

Curriculum Vitae

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PD Dr. rer. nat. habil. Simon Poppinga

Botanic Garden Freiburg

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Personal status

Born 13.12.1979 in Aurich, Germany. Married, two children (*2012, 2014).

Current and previous positions

2017-present: Honorary curator at the Botanic Garden Freiburg for the collection of carnivorous plants.

2013-present: Group leader at the Botanic Garden Freiburg for plant movements and biomimetics.

2009-2013: Research assistant and PhD candidate at the Botanic Garden Freiburg.

2007-2009: Coordinator of the carnivorous plants workgroup at the Nees Institute for Biodiversity of Plants (University of Bonn).

Academic degrees

2020: Habilitation and *Venia legendi* (PD Dr. rer. nat. habil.) in Botany (University of Freiburg).

2013: PhD (Dr. rer. nat.) in Biology, final mark: *summa cum laude* (with distinction). Supervisor: Prof. Thomas Speck, Botanic Garden, University of Freiburg.

2007: Diploma (Dipl.-Biol.) in Biology, final mark: *sehr gut* (A, excellent). Supervisor: Prof. Wilhelm Barthlott, Nees Institute for Biodiversity of Plants, University of Bonn.

Prizes and awards

Research awards

2017: Third place of the Innovationspreis 2017 (category: "Forschung/Wissenschaft") awarded by the AVK (Industrievereinigung Verstärkte Kunststoffe e. V. und AVK-TV GmbH) for the development of the biomimetic façade shading element Flectofold (together with project partners).

2013: Gips-Schüle-Forschungspreis by the Gips-Schüle-Foundation, endowed with 40.000 €, for „Flectofin® - Bio-inspirierte, wandelbare technische Systeme“ (together with project partners).

2012: International Bionic Award, endowed with 10.000 € by the Schauenburg-Foundation and awarded by VDI e.V. (Association of German Engineers) for "Flectofin® - a hinge-less flap-ping mechanism inspired by nature" (together with project partners).

2011: TechTextile Innovationprize (category: Architecture) for the development of "Bionic facades shading based on the model of the *Strelitzia*" (Flectofin®) (together with project partners).

- 2010: 1st poster prize (endowed with 200 €) for the two posters “Gelenkfreie Klappen bei *Strelitzia reginae*” and “Optimierung und Weiterentwicklung des Flectofin®” at the 5. Bremer Bionik Kongress, Patente aus der Natur’, Bremen (together with project partners).

Teaching awards

- 2019: First teaching prize from the student council “Biology” for the Biologische Grundpraktikum II B „Morphologie und Systematik der Angiospermen” (together with other lecturers).
- 2018: Second teaching prize from the student council “Biology” for the Biologische Grundpraktikum II B „Morphologie und Systematik der Angiospermen” (together with other lecturers).
- 2017: First teaching prizes from the student council “Biology” for the Biologische Grundpraktikum II B „Morphologie und Systematik der Angiospermen” and for the Grundmodul “Pflanzenphysiologie” (both together with other lecturers) (SS 2017 & WS 2016/17).
- 2015: First teaching prizes from the student council “Biology” for the Bachelor-Vertiefungsmodul “Funktionelle Morphologie, Biomechanik und Bionik” and for the Grundmodul “Pflanzenphysiologie” (both together with other lecturers) (both WS 2014/15).

