

Leif Schulman, Curriculum Vitae



1. PERSONAL DETAILS

Name SCHULMAN, Leif Edvard
Place and date of birth Espoo, Finland, November 21, 1968
Family Married to Dr. Maria Hällfors, one son born 2016; four children from previous marriage (born -97, -99, -00 and -03)
Contact information Finnish Museum of Natural History
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2. CURRENT POSITION

Director, Finnish Museum of Natural History, University of Helsinki; since 03/2010. Duties: Responsible of the operation of the institution and of its development, resources (c. 140 staff, 11.5 M€ annual budget, and collections of 13.5 million specimens), and relations to the Finnish society and the international community of sister institutions; scientific research and teaching.

3. EDUCATION AND TRAINING

Education

Matriculation examination, Espoonlahti High School, May 1987

Bachelor of Science, BSc, University of Helsinki, May 1996

Master of Science, MSc, University of Helsinki, September 1997

Doctor of Philosophy, PhD, University of Turku, December 2003

Training in leadership, management, administration: 160+ h, Univ. Hels. staff training, 2001–2016

Language skills

Finnish (school, education, working, and second home language); Swedish (mother tongue, home language and third working language), English (second working and education language), Spanish (fair), German, Portuguese (basics), Norwegian, Danish (good comprehension)

4. PREVIOUS APPOINTMENTS

Director of the Botanic Garden and Herbarium, Finnish Museum of Natural History, University of Helsinki; 09/2009–02/2010.

Director of the Botanic Garden, Finnish Museum of Natural History, University of Helsinki; 08/2005–08/2009; Acting Director of the Botanic Garden; 01/2004–07/2005

Curator, Helsinki University Botanic Garden, 03/2001–07/2005.

Research Assistant, 11/1997–02/2001, and Researcher, 10/2001–09/2002, Dpt. of Biology, Univ. Turku.

Consultant (specialist on *ex situ* conservation, botanical collections and repatriation of biodiversity data), Biota-BD Ltd, 05/1999–11/2000, in the project *Programa Ambiental Nicaragua-Finlandia, Proyecto Apoyo a las Areas Protegidas y la Biodiversidad*.

Researcher, Univ. Helsinki, Dpt. of Ecology and Systematics, 12/1995–05/1997, and Consultant, Metsähallitus Consulting, 12/1997–12/1998, in the project *Trees of Amani Nature Reserve, NE Tanzania – a Field Guide*.

Assistant lecturer, Univ. Helsinki, Dpt. of Ecology and Systematics, 1995, 32h; 1997, 274h; 1999, 91h

Translator (Finnish and Swedish to English; Swedish to Finnish) and writer, 05–11/1995, and Editor and Team Coordinator, 05–10/1996, in the project *CD-flora II, and interactive electronic publication on Finnish plants*. Rec Button Ltd.

Various short- and part-time jobs as translator, nature guide, lab assistant, scale model constructor, security guard, substitute teacher, construction worker, farm worker, and shop assistant 1987-1994.

5. MAJOR MANAGERIAL POSITIONS, POSITIONS OF TRUST, AND EXPERT DUTIES (LAST 10 YEARS)

Coordinator, EC H2020 INFRADEV -funded project 'Innovation and Consolidation for Large-scale Digitisation of Natural Heritage ICEDIG' (3 M€, 2018–2020, 12 European partners; www.icedig.eu).

Convener and Chair, International Seminar 'Finnish Biodiversity Information for the Benefit of Society', University of Helsinki Main Hall, Helsinki, Finland, 2017

Head of Organising Team, 24th Governing Board Meeting of the Global Biodiversity Information Facility (GBIF GB24, Helsinki, Finland, September 24–29, 2017), 2016–17

Member, National IPBES Panel of Finland, Ministry of the Environment, 2015–2018, 2019–2022

Member of Steering Group, the ENVIBASE project, Ministry of the Environment, 2015–2017

Member of Working Group for the development of a national museum policy, Ministry of Education and Culture, 2015–2016

Member of Steering Group, University of Helsinki Global South (HUGS) network (Univ. Helsinki) 2013–2016

Member of Working Group analyzing the future of the Museums of the University of Helsinki appointed by the Rector (Univ. Helsinki) 2012–2013

Member of Working Group analyzing the future of the Agricultural Museum of the University of Helsinki appointed by the Rector (Univ. Helsinki) 2011–2012

Trustee, WWF Finland Board of Trustees, 07/2011–06/2014 and 07/2014–06/2017

Member, leading group of the National Digital Library, Ministry of Education, 03/2011–

Member of Steering Group of the European Social Fund and European Regional Development Fund projects funding the Finnish Digitisation Centre for Natural History Collections DIGITARIUM, 2010–2013

Member, working group on the promotion of the realisation and follow-up of Finland's biodiversity strategy and action plan, Ministry of the Environment, 03/2010–2016 and 2017–2021 [Suomen luonnon monimuotoisuuden suojelun ja kestävän käytön kansallisen strategian ja toimintaohjelman toteutusta ja seurantaa edistävä työryhmä]

Head of Delegation (Finland) to the Governing Board of the Global Biodiversity Information Facility (GBIF), Min. Education, 03/2010–

Member of Advisory Board of Taita Research Station, Kenya (Univ. Helsinki) 2010–13, 2014–16, 2017–

Chair of Leading Group, Radiocarbon Analytics Finland RACAF (Univ. Helsinki), 2010–

Member of Steering Group, Development of a National Action Plan on Species Conservation, Ministry of the Environment, 2010–11 [Lajisuojelun valtakunnallinen toimintaohjelma –hankkeen ohjausryhmä]

Guest Editor, Biodiversity and Conservation, Special Issue 'EuroGardV' 2009–10

Invited expert, seminar 'Genetic resources in international negotiations and the new ABS regime 2010', presentation on the IPEN system of botanic gardens, Min. Env., 03/2009

Solicited expert commentary on the draft of *Appendix 3 (A progress towards targets of the Global Strategy for Plant Conservation GSPC) of the fourth national report to the COP of the CBD* by the Finnish Environment Institute SYKE, 03/2009

Invited Standing Expert in Steering Committee of the preparation of a national strategy and action plan on invasive alien species, the Ministry of Agriculture and Forestry, 2008–11

Co-leader of private-public research and product development project (Univ. Helsinki and Luontoportti Ltd.), 2008–10

Member of Working Group for Strategy Development (Univ. Helsinki, Finnish Mus. of Natural History), 2007–08

Invited expert (*ex situ* conservation and conservation of genetic resources), development project of nature conservation [luonnonsuojelun tuottavuushanke], Finnish Environment Institute SYKE, 2007–08

Invited expert, International architects' workshop-competition "Botanic Garden in Riga future visions", invitation by University of Latvia on the recommendation of BGCI, 09/2007

Member of Steering Committee of the planning process of the general plan for the Kaisaniemi Park [asemakaavatasoinen yleissuunnitelma], City of Helsinki Planning Department, 2007

Chair of Scientific Committee, EuroGard V – the Fifth European Botanic Gardens Congress, 2006–09

Chair of Organising Committee, EuroGard V – the Fifth European Botanic Gardens Congress, 2006–09

Invited expert, working group for the development of the Korkeasaari Zoo (City of Helsinki), 2006–07

Member of European Consortium of Botanic Gardens, elected national representative of Finland, 2005–11

Vice chairman and representative of the University of Helsinki, consultative committee of the Korkeasaari Zoo (City of Helsinki) 2005–07, 2008–10

Deputy Member of the Plant Variety Board of Finland, expert on garden plants (Ministry of Agriculture and Forestry), 2001–04 and 2004–07

Peer Reviewer for, *inter alia*: Biodiversity and Conservation, Biological Conservation, Brittonia, Cladistics, Diversity and Distributions, Ecography, Ecosystem Services, Environmental Conservation, Global Change Biology, Journal of Biogeography, Monographs in Systematic Botany from the Missouri Botanical Garden, Nordic Journal of Botany, Novon, Phytotaxa, Plant Systematics and Evolution, Scientific Reports

6. INTERNATIONAL EXPERIENCE

Studies abroad: University of Edinburgh, UK, academic year 1992–93.

Major field work, professional excursions, research visits, and courses abroad: 1992 California, USA, 4 weeks; 1993 Northern Fennoscandia, 2 weeks; 1995 Tanzania, 6 weeks; 1996 Tanzania, 6 weeks; London, UK, 2 weeks; 1998 Peru, 8 weeks; 2002 London, UK, 1 week; 2003 Sweden, 1 week; 2006 Lithuania, Latvia, and Estonia, 1 week; 2007 St. Louis, USA, 1 week; 2011 Kenya, 2 weeks; 2012 and 2013 Northern Norway, 1.5 weeks; 2017 Kenya, 1½ weeks, Kenya, 1 week.

