

## CURRICULUM VITAE

### IRENE LICHTSCHEIDL

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**Date of Birth:** 12 June 1955  
**Marital Status:** married since 1982 to the Chemist Mag. Dr. Josef Lichtscheidl  
one son and one daughter, both born 1994  
**Nationality:** Austrian

### EDUCATION

1996: **“Venia docendi”** (Habilitation) in "Anatomy and Physiology of Plants" at the University of Vienna. Specialization in physiology of plant cells  
1983 **Graduation to Dr. phil.** at the University of Vienna *sub auspiciis praesidentis rei publicae*  
1978-1982: **Ph.D.** Thesis at the Institute of Plant Physiology, University of Vienna. Supervisor: Univ. Prof. Dr. Walter G. Url  
1976–1982 **Study of Botany** at the University of Vienna  
1973–1977 **Study of Pharmacy** at the University of Vienna

### PROFESSIONAL EXPERIENCE

Since 2005 Core Facility for Light and Electron Microscopy, Head of the Department since 2009  
2000-2004 Head of the Department of Cell Physiology and Scientific Film at the Institute of Ecology, University of Vienna  
since 1996 Habilitation at the University of Vienna  
1988 - 1989 PostDoc at the University of Massachusetts at Amherst, MA  
1987 Post Doc at the Technical University of Munich, Germany  
Since 1983 University Assistant at the Institute of Plant Physiology, University of Vienna

### AWARDS

Fulbright Stipendium for the PostDoc in Amherst  
Special Awards for films about „The cytoplasm of plant cells“ and „Dynamics of ER“  
Promotion *sub auspiciis praesidentis rei publicae* (summa cum laude)

## **AIM OF MY RESEARCH**

I seek to contribute to the understanding of the organization and dynamics of plant cells under various physiological and ecological conditions including cell development and stress caused by excess of heavy metals in the soil.

During my studies of Botany I specialized in analysing structure and functions of plant cells. For this aim, I established in my Facility advanced techniques of light microscopy, ie. video-enhanced contrast light microscopy and uv microscopy, which allow for visualization of microscopic details below the resolution of the conventional light microscope (usually ca 300 nm) in bright field or differential interference contrast. It is thus possible to observe organelles such as endosomes (80-200 nm), endoplasmic reticulum (80 nm), microtubules (25 nm) and bundles of actin microfilaments in living cells and extruded cytoplasm, and to observe their dynamic behaviour. For further information about the ultrastructure of cells and their organelles, plants are studied in the scanning and transmission electron microscope. Chemical fixation and dehydration could, however, cause severe alterations of the cytoplasm, and chemical fixation is also a problem where fluorescence staining is needed. I therefore started to use the improved methods of freeze fixation and freeze substitution newly developed in our Facility, and I currently develop protocols for different organisms for best possible preservation of the cytoplasm during transfer from light to fluorescence and electron microscope.

Together with my research group and students, I focus mainly on three research topics:

### **1. Growth of plant cells, eg developing root hairs and germinating pollen tubes:**

Cytomorphology and organelle motility are related to cell elongation and cell wall development. As methods, we use fluorescence and video-enhanced light microscopy for analysing the dynamic properties of (sub)microscopic organelles and the cytoskeleton. Ultrastructural details are revealed by scanning and transmission electron microscopy. Molecular background is analysed in cooperation with colleagues with relevant techniques.

### **2. Stress reaction of plant cells to abiotic stress:**

Here, we investigate the reactions of living cells to mechanical injury, to various biotic and abiotic chemicals, to heavy metals and to osmotic stress or light. The results shall improve our understanding of cell signalling, cell-to-cell communication and stress defense on the cellular level. During the last years focus was laid mainly on heavy metal toxicity. We apply light and electron microscopy for analysis of plant cell structure and function, relate structural information to molecular results from colleagues, and investigate the ecology of heavy metal contaminated soils and their vegetation. Emphasis is laid on strengthening of plants able to grow in heavy metal contaminated soils so that they can be used for remediation of toxic sites.

### **3. Structure, function and ecology of carnivorous plants and their glandular cells:**

Due to deficiency of nutrients, plants have developed mechanisms to extract proteins from animals and insects. Leaves have been transformed into special traps but the mechanisms of nutrient uptake and further transport in the plant remain to be clarified. In addition, glandular cells of carnivorous plants are excellent models for the study of secretion and absorption. In *Drosera sp.*, we have developed a method to describe the uptake of animal protein (endocytosis, membrane permeation). Now, we are able to investigate other carnivorous plants in this respect.