Received funding / current research projects

- 2019: “Bio-inspirierte elastische Materialsysteme und Verbundkomponenten für nachhaltiges Bauen im 21ten Jahrhundert (BioElast)”, granted by MWK Baden-Württemberg (Schwerpunktbereich: Aufbau und Stärkung der Forschungsinfrastruktur im Bereich der Mikro- und Nanotechnologie sowie der neuen Materialien). Co-applicant (with Thomas Speck) for „Projekt 3: Entwicklung von Materialsystemen für flächige Bauelemente mit autonom-adaptiver Formveränderung inspiriert von den passiven, mehrstufigen Bewegungen von flächigen Pflanzenstrukturen” (subsidy amount: 97,842 EUR, reference number: Az.: 33-7533.-30-121/15/3C, runtime: 01.06.2019 – 31.05.2021).
- “Bio-inspirierte elastische Materialsysteme und Verbundkomponenten für nachhaltiges Bauen im 21ten Jahrhundert (BioElast)”, granted by MWK Baden-Württemberg (Schwerpunktbereich: Aufbau und Stärkung der Forschungsinfrastruktur im Bereich der Mikro- und Nanotechnologie sowie der neuen Materialien). Co-applicant (with Thomas Speck) for „Projekt 2: Kinematische Prinzipien und Bewegungsdesign bei sich durch Verformung bewegenden Pflanzenstrukturen als Ideengeber für bioinspirierte Materialsysteme und Bauelemente in der Architektur” (subsidy amount: 156,000 EUR, reference number: Az.: 33-7533.-30-121/15/3B, runtime: 01.06.2019 – 31.05.2021).
- 2018: „JONAS research initiative: Joint research network on advanced materials and systems - Smart materials for sustainable architecture (smartSUS)”, granted by BASF-SE and the MWK Baden-Württemberg. Co-applicant (with Thomas Speck) for the extension of the smartSUS-project „Bio-inspired fiber-reinforced flap and scale structures for self-adaptive heat and humidity regulation” (subsidy amount: 250,000 EUR, reference number: AZ: 7713.1-11/2.1.6, runtime: 01.08.2018 – 31.04.2021).
- “BiVaS – Energiereduktion in der Vakuumhandhabung durch Reduzierung von Totvolumina mittels bionischer Wirkprinzipien”, granted by the BMWi within the 6. Energieforschungsprogramm. Lead-PI and main applicant for the sub-project “Bionischer Vakuumgreifer”(subsidy amount: 199,700 EUR, reference number: 03ET1559 C, runtime: 01.05.2018 – 30.04.2021).

“Transregio SFB TRR 141: Biological design and integrative structures”, Collaborative Research Center granted by the DFG. Co-applicant (with Thomas Speck) for extension of the sub-project A04 “Kinematics of planar, curved and corrugated plant surfaces as concept generators for deployable systems in architecture” (subsidy amount: 91,400 EUR, runtime: 01.07.2018 – 30.06.2019).

- 2017: “Personalisierter 3D- und 4D-Druck von programmier-und schaltbaren sowie selbstregulierend multifunktionalen Materialsystemen für Sport und Medizin”, granted by the Baden-Württemberg-Stiftung. Co-applicant (with Thomas Speck) for the sub-project “Analyse biologischer Vorbilder und biomimetischer 3D-/4D-Druck” (subsidy amount: 141,000 EUR, reference number: IAF-2 / 4D-multiMATS, runtime: 01.05.2017 – 30.04.2020).
- 2015: „JONAS research initiative: Joint research network on advanced materials and systems - Smart materials for sustainable architecture (smartSUS)”, granted by BASF-SE and the MWK Baden-Württemberg. Co-applicant (with Thomas Speck) for the extension of the smartSUS-project „Bio-inspired fiber-reinforced flap and scale structures for self-adaptive heat and humidity regulation” (subsidy amount: 250,000 EUR, reference number: AZ: 7713.1-11/2.1.6, runtime: 01.08.2015 – 31.07.2018).
- 2014: “Transregio SFB TRR 141: Biological design and integrative structures”, Collaborative Research Center granted by the DFG. Co-applicant (with Thomas Speck) for the sub-project A04 “Kinematics of planar, curved and corrugated plant surfaces as concept generators for deployable systems in architecture” (subsidy amount: 241,100 EUR, runtime: 01.10.2014 – 30.06.2018).
- 2012: “Trap diversity and evolution in carnivorous bladderworts (*Utricularia*)”. Co-applicant (with Thomas Speck) for the research proposal funded by the Innovationsfonds Forschung of the University of Freiburg (subsidy amount: 17,100 EUR, reference number: 7441.1)

Nomination list places in professor appointment procedures

- 2019: Shortlisted for the tenure track position in soft biological systems, Wageningen University (NL)
- 2018/2019: Second place on the nomination list for the W2 (tenure to W3) „Systematische Botanik und Biodiversität“ at the Humboldt-University of Berlin (PR/025/18).

Editor experience

- 2021 Guest Associate Editor for *The Journal of Experimental Botany* for the special issue “Mechanical ecology”
- since 2018 Associate Editor for the *American Journal of Botany*
- 2018-2019 Guest Associate Editor for *Frontiers in Plant Science*
- 2018 Guest Associate Editor for *AoB PLANTS*

Organized scientific sessions and symposia

- 2022: Forthcoming symposium „Mechanical ecology - taking biomechanics to the field“ at the Annual Meeting of the Society for Experimental Biology (SEB) in Antwerp, Belgium (together with Ulrike Bauer, University of Bristol).