Consultancy assignments abroad: 1999 Nicaragua, 3 weeks; St. Louis, USA, 1 week; 2000 Nicaragua, 2 weeks + 1 week; 2007 Riga, Latvia, 3 days

International congresses and meetings attended (last 10 years)

2008 Cooperation between botanic gardens of the Baltic Sea Region, planning meeting, Visby, Sweden; Annual meeting of ENSCONET, Las Palmas de Gran Canaria; Meeting of the European Botanic Gardens Consortium, Delft, the Netherlands; 2nd World Botanic Gardens Scientific Congress "Challenges in Botanical Research and Climate Change", Delft, the Netherlands (2nd moderator of concluding session); Cooperation between botanic gardens of the Baltic Sea Region, 1st congress, Visby, Sweden (chair of concluding session); Meeting of the European Botanic Gardens Consortium, Bordeaux, France. 2009 Meeting of the European Botanic Gardens Consortium, Helsinki, Finland (chair of organizing committee, chair of meeting); EuroGard V, 5th European botanic gardens congress, Helsinki, Finland (chair of organizing committee, chair of scientific committee, three oral presentations, one poster, chair of several sessions, co-organiser of one workshop); Cooperation between botanical gardens in the Baltic Sea Region, the 2nd international conference, Vilnius, Lithuania (chair of one session, moderator and chair of closing discussion); Plant conservation for the next decade: a celebration of Kew's 250th anniversary and Workshop reviewing phase 1 of the Millennium Seed Bank Partnership, London, UK. 2010 4th Global Botanic Gardens Congress, Dublin, Ireland (co-author of two oral and two poster presentations, session chair); 17th Meeting of the GBIF Governing Board, Suwon, Republic of Korea (Head of Delegation of Finland); Meeting of the European Botanic Gardens Consortium, Palermo, Italy. 2011 Opening of Helsinki University's Taita Research Station, Taita Hills, Kenya (oral presentation); HENVI Science Days on Interdisciplinary Environmental Research and Teaching: Why does society need environmental research?, Helsinki, Finland; Nordic Arboretum Committee Symposium: Effective use of woody plant collections for northern areas, St. Petersburg, Russia; XVIII International Botanical Congress IBC 2011, Melbourne, Australia (oral presentation); 18th Meeting of the GBIF Governing Board, Buenos Aires, Argentina; Meeting of the European Botanic Gardens Consortium, Meise, Belgium. 2012 Sixth European Botanic Gardens Congress – EuroGard VI, Chios, Greece (two oral presentations, two co-authorships of oral presentations, session chair, closing discussion panelist); 19th Meeting of the GBIF Governing Board, Lillehammer, Norway. 2013 33rd General Meeting of CETAF, Berlin, Germany; 34th General Meeting of CETAF, Edinburgh, UK; 20th Meeting of the GBIF Governing Board, Berlin, Germany. 2014 35th General Meeting of CETAF, Oslo, Norway; Baltic botanic gardens congress, Uppsala, Sweden; 21st Meeting of the GBIF Governing Board, New Delhi, India; 36th General Meeting of CETAF, Vienna, Austria. 2015 Swedish ArtDatabanken, cooperation excursion, Uppsala, Sweden; 27th International Conference for Conservation Biology/4th European Congress for Conservation Biology ICCB-ECCB 2015, Montpellier, France; 22nd Meeting of the GBIF Governing Board, Antananarivo, Madagascar; 38th General Meeting of CETAF, Geneva, Switzerland. 2016 23rd Meeting of the GBIF Governing Board, Brasilia, Brazil; Cooperation negotiations with National Museums of Kenya and visit to Taita Research Station, Nairobi and Wundanyi, Kenya. 2017 Field course on the nature and society of Kenya (upper secondary school level); 41st General Meeting of CETAF, Bonn, Germany; DiSSCo Connect meeting, Leiden, the Netherlands; 42nd General Meeting of CETAF, Heraklion, Greece; 24th Meeting of the GBIF Governing Board, Helsinki, Finland (organiser). 2018 Kick-off meeting of the project ICEDIG, Montpellier, France (Chair); DiSSCo Align meeting, Leiden, the Netherlands, Jan 19 (oral presentation); 5th European Congress of Conservation Biology, Jyväskylä, Finland, June 12–15 (oral presentation and poster); CETAF 43rd General Meeting, London, UK, April 25–26; 4th International Conference on Research Infrastructure, Vienna, Austria, Sep 12–14; ICEDIG Executive Board meeting, London, UK, Sep 20 (Chair); 25th Meeting of the GBIF Governing Board, Kilkenny, Ireland, Oct 15–18; CETAF 44th General Meeting and COST Action MOBILISE align meeting, Bratislava, Slovakia; ICEDIG General Assembly and EEAB meeting, Meise, Belgium, Dec 4 (Chair)

7. MAJOR GRANTS AND ALLOCATIONS RECEIVED

As PI (11.56 M€ in total)

482 000 €, 2007-09, for Kumpula Botanic Garden Opening Project (Univ. Helsinki, Biol. Soc. Vanamo)

83 000 €, 2008-09, for EuroGard V – fifth European Botanic Gardens Congress: Botanic Gardens in the Age of Climate Change (the Federation of Finnish Learned Societies, Valdemar von Frenkell's foundation,

- Maj and Tor Nessling's foundation, Min. Env., Univ. Helsinki, Corporate sponsors; applications partly with Dr. Susanna Lehvavirta)
- 210 000 €, 2008-10, Development and botanical content production of the NatureGate® web portal (www.naturegate.fi), public-private R&D cooperation agreement between Univ. Helsinki and Luontoportti Ltd. (Univ. Helsinki)
- 860 000 €, 2012-2014, 'Changes in the air' – a scientific exhibition on the changing climate and its effects on nature. (500 k€ as exhibition objects, 360 k€ monetary; various foundations and private donors)
- 2 185 000 €, 2015-2017, Finnish Biodiversity Information Facility (FinBIF) [Suomen lajitietokeskus], a national scientific infrastructure for the collation and distribution of occurrence data on species (part of the Envibase project with a total external funding of c. 6.52 M€ coordinated by the Finnish Environment Institute SYKE, PI. (Ministry of Finance)
- 1 417 000 €, 2015-2017 (PI of consortium, own institutional share 375 000 €), Finnish Biodiversity Information Facility (FinBIF) [Suomen lajitietokeskus], development project for accelerating the digitisation, generation, mobilisation, collation, standardisation, and open-access distribution and utilisation of biodiversity data. (Academy of Finland)
- 50 000 €, 2017, Helsinki Institute of Life Science HiLIFE, for the development of the Research Infrastructure Platform 'Helsinki University Biodiversity Collections Research Infrastructure HUBCRI' (Consortium PI with PIs of partial projects Aino Juslén, Marko Hyvärinen, Gunilla Ståhls-Mäkelä, Arto Luttinen, and Kaarina Sivonen).
- 50 000 €, 2017, University of Helsinki strategic funds, for the development of the e-learning environment 'Pinkka' to support various image-based studies in life and geo sciences (Consortium PI, partners include Faculties of Biological and Environmental Sciences, Agriculture and Forestry, and Veterinary Medicine).
- 450 000 €, 2018–2020, Helsinki Institute of Life Science HiLIFE, allocated based on international evaluation and user survey for the development of the Research Infrastructure Platform 'Helsinki University Biodiversity Collections Research Infrastructure HUBCRI' (Consortium PI with PIs of partial projects Aino Juslén, Marko Hyvärinen, Gunilla Ståhls-Mäkelä, Arto Luttinen, and Kaarina Sivonen)
- 3 000 000 €, 2018-2020, Innovation and Consolidation for Large Scale Digitisation of Natural Heritage (ICEDIG), as PI but with Dr. Hannu Saarenmaa as lead author and contributions from teams of 11 European partner organisations (own institutional share of budget 532 000 €). (H2020, Call INFRADEV-2016-2017)
- 2 755 000 €, 2019–2022 (PI of consortium, own institutional share 1 787 000 €), FinBIF 2.0 – Second Construction Cycle of the Finnish Biodiversity Information Facility [FinBIF 2.0 – Suomen Lajitietokeskuksen toinen kehityssykli], development project for accelerating the digitisation, generation, mobilisation, collation, standardisation, and open-access distribution and utilisation of biodiversity data. (Academy of Finland)

As member of group (12.1 M€ in total)