### **4. Cooperation with colleagues about their topics:**

Due to my experience in live cell imaging and also in electron microscopy, I cooperate closely with colleagues from other fields and analyse structural and dynamic properties of their organisms, cells and technical items.

## PUBLICATIONS since 2002

- Bokor, B., Soukup, M., Vaculík, M., Vďačný, P., Weidinger, M., Lichtscheidl, I., Vávrová, S., Sonah, H., Deshmukh, R., Bélanger, R.R., White P., El-Serehy, H.A., Lux, A. (2019): Silicon uptake and localisation in date palm (*Phoenix dactylifera*) – A unique association with sclerenchyma. *Frontiers in Plant Science* 10, in press. doi: 10.3389/fpls.2019.00988
- Burger, A., Weidinger, M., Adlassnig, W., Puschenreiter, M., Lichtscheidl, I. (2019): Response of *Arabidopsis halleri* to cesium and strontium in hydroponics: extraction potential and effects on morphology and physiology. *Ecotoxicology and Environmental Safety* 184, 109625.
- Burger, A., Weidinger, M., Adlassnig, W., Puschenreiter, M., Lichtscheidl, I. (2019): Response of *Plantago major* to cesium and strontium in hydroponics: absorption and effects on morphology, physiology and photosynthesis. *Environmental Pollution* 254, 113084.
- Ryszka, P., Lichtscheidl, I., Tylko, G., Turnau, K. (2019): Symbiotic microbes of *Saxifraga stellaris* ssp *alpigena* from the copper creek of Schwarzwand (Austrian Alps) enhance plant tolerance to copper. *Chemosphere* 228: 183-194.
- Burger, A., Lichtscheidl, I. (2019): Strontium in the environment: Review about reactions of plants towards stable and radioactive strontium isotopes. *Sci Total Environ* 633:1458-1512.
- Ghaffar, R., Weidinger, M., Mähner, B., Schagerl, M., Lichtscheidl, I. (2018): Adaptive responses of mature giant chloroplasts in the deep-shade lycopod *Selaginella erythropus* to prolonged light and dark periods. *Plant, Cell and Environment* 41:1791-1805 .
- Burger, A., Lichtscheidl, I. (2018): Stable and radioactive cesium: A review about distribution in the environment, uptake and translocation in plants, plant reactions and plants' potential for bioremediation. *Science of the Total Environment* 618, 1459-1485.
- Piovar, J., Weidinger, M., Backor, M., Backorova, M., Lichtscheidl, I. (2017): Short-term influence of Cu, Zn, Ni and Cd excess on metabolism, ultrastructure and distribution of elements in lichen *Xanthoria parietina* (L.) Th. Fr. *Ecology and Environmental Safety* 145, 408-419. <http://dx.doi.org/10.1016/j.ecoenv.2017.07.063>
- Bokor, B., Ondos, S., Vaculik, M., Bokorova, S., Weidinger, M., Lichtscheidl, I., Turna, J., Lux, A. (2017): Expression of genes for Si uptake, accumulation, and correlation of Si with other elements in lonome of Maize kernel. *Front. Plant Sci.* 8:1063. doi: 10.3389/fpls.2017.01063
- Adlassnig, W., Weiss, Y.S., Sassmann, S., Steinhauser, G., Hofhansl, F., Baumann, N., Lichtscheidl, I.K., Lang, I (2016) The copper spoil heap Knappenberg, Austria, as a model for metal habitats – Vegetation, substrate and contamination. *Science of the Total Environment* 563-564, 11037-1049. <http://dx.doi.org/10.1016/j.scitotenv.2016.04.179>
- Schreiber-Brynzak, E., Pichler, V., Heffeter, P., Hanson, B., Theiner, S., Lichtscheidl-Schultz, I., Kornauth, C., Bamonti, L., Dhery, V., Groza, D., Berry, D., Berger, W., Galanski, M., Jakupec, M.A., Keppler, B.K. (2016): Behavior of platinum(IV) complexes in models of tumor hypoxia: cytotoxicity, compound distribution and accumulation. *Metallomics* 8, 422-433. DOI: 10.1039/C5MT00312A.
- Schreiber-Brynzak, E., Klapproth, E., Unger, C., Lichtscheidl-Schultz, I., Goeschl, S., Schweighofer, S., Trondl, R., Dolznig, H., Jakupec, M., Keppler, B.K. (2015): Three-dimensional and co-culture models for preclinical evaluation of metal-based anticancer drugs. In: *Investigational New Drugs: the journal of new anti-cancer agents*, Band 33, Nr. 4, 08.2015, S. 835-847.
- Sassmann, S., Adlassnig, W., Puschenreiter, M., Palomino-Cadenas, J., Leyvas, M., Lichtscheidl, I., Lang, I. (2014): Free metal ion availability is a major factor for tolerance and growth in *Physcomitrella patens*. *Environmental and Experimental Botany* 110: 1-10. <http://dx.doi.org/10.1016/j.envexpbot.2014.08.010>
- Legin, A. A., Schintlmeister, A., Jakupec, M. A., Galanski, M., Lichtscheidl-Schultz, I., Wagner, M. & Keppler, B. K. (2014): NanoSIMS combined with fluorescence microscopy as a tool for subcellular imaging of isotopically labeled platinum-based anticancer drugs. *Chemical Science*: 5, 3135-3143
- Ovečka, M., Takáč, T., Komis, G., Vadovič, P., Bekešová, S., Doskočilová, A., Smékalová, V., Luptovčiak, I., Šamajová, O., Schweighofer, A., Meskiene, I., Jonak, C., Křenek, P., Lichtscheidl, I., Škultéty, L., Hirt, H., Šamaj, J. (2014): Salt-induced subcellular kinase relocation and seeding susceptibility caused by overexpression of Medicago SIMKK in *Arabidopsis*. *Journal of Experimental Botany* 65, 2335-50. doi:10.1093/jxb/eru115.