- 2020: Symposium „Form, structure and function: how plants vs. animals solve physical problems“ at the Annual Meeting of the Society for Integrative and Comparative Biology (SICB) in Austin, TX, USA (Jan 3-7, 2020) (together with Ulrike Müller, California State University Fresno). Funding for this symposium was provided by the Society for Integrative and Comparative Biology (DCE, DIZ, DVM), the American Microscopical Society (AMS), the National Science Foundation (NSF IOS award number 1930744), and the Company of Biologists.
- 2017: Symposium „Carnivorous plants - Physiology, ecology, and evolution“ at the annual main meeting of the Society for Experimental Biology (SEB) in Gothenburg, Sweden (06.07.2017).
- 2015: „Young Scientist’s Forum“ at the 8th Plant Biomechanics Conference in Nagoya, Japan (30.11.-04.12.2015) (together with Naomi Nakayama & Kentaro Abe).

Reviewing and consulting activities

Reviews for grant agencies:

Austrian Science Fund, German Research Foundation (DFG), Japan Society for the Promotion of Science (JSPS), National Science Foundation (NSF), National Science Centre Poland

Reviews for journals:

ACS Applied Materials & Interfaces; Advanced Science; Advanced Materials Technologies; Annals of Botany; Aquatic Botany; Arthropod-Plant Interactions; Australian Journal of Botany; Bioelectrochemistry; BioEssays; Bioinspiration & Biomimetics; Biomechanics and Modeling in Mechanobiology; Biomimetics; Botany; Carnivorous Plant Newsletter; Construction & Building Materials; Current Biology; Ecology and Evolution; Freshwater Biology; Frontiers in Plant Science; Fundamental and Applied Limnology; Integrative & Comparative Biology; Interface Focus; International Journal of Molecular Sciences; Journal of Experimental Botany; Journal of Experimental Zoology Part A; Journal of Plankton Research; Journal of Plant Research; Journal of the Royal Society Interface; Nature Communications; New Phytologist; Perspectives in Plant Ecology, Evolution and Systematics; Physiology and Molecular Biology of Plants; Plant Physiology and Biochemistry; Plant Biology; Plant Signaling & Behavior; PLoS ONE; Proceedings of the National Academy of Sciences of the United States of America (PNAS);...Proceedings of the Royal Society: B; Protoplasma; Royal Society Open Science; Sensors; Science; Scientific Reports; Smart Materials and Structures

Reviews for book publishers:

Oxford University Press

Consulting for book publishers:

Jim Pattison Group (Guinness World Records 2021)

Teaching

Lectures, courses, and seminars:

- Biologisches Grundpraktikum II B “Morphologie und Systematik der Angiospermen”: Instructor for the course weeks “Rosaceae, Caryophyllaceae, Brassicaceae - Früchte”(one day in 2016), “Bestäubung” (SS 2012-2017, 2019-2021, one day in 2018), “Pseudanthien” (SS 2012-2014, 2016-2021), and “Monocotyledonen” (SS 2015, one day in 2018). The course includes lectures, practical examination of plant material, and plant identification exercises.
- Grundmodul “Physiologie”: Pflanzenphysiologischer Grundkurs für Bachelor-und Lehramts-Studierende der Biologie. Course instructor for “Wasserhaushalt der Pflanze” (WS 2012/2013-2018/2019)

and "Biomechanik der Pflanzen: Zug-und Biegeversuch" (WS 2012/2013). The course includes lectures, experimental examination of plant material, and evaluation of scientific protocols.

- Bachelor-Vertiefungsmodul "Funktionelle Morphologie, Biomechanik und Bionik". Instructor for the course week "Haftung" (WS 2013-2021). The course includes seminars, lectures, experimental examination of plant material, SEM introduction, and evaluation of scientific protocols.
- Master-Orientierungsmodul "Angewandte Biowissenschaften –Translational Biology": Co-course instructor for "Gelenkfreie Bewegungen und wandelbarer Leichtbau" and "Verzweigte Faserverbünde in Natur und Technik" (WS 2012/2013, 2013/2014, 2015/2015, 2015/2016) (lecture "Pflanzenbewegungen & Bionik" 2016/2017). The course includes lectures and experimental examination of plant material.
- Master-Orientierungsmodul "Pflanzenwissenschaften": Co-course instructor for "Form-und Gewichtsoptimierung bei Pflanzen nach Mattheck" (WS 2012/2013-2014/2015). The course includes lectures and experimental examination of plant material.
- Lehramtsmodul Biotechnologie: "Funktionelle Morphologie, Biomechanik und Bionik": Co-course instructor for "Gelenkfreie Bewegungen und wandelbarer Leichtbau" (SS 2013). The course includes lectures and experimental examination of plant material.