- 35 000 €, 2007-09, European Native Seed Conservation Network ENSCONET (European Community FP6; member of large consortium)
- 600 000 €, 2011, Helsinki University Centre for Environment HENVI; Enhancing Sustainable Urban Development through Ecosystem Services - ENSURE. (funding for partial project run by FMNH 318 000 €, member of group with Dr. S. Lehvavirta as PI)
- 70 000 €, 2011, World Design Capital Helsinki 2012; Fifth Dimension – Green Roofs in Urban Areas. (member of group with Dr. S. Lehvavirta as PI)
- 50 000 €, 2012, For the development of a national portal for invasive alien species data management, member of group with H. Koivula as project leader. (Min. Agr. For.)
- 708 000 €, 2012–2017, Ex situ Conservation of Finnish Native Plant Species ESCAPE, member of group with Dr. M. Hyvärinen as project leader. (EU Life+)
- 575 000 €, 2012–2016, Constraints and Opportunities of Assisted Dispersal of Plants in Climate Change Adaptation – biological, legal and ethical analyses (CO-ADAPT), member of group with Dr. S. Lehvavirta as PI. (Academy of Finland)
- 10 000 000 €, 2019–2022, Synthesis of systematic resources – SYNTHESYS PLUS, member of consortium of 32 partner organisations with Dr. V. Smith (NHM London) as PI, own institutional share 485 000 €. (EU H2020)

8. GRANTS AND AWARDS NOT APPLIED FOR

Personal

Stipend for further studies (1 000 FIM = c. 170 €, awarded to the two highest-graded diplomas of Espoonlahti secondary school), Yrjö Jahnsson's Foundation, May 31 1984
 Stipend for further studies (3 000 FIM = c. 500 €, awarded to Espoonlahti High School matriculation diplomas with all six subjects graded *laudatur*), Yrjö Jahnsson's Foundation, May 30 1987
 Stipend for University Student (2 500 FIM = c. 420 €), Memorial Fund for Isabella von Schulmann and Sons [Isabella von Schulmannin ja poikain muistorahasto], 09/1992
 Master's Thesis Prize of the Faculty of Science, University of Helsinki, awarded to theses receiving the highest possible grade (1 500 FIM = c. 250 €), 02/1998
 The Biodiversity Award 2000 [Biodiversiteettiteko 2000 -palkinto], awarded by the Finnish Biodiversity Research Programme FIBRE to promote popular scientific outreach of biodiversity scientists (15 000 FIM = c. 2 500 €, received on account of biodiversity related lectures at schools and public events and of a newspaper article), 01/2001
 The title of Professor in connection with the position of Director for the Finnish Museum of Natural History, conferred by the Chancellor of the University of Helsinki, April 15, 2013

Institutional during my leadership

Honourable Mention in the 'Landscaping Project of the Year' competition to Kumpula Botanic Garden, awarded by Rakennustuoteteollisuus RTT and Puutarhaliitto. 10/2009
 Best Family Resort in the 'Best of Helsinki Awards' competition: the Natural History Museum. 11/2011
 The Environment Prize awarded by the Finnish Association for Nature Conservation to the Finnish Museum of Natural History. 07/2012
 LYKE certificate for excellence in environmental education. 08/2013
 The Sokrates Prize 2014 awarded by Skepsis ry to the Natural History Museum (an annual award for furthering rational thinking and the status of scientific knowledge). 04/2014
 'Siilin Peukku' Prize awarded to the Finnish Museum of Natural History by the Finnish Nature League – Luonto-Liitto (awarded for meritorious work in favour of the environment). 04/2016

9. PUBLIC APPEARANCES

Invited Speaker (60 in total): 31 scientific or professional presentations; 9 popular-scientific presentations; 20 prepared statements or participations in panel discussions or press conferences
 Interviewee (182 in total): 92 in printed media; 44 on radio; 46 on TV or the Internet

10. SUMMARY OF PROFESSIONAL PRODUCTIVITY

A total of 235 professional contributions, consisting of:

- 23 refereed papers in scientific journals, books, or conference proceedings
- 52 unrefereed scientific or professional papers, notes, or editorials
- 41 popular articles, newspaper articles, notes and editorials targeted at a broad audience
- 8 scientific monographs, authored or edited (incl. Bachelor's, Master's and PhD theses)
- 17 professional or popular monographs and hand or guide books
- 4 ICT programs or applications
- 35 congress abstracts
- 31 invited oral presentations without published abstracts
- 15 solicited unpublished reports
- 9 exhibitions

Citation data from Google Scholar (March 13, 2019): h-index 14, total citations 1042 (five most cited papers with 346, 155, 103, 96, and 54 citations).

11. TEACHING EXPERIENCE

Field and lab classes, workshops: *Field course in Ecology* (Univ. Helsinki, 1995, 32 h); *Introduction to botany and mycology* (Univ. Helsinki, 1997, 64 h; 2008, 5 h); *Seed plant systematics* (Univ. Helsinki, 1997, 210 h; 1999 50 h); *Open-air economic plants, demonstrations and examination* (Univ. Helsinki, 2004-); *Growing Season – workshop in environmental arts* (Univ. Industrial Arts & Univ. Helsinki, 2008-09); *Nature and Society of Kenya* (Olari and Tapiola Upper Secondary Schools, 2016–17)

Lectures: *Seed plant systematics* (Univ. Helsinki, 1999, 66 h; Open University, 2004, 8 h); *Ecology and biogeography of Amazonia* (Univ. Helsinki, 1999, 18 h); *Identification of tropical plant families* (Univ. Turku, 2000, 8 h); *Natural history collections* (Univ. Helsinki, 2005, 9 h; 2006, 9 h); *Botanic Gardens from A to Z* (Univ. Helsinki, 2009, 20 h); guest lectures on several courses over the years

Personnel training: *Courses for botanic garden guides* (Univ. Helsinki Botanic Garden, 2001, 2002, 2004, 2005, 2008)

Supervision of Master's theses (9 in total): Matti Leisti 1999 (Faculty of Science, Univ. Turku), Johanna Kolehmainen 2000 (Faculty of Science, Univ. Helsinki), Kari Lahti 2001 (Faculty of Science, Univ. Helsinki), Iiris Koivula 2003-06, (Dpt. of Architecture, landscape architecture, Helsinki Univ. Technology), Raisa Ilmanen 2005 (Faculty of Science, Univ. Turku), Kiira Nordqvist 2005-06 (Faculty of Biosciences, Univ. Helsinki), Mari Miranto 2006 (Faculty of Biosciences, Univ. Helsinki), Outi Lähteenoja 2007 (Faculty of Biosciences, Univ. Helsinki), Maria Hällfors 2009-10 (Faculty of Biosciences, Univ. Helsinki)

Supervision of PhD theses: Outi Lähteenoja 2007–2011 (Faculty of Science, Univ. Turku), *Carbon Dynamics and Ecosystem Diversity of Amazonian Peatlands* (with Kalle Ruokolainen; Accepted with Honours). Teija Alanko 2007–09 + 2012–2017 (Faculty of Biosciences, Univ. Helsinki), *Cloister, manor and botanic gardens in medieval and early modern Finland and Sweden – an archaeobotanical approach to garden history* (with Terttu Lempiäinen and Teija Alenius).

