<b>Wannisa Ritmahan</b> <i>Master student, Utrecht University</i>	2017
<b>Sophia Scheper</b> <i>Master student, Utrecht University</i>	2015

## OTHER ACTIVITIES

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<b>SMB Cell and Developmental Biology subgroup</b> <i>scientific committee member</i>	2020 -
<b>Organising committee Origins Center 2021 meeting</b> <i>scientific advisory member</i>	2020 -
<b>IAS art-science group</b> <i>Co-founder of an informal discussion and experimentation group on the interface between art, science and philosophy.</i>	2019 -
<b>Secretary of the Dutch Society for Theoretical Biology (NVTB)</b> <i>Tasks included membership administration and organising the yearly meeting.</i>	2011-2015

## SKILLS

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<b>Software</b>	C/C++, FORTRAN, PYTHON, BASH, L <sup>A</sup> T <sub>E</sub> X
<b>Modelling</b>	Cellular Potts Model, EmbryoMaker agent-based modelling, ODEs, PDEs, CA
<b>Languages</b>	Dutch (native speaker) English (fluent)

## REFERENCES

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<b>Kirsten ten Tusscher</b> <i>PhD Supervisor</i>	K.H.W.J.tenTusscher@uu.nl
<b>Çan Keşmir</b> <i>Project supervisor</i>	C.Kesmir@uu.nl
<b>Jaap Kaandorp</b> <i>Postdoc Mentor</i>	J.A.Kaandorp@uva.nl