Advanced training in university didactics

I successfully participated in the following advanced training courses at the "Abteilung Hochschuldidaktik" of the University of Freiburg:

- Durch aktivierende Methoden kompetenzorientiertes Lernen fördern
- Fit für die Lehre I
- Fit für die Lehre II
- Forschendes Lernen
- Haus- und Abschlussarbeiten didaktisch gut anleiten und bewerten
- Lehrveranstaltungen (lern-)zielgerecht planen
- Praxisberatung
- Prüfen mit Multiple-Choice-Fragen

Supervision of theses and internships

- 2021: „Funktionsmorphologie und Funktionsweise der drüsigen Trichome von *Byblis gigantea*". Bachelorarbeit von Sebastian Ruppert.
- „Quantifizierung des Haftvermögens von *Hirudo verbana* unter Scherbelastung auf glatten und porösen Oberflächen mit unterschiedlichen Oberflächeneigenschaften". Bachelor Thesis of Benedikt Schuler (together with Tim Kampowski).
- 2020: "Qualitative und quantitative Untersuchung der Tentakelbewegung der karnivoren Pflanze *Byblis gigantea*". Bachelor thesis of Noah Knorr.
- "Hygroskopische Pflanzenstrukturen: Bewegung der inneren Involukralblätter von *Carlina acaulis*". Master thesis of Matthias Pfaff.
- 2019: "Studien zum Festhaften der austrocknungstoleranten Pflanzenarten *Xerophyta dasylirioides* und *Vellozia pulchra* auf tropischen Inselbergen". Bachelor thesis (Rostock University) of Roland Bull (together with first examiner Prof. Stefan Porembski).

- "Der Einfluss verschiedener Reize auf die Verengungsbewegung der Schnappfallen der karnivoren Wasserfalle (*Aldrovanda vesiculosa*)". Bachelor thesis of Marcel Bräuer (together with Anna Westermeier).
- 2018: "Die Biomechanik der Fallenblätter der karnivoren Pflanze *Pinguicula grandiflora*". Bachelor thesis of Lars Bucholz (together with Marc Thielen).
- "Hygroskopische Pflanzenstrukturen - Einfluss von Temperatur und Luftfeuchtigkeit auf die Bewegung". Bachelor thesis of Sophia Krause.
- "Papierbasierte Funktionsmodelle hygroskopischer Pflanzenbewegungen - Eine wissenschaftlich-didaktische Auseinandersetzung". „Zulassungsarbeit“ of Pablo Schenck (together with Olga Speck).
- "Adaptive Mechanik krautiger Pflanzen als Ideengeber für neuartige Materialien: Vergleichende Analyse zur Funktionsmorphologie, Biomechanik und strukturellen Austrocknungstoleranz nahverwandter Gesneriengewächse". PhD thesis of Tim Kampowski (finished 2018).
- 2017: "Beutefanganalysen bei der karnivoren Pflanzenart *Aldrovanda vesiculosa*". Bachelor thesis of Jassir Smajj (together with Anna Westermeier).
- "Biomechanische Analysen der Verengungsbewegung der Fallen von *Aldrovanda vesiculosa*". Bachelor thesis of Lennart Hoppe (together Anna Westermeier).
- "Establishment of a methodology for 3D plant deformation analyses". Master thesis of Max Mylo (together with Anna Westermeier, first examiner: Prof. Jörn Munzert, second examiner: Prof. Thomas Speck).
- "Biomechanik und funktionelle Morphologie der Säule bei *Stylidium debile*". Bachelor thesis of Gianluca Ferraro.
- "Analysis of leaf growth, biomechanics and anatomy during leaf ontogeny in *Syngonium auritum* (Araceae)". Master thesis of Laura-Sofie Lehmann (together with Anna Westermeier).
- "Über den Fangmechanismus karnivorer Reusenfallen am Beispiel von *Genlisea hispidula*". "Zulassungsarbeit" of Cora Carmesin (together with Anna Westermeier, first examiner: Prof. Steven Jansen, second examiner: Prof. Thomas Speck).
- 2016: "Morphometrie und Biomechanik von *Ramonda myconi* bei verschiedenen Wassergehalten". Bachelor thesis of Sven Demandt (together with Tim Kampowski, first examiner: Prof. Heike Beismann, second examiner: Prof. Thomas Speck).
- "Funktionsmorphologie, Kinematik und Biomechanik der Schnappfallen von *Dionaea muscipula* Sol. ex J.Ellis". Bachelor thesis of Nils Vasic (together with Anna Westermeier, first examiner: Prof. Heike Beismann, second examiner: Prof. Thomas Speck).
- "Beutefang bei *Utricularia australis*: Fanganalysen und funktionsmorphologische Untersuchungen". Bachelor thesis of Lars Erik Daber (together with Anna Westermeier).
- "Kinematik und funktionelle Morphologie der Falle von *Aldrovanda vesiculosa*". Bachelor thesis of Philipp Vögele (together with Anna Westermeier).
- "Die hygroskopische Bewegung des Zapfens von *Cupressus sempervirens* L.". Bachelor thesis of Paulina Staus (together with Friederike Gallenmüller).