Leif Schulman Publications and Other Production

1. REFEREED JOURNAL ARTICLES (CLASS A1 ACCORDING TO THE PUBLICATION TYPE CLASSIFICATION OF THE FINNISH MINISTRY OF EDUCATION, SCIENCE AND CULTURE)
 - 1.1. Alm, J., Schulman, L., Silvola, J., Walden, J., Nykänen, H. & Martikainen, P. J. 1999: Carbon balance of a boreal bog during a year with an exceptionally dry summer. — *Ecology*, 80(1):161–174
 - 1.2. Schulman, L., Ruokolainen, K. & Tuomisto, H. 1999: Parameters for global ecosystem models — *Nature*, 399:535–536.
 - 1.3. Schulman, L. 2003: A geo-ecologically specialised new species of *Adelobotrys* (Melastomataceae: Merianieae) from Peruvian Amazonia — *Kew Bulletin*, 58:459–466.
 - 1.4. Schulman, L. & Hyvönen, J. 2003: A cladistic analysis of *Adelobotrys* (Melastomataceae) based on morphology, with notes on generic limits within the tribe Merianieae — *Systematic Botany*, 28:738–756.
 - 1.5. Schulman, L., Koivunen, H. & Ruokolainen, K. 2004: Spatio-ecological Niche Segregation of Two Sympatric Species of *Clidemia* (Melastomataceae) in Western Amazonian Non-flooded Rainforests — *Folia Geobotanica*, 39:143–160.
 - 1.6. Schulman, L., Toivonen, T. & Ruokolainen, K. 2007: Analysing botanical collecting effort in Amazonia and correcting for it in species range estimation. *Journal of Biogeography*. 34: 1388–1399.
 - 1.7. Schulman, L. 2008: *Adelobotrys atlantica* (Melastomataceae: Merianieae): the first species of *Adelobotrys* from Brazil's Mata Atlântica. *Kew Bulletin* 63(3):457–461.
 - 1.8. Lähteenoja, O., Ruokolainen, K., Schulman, L. & Oinonen, M. 2009: Amazonian peatlands: an ignored C sink and potential source. *Global Change Biology* 15:2311–2320.
 - 1.9. Lähteenoja, O., Ruokolainen, K., Schulman, L. & Álvarez Alonso, J. 2009: Amazonian floodplains harbour minerotrophic and ombrotrophic peatlands. *Catena* 79:140–145.
 - 1.10. Hällfors, M., Lindén, L., Rita, H. & Schulman, L. 2011: Using a botanic garden collection to test a bioclimatic hypothesis. *Biodiversity and Conservation* 20(2):259–275, DOI 10.1007/s10531-010-9976-9.
 - 1.11. Miranto, M., Hyvärinen, M., Hiltunen, R. & Schulman, L. 2012: Ex situ conservation of threatened native plants in Finland: analysis of the current status. *Endangered Species Research* 17:227–236, DOI 10.3354/esr00432.
 - 1.12. Hällfors, M.H., Vaara, E.M., Hyvärinen, M., Oksanen, M., Schulman, L., Siipi, H. & Lehvävirta, S. 2014: Coming to terms with the concept of moving species threatened by climate change - a systematic review of terminology and definitions. *PLOS ONE* 9(7): e102979. DOI:10.1371/journal.pone.0102979.
 - 1.13. Ahteensuu, M.T., Aikio, S., Cardoso, P., Hyvärinen, M., Hällfors, M., Lehvävirta, S., Schulman, L. & Vaara, E. 2015: Quantitative tools and simultaneous actions needed for species conservation under climate change - Reply to Shoo et al. (2013). *Climatic Change*, published online 23 January 2015, DOI: 10.1007/s10584-014-1311-0
 - 1.14. Alanko, T.I., Oinonen, M. & Schulman, L. 2015: Plant remains from the early modern garden of the manor of Kumpula, Helsinki, Finland - alternative sampling method for macrofossil analysis. *Vegetation History and Archaeobotany* 24(5):571–585 (published online 10 February 2015, DOI: 10.1007/S00334-015-0517-Z).
 - 1.15. Schulman, L.E. & Ruokolainen, K. 2015: *Adelobotrys tessmannii* (Merianieae, Melastomataceae) and allies: a refined circumscription and description of two new Amazonian species with notes on their ecology. *Phytotaxa* 234(2):101–120. DOI: <http://dx.doi.org/10.11646/phytotaxa.234.2.1>
 - 1.16. Hällfors, M.H., Aikio, S. & Schulman, L.E. 2017: Quantifying the need and potential of assisted migration. *Biological Conservation* 205:34–41. DOI: <http://dx.doi.org/10.1016/j.biocon.2016.11.023>
 - 1.17. Dillen, M., Groom, Q., Chagnoux, S., Güntsch, A., Hardisty, A., Haston, E., Livermore, L., Runnel, V., Schulman, L., Willemse, L., Wu, Z. & Phillips, S. 2019: A benchmark dataset of herbarium specimen images with label data. *Biodiversity Data Journal* 7: e31817. <https://doi.org/10.3897/BDJ.7.e31817>
2. REFEREED REVIEWS IN SCIENTIFIC JOURNALS (CLASS A2)

- 2.1. Schulman, L. 2003: Nature conservation in Amazonia: the role of biological theory in reserve delimitation. — *Lyonia - a journal of ecology and application* (<http://www.lyonia.org>), 5(1):91–100.
- 2.2. Schulman, L., Ruokolainen, K., Junikka, L., Sääksjärvi, I. E., Salo, M., Juvonen, S.-K., Salo, J. & Higgins, M. 2007: Amazonian biodiversity and protected areas: do they meet? *Biodiversity and Conservation* 16: 3011-3051.
3. REFEREED CONTRIBUTION TO BOOK OR OTHER COMPILATION (CLASS A3)
 - 3.1. Hällfors, M.H., Vaara, E.M., Ahteensuu, M., Kokko, K.T., Oksanen, M. & Schulman, L. 2017: Assisted migration as a conservation approach under climate change. Pp. 301–305 in Dominick A. DellaSala and Michael I. Goldstein (eds.) *The Encyclopedia of the Anthropocene*, vol.2. Oxford: Elsevier. DOI: 10.1016/B978-0-12-409548-9.09750-5
4. ARTICLES IN REFEREED CONGRESS PROCEEDINGS (CLASS A4)
 - 4.1. Schulman, L. 2002: Conservación de la naturaleza en la Amazonía: El rol de la teoría biológica en la delimitación de las reservas. — Pp. 501–508 in Bussmann, R. W. & Lange, S. (Eds.), *Conservación de la biodiversidad en los Andes y la Amazonía, memorias del primer congreso de biodiversidad, 24 a 28 Setiembre de 2001, Cusco, Perú* (Conservation of biodiversity in the Andes and the Amazon, Proceedings of the first international congress of biodiversity). Inka e.V., München. ISBN: 3-936425-00-0 (CD-ROM).
 - 4.2. Schulman, L. & Kolehmainen, J. 2004: Saving wild African violets (*Saintpaulia*, Gesneriaceae): a review of ongoing activities and a plan for *ex situ* conservation. Pp. 165–170 in Robbrecht, E. & Bogaerts, A. (Eds.), *EuroGard III, Papers from the Third European Botanic Gardens Congress and the Second European Botanic Gardens Education Congress (BEDUCO II)*. National Botanic Garden of Belgium, Meise (*Scripta Botanica Belgica*, vol. 29).
 - 4.3. Schulman, L., Toivonen, T. & Ruokolainen, K. 2007: Botanical Collecting Effort in Amazonia. Proceedings of the 3rd Global Botanic Gardens Congress, Wuhan, China, April 2007, published online at www.bgci.org/resources/wuhan/ (http://www.bgci.org/files/Wuhan/PapersUD/Schulman_Amazonia.pdf).
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- 13.28. Schulman, L. 2014: Johtajan katsaus [Director's overview; in Finnish]. — In Näkki, P. (ed.), *Luomus, Luonnontieteellinen keskusmuseo – vuosi 2013*. — *Luonnontieteellinen keskusmuseo*. Helsinki. E-publication, available at <http://koivu.luomus.fi/julkaisut/vuosikertomukset/2013/>.
- 13.29. Schulman, L. 2015: Ufoja on sittenkin! [There are UFOs after all!; column, in Finnish] — *GEO* [5-6/2015: 97](#)
- 13.30. Schulman, L. 2015: Johtajan katsaus: Käänteentekevä vuosi 2014 [Director's overview: The Revolutionary Year 2014; in Finnish]. — In Näkki, P. (ed.), *Luomus, Luonnontieteellinen keskusmuseo – vuosi 2014*. — *Luonnontieteellinen keskusmuseo* 2015. Helsinki. E-publication, available at <http://koivu.luomus.fi/julkaisut/vuosikertomukset/2014/>.
- 13.31. Sääksjärvi, I. E. & Schulman, L. 2015: Suomen lajitietokeskus palvelee tutkimuksen, opetuksen ja hallinnon tietotarpeita [The Finnish Biodiversity Information Facility serves the needs of reserach, teaching and administration; in Finnish]. – *Turun Sanomat*, 6.8.2015, alio-kirjoitus.
- 13.32. Schulman, L. 2015: Tiikerin kolme mahdollisuutta [The tiger's third chance; column, in Finnish] — *GEO* 11–12/2015: 97
- 13.33. Schulman, L. 2016: Keijupölyä sivistykseen [Civilising fairy dust; column, in Finnish] — *GEO* 5–6/2016: 97
- 13.34. Schulman, L. 2016: Afrikka opettaa [Lessons by Africa; column, in Finnish] — *GEO* 11–12/2016: 97
- 13.35. Schulman, L. 2017: 1 aphorism in Salo, T. (ed.) *Tiedeaporismikirja: Uusia ajatelmia tieteestä* [Science Aphorisms: New Adages about Science; in Finnish]. Into kustannus, Helsinki. 84 pp.
- 13.36. Schulman, L. 2017: Kenia ei jättänyt kylmäksi [Kenya didn't leave us untouched; column, in Finnish] — *GEO* 5–6/2017: 97
- 13.37. Järvi, J., Hiisivuori, L. & Schulman, L. (eds.). 2017. *Vuodet 2015–2016 – Luonnontieteellisen keskusmuseon vuosikertomus*. — Finnish Museum of Natural History. Helsinki. [The years 2015–2016 – the annual report of the FMNH; in Finnish]. E-publ., available at <http://koivu.luomus.fi/julkaisut/vuosikertomukset/2015-2016/>
- 13.38. Schulman, L. 2017: Johtajan katsaus: Luomuksen vuodet 2015 ja 2016: suuria saavutuksia, rajuja leikkauksia [Director's overview: The years 2015 and 2016: great achievements, grave cuts; in Finnish]. — In Järvi, J., Hiisivuori, L. & Schulman, L. (eds.). 2017. *Vuodet 2015–2016 – Luonnontieteellisen keskusmuseon vuosikertomus*. — Finnish Museum of Natural History.

Helsinki. E-publication, available at http://koivu.luomus.fi/julkaisut/vuosikertomukset/2015-2016/johtajan_katsaus/index.html

- 13.39. Schulman, L. 2017: Eliölajien digiloikka [The digileap of species; column, in Finnish] — GEO [11–12/2017: 97](#)
- 13.40. Schulman, L. & Sääksjärvi, I.E. 2018: Ilmastonmuutosta ei saa torjua luonnon kustannuksella – näin on käymässä Suomen metsissä [Climate change should not be mitigated at the expense of nature; in Finnish]. — Helsingin Sanomat, 8.9.2018 (Vieraskynä-palsta). <https://www.hs.fi/mielipide/art-2000005819434.html>
- 13.41. Schulman, L. 2019: Sivistys ei säily sivistymättä, sarjassa 'Puheenvuoro: tieteen puolustaja' Helsingin yliopiston #Siksitiiede-kampanjassa. <https://www.helsinki.fi/fi/uutiset/korkeakoulu-tiedepolitiikka/leif-schulman-sivistys-ei-saily-sivistamatta> [Knowledge is not preserved without education <https://www.helsinki.fi/en/news/higher-education-science-policy/leif-schulman-knowledge-is-not-preserved-without-education>]
14. POPULAR MONOGRAPHS (CLASS E2)
- 14.1. Schulman, L. 2004: Joulunajan kasveja [Yultide plants; in Finnish]. — *Ulmus* nro. 5. Helsinki University Botanic Garden. Yliopistopaino, Pikapaino, Helsinki. 21 pp.
- 14.2. Piirainen, P. & Schulman, L. 2008: Keidas keskellä Helsinkiä - yliopiston kasvitieteellisen puutarhan Kaisaniemen-kokoelmat, osa I. [An oasis in the centre of Helsinki - the University's Botanic Garden's Kaisaniemi collection, Part I; in Finnish] — *Ulmus* 8. Finnish Museum of Natural History, Botanic Garden. Esa Print, Lahti. 60 pp.
- 14.3. Piirainen, P. & Schulman, L. 2008: En oasis i centrum av Helsingfors - universitetets botaniska trädgårds samlingar i Kajsaniemi, del I. [An oasis in the centre of Helsinki - the University's Botanic Garden's Kaisaniemi collection, Part I; translation from Finnish to Swedish Hällfors, M. & Schulman, L.] — *Ulmus* nr. 9. Finnish Museum of Natural History, Botanic Garden. Esa Print, Lahti. 60 pp.
- 14.4. Schulman, L. 2009: Salaatista sasabambuun - Kumpulan kasvitieteellisen puutarhan yleisopas [Visitor's guide to Kumpula Botanic Garden; in Finnish] — *Ulmus* 10. Finnish Museum of Natural History, Botanic Garden. Esa Print. 25 pp.
- 14.5. Schulman, L. 2009: Från lingonris till taigaros - Gumtäkt botaniska trädgård. [Visitor's guide to Kumpula Botanic Garden; translation from Finnish to Swedish Hällfors, M. & Schulman, L.] — *Ulmus* 11. Finnish Museum of Natural History, Botanic Garden. Esa Print. 25 pp.
- 14.6. Schulman, L. 2009: From cloudberry to Amur cherry - Kumpula Botanic Garden. [Visitor's guide to Kumpula Botanic Garden; translation from Finnish to English University of Helsinki Language Services & Schulman, L.] — *Ulmus* 12. Finnish Museum of Natural History, Botanic Garden. Esa Print. 25 pp.
15. THESES (CLASS G)
- 15.1. Schulman, L. 1996: Ombrotrofisten suoekosysteemien CO₂-vaihtodynamiikka [The CO₂ Dynamics of Ombrotrophic Mires; in Finnish]. University of Helsinki, Department of Ecology and Systematics. (G1. Bachelor's Thesis)
- 15.2. Schulman, L. 1997: Carbon dioxide exchange and carbon balance of a boreal bog: exceptional results in a year with a dry growing season. University of Helsinki, Department of Ecology and Systematics. (G2. Master's Thesis)
- 15.3. Schulman, L. 2003: Taxonomy, chorology, speciation, and conservation in a heterogeneous Amazonia: case-studies in the flowering-plant family Melastomataceae. *Annales Universitatis Turkuensis Ser. A II* 171. 37 pp. + 5 reprints, 145 pp. in total. (G4. Doctoral Dissertation)
16. ICT PROGRAMS OR APPLICATIONS (CLASS I2)
- 16.1. Schulman, L. & Lahti, K. (Eds.) 1996: CD-Flora II, an interactive electronic publication on Finnish plants (in Finnish, Swedish, and English). — Rec Button Oy, Helsinki. 600 MB.
- 16.2. Schulman, L., Rueda, R. et al. 2000: La Base de Datos Botánica de Nicaragua [A plant database for Nicaragua; in Spanish]. MARENA & PANIF-APB, Nicaragua. MS-Access based relational database. (Design of structure and functions, supervision of programming).

- 16.3. Lipponen, V. & Schulman, L. 2005: T-Puska, tieteellisille puutarhoille suunniteltu kasvitietokanta [T-Bush, a plant database designed for scientific gardens; in Finnish]. Helsinki University Botanic Garden. MS-Access based relational database.
 - 16.4. Schulman, L. (project PI), Juslén, A. & Lahti, K. with numerous other specialist contributors and IT-developers. Operational since 12/2016, continuously up-dated: Finnish Biodiversity Information facility FinBIF at www.laji.fi
17. CONGRESS ABSTRACTS (NOT CLASSIFIED)
- 17.1. Schulman, L. & Junikka, L. 1997: A field guide to East Usambara trees. — Pp. 24–25 in Nummelin, M. (Ed.), International conference on the Eastern Arc Mountains, 1–5 December 1997, Morogoro, Tanzania; Abstracts.
 - 17.2. Schulman, L. 1998: The role of ecological determinants in the evolution of *Adelobotrys* DC. (Melastomataceae). — In Rainforests: Past and Future, an international symposium exploring the historical and ecological determinants of diversity in tropical rainforests, 24–27 April, 1998, Cairns, Australia, organised by Rainforest CRC and STRI.
 - 17.3. Schulman, L. 1999: Ecological specialisation in *Adelobotrys* (Melastomataceae) at different spatial scales in the Neotropics. — In British Ecological Society 1999 Annual Symposium “Ecological Consequences of Habitat Heterogeneity, University of Sussex, UK, 23–25 March 1999.”
 - 17.4. Schulman, L. 1999: Ecological specialisation in *Adelobotrys* (Melastomataceae) at different spatial scales. — In Symposium of Nordic Botanical Research in the Neotropics. University of Turku, Finland, 13.–17. 7. 1999.
 - 17.5. Schulman, L. & Ruokolainen, K. 1999: Habitat Specificity in *Adelobotrys* (Melastomataceae) in the Neotropics and its conservation implications. — Habitat Loss Conference. Espoo, Finland.
 - 17.6. Schulman, L. 2001: Nature conservation in Amazonia: the Role of biological theory in reserve delimitation. — In Volumen de los resúmenes. Conservación de la Biodiversidad en los Andes y la Amazonía. Cusco, Peru, 24.–28. 9. 2001.
 - 17.7. Schulman, L. & Ruokolainen, K. 2002: Plant speciation modes in Amazonia with special reference to the Melastomataceae. — In Plant Species-Level Systematics, Abstracts. Leiden, Netherlands, 13.–15. 11. 2002.
 - 17.8. Schulman, L., Kolehmainen, J. & Watkins, C. 2003: Conservation of African violets (*Saintpaulia*) in and ex situ. P. 47 in J. Rammeloo & A. Bogaerts (Eds.), EuroGard III, third European botanic gardens congress (21–26 July, 2003). Abstracts. BEDUCO II, second European botanic gardens education congress (20–25 July, 2003). Abstracts. Meise, National Botanic Garden of Belgium (*Scripta Botanica Belgica*; Vol. 27).
 - 17.9. Schulman, L. & Miranto, M. 2006: Living collections of botanic gardens as a means of ex situ conservation – a case study on African violets. P. 22 in Hanzelka, P, EuroGard IV Botanic Gardens and the 2010 Challenge, 18th – 22nd September 2006, Prague-Pruhonice – Congress proceedings (Lecture sections).
 - 17.10. Pesu, M. & Schulman, L. 2006: Giant willow re-erected. P. 48 in Hanzelka, P, EuroGard IV Botanic Gardens and the 2010 Challenge, 18th – 22nd September 2006, Prague-Pruhonice – Congress proceedings (Poster section).
 - 17.11. Åhlberg, M. & Schulman, L. 2006: Global ESD innovation in progress: NatureGate(R) in Biodiversity Education. P. 175 in Young, J., Åhlberg, M., Niemelä, N., Parr, T., Pauleit, S., & Watt, A.D. (Eds), Actions for the 2010 biodiversity target in Europe – How does research contribute to halting biodiversity loss? Report of an e-conference (available at [www.edinburgh.ceh.ac.uk/biota/Archive_2010target/ Long%20report_final.pdf](http://www.edinburgh.ceh.ac.uk/biota/Archive_2010target/Long%20report_final.pdf))
 - 17.12. Schulman, L. & Miranto, M. 2007. How valuable are living collections of botanic gardens for ex situ conservation? 3rd Global Botanic Gardens Congress, Wuhan China. (oral presentation)
 - 17.13. Schulman, L., Toivonen, T. & Ruokolainen, K. 2007. Botanical collecting effort in Amazonia. 3rd Global Botanic Gardens Congress, Wuhan China. (oral presentation)
 - 17.14. Junikka, L. & Schulman, L. 2007. New botanic garden in Helsinki. 3rd Global Botanic Gardens Congress, Wuhan China. (poster)
 - 17.15. Schulman, L. & Lehvävirta, S. 2008. EuroGard V - Fifth European Botanic Gardens Congress. P. 109 in Ursem, W.N.J., van den Wollenberg, L.J.W. & Ammann, N.H. (eds.), Second World Scientific Congress: Challenges in Botanical Research and Climate Change 29 June - 4 July 2008. (poster)
 - 17.16. Hyvärinen, M. & Schulman, L. 2008. Luonnonvarojen *ex situ* –suojelu ja VACCIA-projekti [*Ex situ* conservation of natural resources and the VACCIA project; in Finnish]. P. 16 in Veteläinen, M. (ed.),