- 2015: "Kinematics of planar, curved and corrugated plant surfaces as concept generators for deployable systems in architecture". PhD thesis of Anna Westermeier (finished 2020).
- "Trap movement and fluid dynamics in Lentibulariaceae". Master thesis of Anna Westermeier.
- "Analyse der Funktionsmorphologie der Zapfen von *Cupressus sempervirens*". State examination thesis of Irina Butschek (together with Friederike Gallenmüller).
- 2014: "Funktionsmorphologie und Biomechanik von *Monophyllaea horsfieldii*". Bachelor thesis of Max Mylo (together with Tim Kampowski).
- "Hygroskopische Bewegung des Zypressenzapfens". Bachelor thesis of Ann-Christine Dömeland (together with Friederike Gallenmüller).
- "Funktionsmorphologie und Biomechanik von Laubmoos-Peristomen". Bachelor thesis of Max Langer (together with Friederike Gallenmüller).
- "Hygroskopische Bewegungen bei Kiefernzapfen". Bachelor thesis of Fabio Salvatore Aleo Horcas.
- "Funktionsmorphologische und biomechanische Untersuchung der Saugstrukturen des Medizinischen Blutegels *Hirudo verbana*". Bachelor thesis of Laura Eberhard (together with Friederike Gallenmüller and Tim Kampowski).
- 2013: "Fächerübergreifender Kompetenzerwerb in der Biomechanik: Wie fleischfressende Pflanzen ihre Beute überlisten – mechanische Tricks von grünen Fallenstellern". State examination thesis of Amélie Metzger (together with Olga Speck).
- "Der Öffnungsmechanismus der Samenkapsel von *Hamamelis mollis*". Internship of Anne-Sophie Böse (together with Robin Seidel).
- "Qualitative und quantitative Analyse der Saughaftvorgänge beim Medizinischen Blutegel (*Hirudo medicinalis*, Hirudidae)". Master thesis of Tim Kampowski (together with Friederike Gallenmüller).
- "Funktionelle Morphologie und Beutefang der karnivoren Gleitfallenpflanze *Cephalotus follicularis*". Bachelor thesis of Lukas Walter (together with Holger Bohn).
- "Biomechanik und funktionelle Morphologie ausgewählter, nicht-aquatischer Wasserschlaucharten (*Utricularia* spp.)". Bachelor thesis of Anna Westermeier (together with Tom Masselter).
- 2012: "Das Peristom der fleischfressenden Pflanze *Cephalotus follicularis*: Eine konvergente Struktur zum Fang von Ameisen?". Bachelor thesis of Jörg Hanisch (together with Holger Bohn).
- 2011: "Das Sporangium von *Adiantum peruvianum* (Pteridaceae) – Biomechanik und Funktionsmorphologie eines ultraschnellen Sporenausbreitungsapparates". Bachelor thesis of Markus Warnke (together with Tom Masselter).
- "Biomechanik und Funktionsmorphologie der Saugfalle von *Utricularia* - ein Beispiel für ultraschnelle Bewegungen im Pflanzenreich". Diploma thesis of Carmen Weißkopf (together with Tom Masselter).
- 2009: "Beutefang bei *Utricularia vulgaris*". Internship by Leo Kunz (together with Tom Masselter).

Memberships

- Botanical Society of America (BSA)
- Deutsche Gesellschaft für fleischfressende Pflanzen (GFP)
- Deutsche Kakteen-Gesellschaft (DKG)
- Deutsche Orchideen-Gesellschaft (DOG)
- Freundeskreis Botanische Gärten Bonn
- International Carnivorous Plant Society (ICPS)
- Society for Experimental Biology (SEB)

Further activities

- Since 2009: Guide for the Botanic Garden of Freiburg.
- 2005-2009: Guide for the “Bonn Botanisch Führungsservice” in the Botanic Gardens of Bonn.
- 2004: Six weeks of volunteering (reforestation and environmental education) at the “La Hesperia” biological station in Ecuador (supported by Inwent gGmbH).
- 2002-2007: Student assistant at the Nees Institute for Biodiversity of Plants (University of Bonn).
- 1999-2000: Civilian service, Büro für Natur- und Umweltschutz, Sankt Augustin, Germany.