- Suomen kansallinen kasvigeenivaraohjelma suojelutyön tukena 2003-2008, 5-vuotis juhlaseminaarin esitelmä- ja posteritivistelmät 26.8.2008, jokioinen. MTT:n selvityksiä 165.
- 17.17. Schulman, L. 2009. Kuuden hehtaarin laboratorio – Kumpulan kasvitieteellisen puutarhan uusia kasveja [The six-hectare laboratory - new plants in Kumpula Botanic Garden; in Finnish]. Pp. 22-23 in Anonymous, Vihertekniikka Viherpäivät '09, Tampere, Scandic Hotel Rosendahl, 10.-11.2.2009, seminaariluennot ja näytteilleasettajat.
- 17.18. Hyvärinen, M., Miranto, M. & Schulman, L. 2009. Finnish *ex situ* plant conservation network in pursuit of a more balanced approach in the national implementation of global plant conservation strategies. P. 61 in Lehvävirta, S., Aplin, D. & Schulman, L. (eds.) 2009, EuroGard V, botanic gardens in the age of climate change - programme, abstracts, and delegates. — *Ulmus* 13, Helsinki.
- 17.19. Rikkinen, J., Virtanen, V., Junikka, L. & Schulman, L. 2009. Living collections and web-resources: blended learning at the botanic garden. P. 78 in Lehvävirta, S., Aplin, D. & Schulman, L. (eds.) 2009, EuroGard V, botanic gardens in the age of climate change - programme, abstracts, and delegates. — *Ulmus* 13, Helsinki.
- 17.20. Schulman, L., Saarinen, T., Lindén, L. & Rita, H. 2009. Linking bioclimatic theory with botanic garden collection policy - the Kumpula case. P. 79 in Lehvävirta, S., Aplin, D. & Schulman, L. (eds.) 2009, EuroGard V, botanic gardens in the age of climate change - programme, abstracts, and delegates. — *Ulmus* 13, Helsinki.
- 17.21. Alanko, T. & Schulman, L. 2009. Archaeobotanical studies in botanic gardens. P. 94 in Lehvävirta, S., Aplin, D. & Schulman, L. (eds.) 2009, EuroGard V, botanic gardens in the age of climate change - programme, abstracts, and delegates. — *Ulmus* 13, Helsinki.
- 17.22. Lähteenoja, O., Ruokolainen, K., Schulman, L. & Oinonen, M. 2009. Amazonian peatlands: an ignored C sink and potential source. The 2nd International Symposium, Peatlands in the Global Carbon Cycle, 25-30 September, Prague, Czech Republic.
- 17.23. Rikkinen, J., Virtanen, V., Junikka, L. & Schulman, L. 2010. Living collections and web-resources: blended learning at the botanic garden. Sulautuva opetus - Blended Learning 2010, 11.-12.3.2009, Helsinki (<http://blogs.helsinki.fi/sulautuvaopetus/ohjelma/>).
- 17.24. Hällfors, M., Schulman, L., Lindén, L. & Rita, H. 2010. Testing bioclimatic hypotheses with botanic garden collections. P. 77 in Anon. 2009, 4th Global Botanic Gardens Congress - Addressing global change: a new agenda for botanic gardens, 13th - 18th June 2010, Dublin, Ireland. Conference programme & book of abstracts.
- 17.25. Lehvävirta, S. & Schulman, L. 2010. High customer satisfaction with low resource allocation in a small garden. P. 81 in Anon. 2009, 4th Global Botanic Gardens Congress - Addressing global change: a new agenda for botanic gardens, 13th - 18th June 2010, Dublin, Ireland. Conference programme & book of abstracts.
- 17.26. Schulman, L. & Lehvävirta, S. 2011. European botanic gardens working for climate change mitigation and adaptation. P. 224 in Anon. 2011, Final IBC 2011 Abstract Book (available at www.ibc2011.com).
- 17.27. Hyvärinen, M., Miranto, M., Hiltunen, R. & Schulman, L.E. 2012. Tor protect and serve – the new Finnish national *ex situ* conservation strategy and action plan in highlight. Pp. 61-62 in Cook, C.M, Maloupa, E. & Photini, M. (eds.), Sixth European Botanic Gardens Congress EuroGard VI – European Botanic Gardens in a Changing World, May28 – June02 2012, Chios Island, Greece, Book of Abstracts.
- 17.28. Lehvävirta, S., Gabrych, M., Mesimäki, M., Vakkilainen, K., Vilisics, F. & Schulman, L. 2012. Plant diversity on green roofs. Pp. 71-72 in Cook, C.M, Maloupa, E. & Photini, M. (eds.), Sixth European Botanic Gardens Congress EuroGard VI – European Botanic Gardens in a Changing World, May28 – June02 2012, Chios Island, Greece, Book of Abstracts.
- 17.29. Schulman, L., Hyvärinen, M., Junikka, L. & Aplin, D. 2012. Living collection policy: safeguarding science at botanic gardens. Pp. 78-79 in Cook, C.M, Maloupa, E. & Photini, M. (eds.), Sixth European Botanic Gardens Congress EuroGard VI – European Botanic Gardens in a Changing World, May28 – June02 2012, Chios Island, Greece, Book of Abstracts.
- 17.30. Hällfors, M., Vaara, E.M., Hyvärinen, M., Schulman, L.E. & Lehvävirta, S. 2012. Botanic gardens and assisted migration – where do we stand? Pp. 82-83 in Cook, C.M, Maloupa, E. & Photini, M. (eds.), Sixth European Botanic Gardens Congress EuroGard VI – European Botanic Gardens in a Changing World, May28 – June02 2012, Chios Island, Greece, Book of Abstracts.
- 17.31. Hällfors M.H., Vaara E., Hyvärinen M., Oksanen M., Siipi H., Schulman L.E., Lehvävirta S. 2013: Coming to terms with assisted migration. Poster presentation by the first author in Student Conference on Conservation Science, New York, USA on October 9–11.

- 17.32. Lehtimäki, I., Hällfors M.H., Lehvävirta, S., Schulman, L.E. & Hyvärinen, M. 2015. Translocation experiments with Siberian primrose in six botanic gardens – practical experiences and preliminary results. Pp. 79–80 in Joly, E., Larpin, D., Delmas, M. & Carmine, B. (eds.), EuroGard VII – European botanic gardens in the decade on biodiversity challenges and responsibilities in the countdown towards 2020, Book of Abstracts. Oral presentation by the first author in the congress held in Paris on July 6–10.
- 17.33. Hällfors M.H., Vaara E., Hyvärinen M., Oksanen M., Siipi H., Schulman L.E., Lehvävirta S. 2015: Coming to terms with assisted migration. Poster presentation by the first author in the 27th International Congress for Conservation Biology & 4th European Congress for Conservation Biology, Montpellier, France on August 2–6.
- 17.34. Hyvärinen, M., Jovero, S., Pehkonen, P. & Schulman, L. 2018: Conservation of tropical montane forest in Taita Hills – how a botanic garden could make a difference. Oral presentation by the first author at the Eight European Botanic Gardens Congress, Lisbon, May 7–11, 2018. Pp. 82–83 in Espirito Santo, D., Soares, A.L. & Veloso, M. (eds.), Book of Abstracts, 8th EUROGARD Congress. <http://www.eurogard2018.org/wp-content/uploads/BOOK.pdf>
- 17.35. Schulman, L., Juslén, A. & Lahti, K. 2018: The Finnish Biodiversity Information Facility FinBIF – an integrated open data infrastructure supporting research and decision-making in conservation. Oral presentation by the first author and poster at the 5th European Congress of Conservation Biology, Jyväskylä, Finland, June 12–15, 2018, <https://peerageofscience.org/conference/eccb2018/108028/>
18. INVITED ORAL PRESENTATIONS WITHOUT PUBLISHED ABSTRACTS (NOT CLASSIFIED)
- 18.1. *Plantas como indicadores de la variación medioambiental de los bosques amazónicos* [Plants as indicators of environmental variation in Amazonian forests; in Spanish] in the workshop Geoecología y Desarrollo Amazónico – Seminario Taller (Iquitos, Peru, 02/1999).
- 18.2. *Nature conservation in Amazonia: the role of biological theory in reserve delimitation* in the course Ecology, conservation, and utilization of tropical forests (University of Turku, Seili, 11.10.2000).
- 18.3. *Rion sopimus: juridinen ja eettinen velvoite puutarhoille* [The Rio Convention: a legal and moral obligation for gardens; in Finnish] in the Conference of Finnish Botanic Gardens (Botanical Gardens of the university of Oulu, Oulu, 30.8.2001).
- 18.4. *Nature conservation in Amazonia: the role of biological theory in reserve delimitation* in the visiting lecturers' seminar series (University of Turku, Department of Biology, 13.11.2001).
- 18.5. *Suvun Saintpaulia (paavalinkukat) suojelu* [The conservation of the genus *Saintpaulia*; in Finnish] in the Conference of Finnish Botanic Gardens (Joensuu University Botanic Garden, Joensuu, 4.9.2003).
- 18.6. *Arboretumeiden tieteellinen merkitys* [The scientific significance of arboreta; in Finnish] in the Arboretum Seminar of the Finnish Dendrological Society (Helsinki, 28.4.2005).
- 18.7. *Bevarandearbete av Saintpaulia i botaniska trädgårdar* [Conservation work on *Saintpaulia* in botanic gardens; in Swedish] in the Nordic Garden Meeting (Uppsala, 8.6.2005).
- 18.8. *Kasvitieteelliset puutarhat tieteen ja muun maailman rajalla* [Botanic gardens on the border between science and the rest of the world; in Finnish], invited lecture at the Department of Biology, University of Joensuu (Joensuu, 20.4.2006).
- 18.9. *Analysing botanical collecting effort in Amazonia and correcting for it in species range estimation*, invited lecture at the Department of Biology, University of Oulu (Oulu, 15.3.2007).
- 18.10. *How valuable are living collections of botanic gardens for ex situ conservation?*, invited lecture at the Department of Biology, University of Oulu (Oulu, 16.3.2007).
- 18.11. *Notes on the work of Botanic gardens in the third millennium*, invited lecture at the Faculty of Biology, University of Latvia (Riga, 28.9.2007).
- 18.12. *Analysing botanical collecting effort in Amazonia and correcting for it in species range estimation*, invited lecture at the Missouri Botanical Garden (St. Louis, USA, 10.10.2007).
- 18.13. *Botanic gardens in the age of climate change*, invited lecture at the Jardí Botànic de la Universitat de València (Valencia, Spain, 2.12.2009).
- 18.14. *Biologisten kokoelmien merkitys lajien uhanalaisuuden arvioinnissa* [The role of biological collections in species' red listing], invited lecture in the publication event of the national Red List 2010 (House of the Estates, Helsinki, 1.12.2010).
- 18.15. *The Finnish Museum of Natural History (FMNH) and its activities in tropical East Africa*, invited lecture in the Opening Ceremony of the University of Helsinki's Taita Research Station (Taita Hills, Kenya, 12.1.2011)

- 18.16. Prepared oral commentary on the draft of the National Action Plan on Species Conservation, Finnish Environment Institute SYKE (Helsinki, Finland, 26.10.2011).
- 18.17. *The Finnish national strategy on alien species*, invited lecture in 'Mini symposium on aliens and invasive species' at the National Botanic Garden of Belgium (Meise, Belgium, 2.12.2011).
- 18.18. *Lajitietokeskus – LTKM:n lajitiedon hallinnan kehittämishanke* [The Species Information Centre – a development project by the FMNH to administer species data; in Finnish; prepared with Tapani Lahti and Hanna Koivula]. Invited lecture in a seminar on the distribution of scientific datasets [Yhteistyöllä vaikuttavuutta, LYNETin tutkimusaineistoseminaari] (Vantaa, Finland 31.1.2012)
- 18.19. *Global Biodiversity Information Facility GBIF — kansainvälisen organisaation esittely ja kehityskulut* [Global Biodiversity Information Facility GBIF — presentation of the international organisation and its development; in Finnish]. Invited lecture for the meeting of the follow-up group on the national BD strategy and action plan (Helsinki 9.2.2012).
- 18.20. *Helsingin kasvitieteellisen puutarhan uusi kokoelmapolitiikka* [The Living Collections Policy of Helsinki University Botanic Garden; in Finnish]. Invited lecture for the 25th conference of Finnish botanic gardens (Rauma, 22.8.2012).
- 18.21. *Mikä on lajitietokeskus?* [What is the Species Information Centre?; in Finnish]. Presentation in the founding seminar of the Finnish Biodiversity Information Facility (Helsinki, 7.9.2012).
- 18.22. *Suomen lajitietokeskus* [The Finnish Biodiversity Information Facility]. Presentation in the event "Tieto jakoon – Vanamon syystapahtuma" [the autumn event of Finnish Biological Society 'Vanamo'] (Helsinki, 14.10.2012)
- 18.23. *Lajitietokeskus ja tietojen avoimuus ekologisten verkostojenkin suunnittelun pohjana* [The Biodiversity Information Facility and open access of data in the planning ecological networks]. Presentation in the event "Ekologiset yhteydet 8 –seminaari" [Ecological connections 8 seminar], SLL Uudenmaan piiri (Helsinki, 7.3.2013)
- 18.24. *Lajitietokeskus – orastava resurssi tutkijoille* [The Biodiversity Information Facility – an emerging resource for researchers]. Presentation in the event "Puutteellisesti tunnettujen ja uhanalaisten metsälajien tutkimusohjelman hankkeiden PUTTE-tapaaminen" [Meeting of the projects in the PUTTE research programme], Metso-ohjelma, SYKE (Helsinki, 14.11.2013)
- 18.25. *Lajitietokeskus – missä mennään?* [The Biodiversity Information Facility – a status overview]. Presentation in the event "Eliötyöryhmäseminaari" [Seminar for Species Specialist Groups], SYKE (Helsinki, 4.11.2014)
- 18.26. *Finland's national strategy on invasive alien species: what it says and how it is doing*. Presentation in the event "Species' invasions seminar", Metapopulation Research Group (Helsinki, 6.11.2014)
- 18.27. *Biologiset kokoelmat ja Suomen lajitietokeskus - merkitys lajien suojelussa ja arvioinnissa* [Biological collections and the Finnish Biodiversity Information Facility – role in species conservation and evaluation]. Presentation in the event "50 vuotta uhanalaisten lajien puolesta" [seminar to celebrate the 50th anniversary of the IUCN Red List], Ministry of the Environment (Helsinki, 5.12.2014)
- 18.28. *Suomen lajitietokeskus toiminnassa – miten tästä eteenpäin?* [Finnish Biodiversity Information Facility in operation - what happens next?]. Invited presentation in the event "Yhteinen tieto hyötykäyttöön" [Common data to productive use], SYKE and Luke (Helsinki, 16.5.2017)
- 18.29. *Distributed System of Scientific Collections DiSSCo*. Invited presentation in the event "National Natural History Collections Days 15.–16.6.2017" (Espoo, 16.6.2017)
- 18.30. *Kaalitarhasta Luomukseen – luonnontieteelliset kokoelmat ympäristötutkimuksen tukena* [From a cabbage garden to Luomus – natural-scientific collections in support of environmental research; in Finnish]. Invited presentation in the event "Man and the environment – retirement seminar of MoFA Environmental Councillor Matti Nummelin". (Economicum, Hki, 27.2.2018)
- 18.31. *Kokemuksia hakemusten valmistelusta: tiekartan infrastruktuurin näkökulma* [Experiences of proposal preparation: the point of view of a roadmap RI; in Finnish]. Invited presentation in the event "FIRI 2019 call info" by the Academy of Finland. (Vanha ylioppilastalo, Hki, 7.2.2019)
19. UNPUBLISHED REPORTS, A SELECTION (NOT CLASSIFIED)
- 19.1. Schulman, L. 1992: Kihdin-Isokarin väylähanke, kirjallisuusselvitys [The Kihti-Isokari shipping route project, a literature review]. — ordered by Biosukeltajat ry, Helsinki.
- 19.2. Schulman, L., Ramírez, R., Rueda, R. & Grijalva, A. 1999: Desarrollo de las Instituciones Ex Situ Botánicas como parte del PANIF-APB — Análisis de la situación actual y propuestas de acción. [Development of botanical ex situ institutions as part of PANIF-APB - An analysis of the current

- situation and proposals for action; in Spanish] — Programa Ambiental Nicaragua - Finlandia, Proyecto Apoyo a las Areas Protegidas y Biodiversidad. Managua. 36 pp.
- 19.3. Schulman, L. 1999: La Base de Datos TROPICOS de Missouri Botanical Garden — descripción de su estructura y contenido, y un plan de acción para la repatriación de información botánica a Nicaragua. [The TROPICOS database of the Missouri Botanical Garden - a description of its structure and contents and a plan for repatriation of botanical information to Nicaragua; in Spanish] — Programa Ambiental Nicaragua - Finlandia, Proyecto Apoyo a las Areas Protegidas y Biodiversidad. Managua. 9 pp.
- 19.4. Kotiluoto, R. & Schulman, L. 1999: Repatriation of biodiversity information from Nicaragua. — Programa Ambiental Nicaragua - Finlandia, Proyecto Apoyo a las Areas Protegidas y Biodiversidad. Managua. 15 pp.
- 19.5. Schulman, L. 2000: Plan de Acción para el Componente Conservación Ex Situ para el Año 2000 — seguimiento del plan del año 1999 y propuestas nuevas. [An action plan for the ex situ conservation component for the year 2000 - follow-up of the 1999 plan and news proposals; in Spanish] — Programa Ambiental Nicaragua-Finlandia, Proyecto Apoyo a las Areas Protegidas y Biodiversidad. Managua. 17 pp.
- 19.6. Schulman, L., Rueda, R. & Walsh, B. 2000: On the future of botany in Nicaragua. — Programa Ambiental Nicaragua-Finlandia, Proyecto Apoyo a las Areas Protegidas y Biodiversidad. Managua. 6 pp.
- 19.7. Schulman, L. 2000: A brief commentary on the planning process of the National Biodiversity Strategy of Nicaragua. — Programa Ambiental Nicaragua-Finlandia, Proyecto Apoyo a las Areas Protegidas y Biodiversidad. Managua. 3 pp.

20. EXHIBITIONS

20.1. Popular-scientific exhibitions (NOT CLASSIFIED)

- 20.1.1. Schulman, L. & Havas-Matilainen, P. (texts), Kivinen, R., Pakkanen, O., Silvonen, M., Nikiforow, C. & Grahn, S. (display): 33 joulun kasvia [33 Christmas plants - a thematic exhibit on Christmas plants and their cultural history; in Finnish], Helsinki University Botanic Garden, 16.12.2003 – 4.1.2004.
- 20.1.2. Schulman, L. & Havas-Matilainen, P. (texts), Nikiforow, C., Kivinen, R., Pakkanen, O., Kaikula, V., Sumelius, L., Leppäkari, H., Sirola, M., Hanhimäki, E. & Rönnqvist, P. (display): Joulunajan kasveja [Yultide plants - a thematic exhibit on the biology and cultural history of plants with a connection to Christmas; in Finnish], Helsinki University Botanic Garden, 2.12.2004 – 2.1.2005.
- 20.1.3. Schulman, L., Hedman, A., Pelttari, A., Laukko, H., Tynkkynen, L., Etäsalo, I. Häkkinen, M. (texts); Nikiforow, C. & Etäsalo, I. (display): Millä maailma elää? [What does the world live on? A thematic exhibit on food plants and the food security of the world; in Finnish], Helsinki University Botanic Garden, 1.–27.2.2005.
- 20.1.4. Koskinen, T., Timonen, T., Korhonen, M., Schulman, L., Havas-Matilainen, P. & Pesu, M. (texts), Koskinen, T., Pesu, M. et al. (display): Joulupuu [The Christmas tree - e thematic exhibit on Christmas traditions and Christmas trees; in Finnish], Helsinki University Botanic Garden, 13.12.2005 – 8.1.2006.
- 20.1.5. Schulman, L., Alanko, T., Immanen, J., Hyvönen, J. & Stenroos, S. (järjestelyryhmä): Kasvitieteen kevät Kaisaniemessä 2006 [Botanical spring in Kaisaniemi 2006 - a popular-scientific exhibition on botanical research carried out at the University of Helsinki; in Finnish], Helsinki University Botanic Garden, 4.5. – 28.5.2006.
- 20.1.6. Schulman, L., Alanko, T., Miranto, M., Paajanen, M., Kolehmainen, J., Junikka, L. & Pesu, M.: Punaista – uhanalaisia kasveja [Red alert! - endangered plants. A popular-scientific exhibition on causes and consequences of threats to the survival of plant species; in Finnish], Helsinki University Botanic Garden, 13.12.2006 – 7.1.2007.
- 20.1.7. Tuomisto, H., Schulman, L., Alanko, T. et al.: Amazonia suomalaisten silmin / Amazonia through Finnish eyes / Amazonía: Aportes finlandeses para su desarrollo – a popular-scientific exhibition on the 25-year work of Finnish scientists in Amazonia; originally in Finnish, translated into English and Spanish; Helsinki University Botanic Garden, 3.5.–3.6.2007; Turku University Botanic Garden 06–08/2008; Universidad la Molina, Lima, Peru 02–03/2008; Pontificia Universidad Católica del Perú, 03/2008; Instituto de Investigaciones

Amazonicas del Peru, Iquitos, 04/2008–; Centro de Investigación CICRA (ACCA) 2008;
Universidad Nacional Amazónica de Madre de Dios 2008

- 20.1.8. Schulman, L., Hartwall, J., Arppe, L., Eronen, J., Fortelius, M., Hanski, I.K., Hällfors, M., Juslén, A., Kaila, L., Kurtto, A., Laaka-Lindberg, S., Lehtikoinen, A., Lehvävirta, S., Luoto, M., Luttinen, A., Mattila, J., Meller, L., Niemi-Kapee, J.-M., Oinonen, M., Paukkunen, J., Saarinen, J., Seppä, H., Ukkonen, P., Vesala, T., Viranta-Kovanen, S., Väinölä, R., Väre, H. (*production, planning and content expertise*); Hutri, K., Andersson, R., Blomqvist, S., Fröberg, K., Granqvist, E., Granroth, J., Gustavsson, L., Heikkinen, L., Heimala, V., Helynranta, L., Hiisivuori, L., Hyvärinen, H., Jantunen, M., Jovero, S., Korhonen, V., Koskinen, V., Kumpunen, J., Lee, N., Lempiäinen, N., Liinamaa, M., Ling, C., Pernilä, J., Peura, J., Polameri, S., Puolakoski, A., Pöllönen, N., Reponen, S., Talvitie, D., Thusberg, H., Uusitalo, L., Vanhapiha, M., Weckman, E. (*planning and realisation of exhibits*): Change in the Air – a popular-scientific exhibition about climatic changes and their effects on nature and humankind, Finnish Museum of Natural History, University of Helsinki, as of November 21, 2015.

20.2. Art exhibitions (CLASS F3)

- 20.2.1. Schulman, A. & Schulman, L.: Tropical Inspiration—diversiteettiä savesta [Tropical inspiration - diversity out of clay; in Finnish and Swedish], Kasvitieteellisen puutarhan galleria, Helsinki, 4.–30.6.2002.