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- Wernitznig, S., Adlassnig, W., Sprocati, A. R., Turnau, K., Neagoe, A., Alisi, C., Sassmann, S., Nicoara, A., Pinto, V., Cremisini, C., Lichtscheidl, I. (2013): Plant growth promotion by inoculation with selected bacterial strains versus mineral soil supplements. *J of Env Science and Pollution Research* 21, 6877-6887.
- Adlassnig W., Sassmann S., Lendl T., Wernitznig S., Hallberg K.B., Hofhansl F., Lang I., Lichtscheidl I. (2013): Heavy metal household of the former mining site Schwarzwand (Salzburg, Austria): spontaneous self cleaning by plants and biofilms. *J of Applied Geochemistry* 35, 196-206.
- Nebel L., Kreitner G., Horak O., Adlassnig W., Eder G., Palomino E., Leyva M., Lichtscheidl I. (2013): BioRem – Database for remediation of heavy metal rich habitats and protection of their biodiversity. *American Journal of Plant Sciences* 4, 1938-1940. <http://www.univie.ac.at/biorem/>
- Adlassnig W., Koller-Peroutka M., Bauer S., Koshkin E., Lendl T., Lichtscheidl I.K. (2012): Endocytotic Uptake of Nutrients in Carnivorous Plants. *The Plant Journal* 71(2):303-13
- Pleskot R., Pejchar P., Bezdova R., Lichtscheidl I.K., Wolters-Arts M., Marc J., Zárský V., Potocký M. (2012): Turnover of Phosphatidic Acid through distinct signaling pathways affects multiple aspects of pollen tube growth in Tobacco. *Front Plant Sci.* 2012 Mar 19;3:54. doi: 10.3389/fpls.2012.00054. eCollection 2012.
- Zhang Y., Kogelnig D., Morgenbesser C., Stojanovic A., Jirsa F., Lichtscheidl-Schultz, I., Krachler R., Li Y., Keppler B. (2011): Preparation and characterization of immobilized [A336][MTBA] in PVA-alginate gel beads as novel solid-phase extractants for an efficient recovery of Hg (II) from aqueous solutions. *J Hazard Mater* 196: 201-209. URL <http://dx.doi.org/10.1016/j.jhazmat.2011.09.018>
- Derksen J., Pierson E., Janssen G.J., Wolters-Arts M., Lichtscheidl I.K., Adlassnig W., Ovecka M., Doris F., Steer M. (2011): Wall architecture and wall porosity of *Nicotiana tabacum* pollen tubes during growth. *The Plant Journal*: 68 (3): 495-506
- Ovecka M., Berson T., Beck, M., Derksen J., Samaj J., Lichtscheidl I., (2010): Structural Sterols Are Involved in both the Initiation and Tip Growth of Root Hairs in *Arabidopsis thaliana*. *The Plant Cell* 22: 2999 -3019.
- Al-Dubai H., Lichtscheidl I., Strobl M., Pittner G., Pittner F. (2010): Immunosorbent assay using gold colloid cluster technology for determination of IgEs in patients' sera. *Nanotechnology, Science and Applications* 2010(3):91-100. DOI 10.2147/NSA.S12926
- Christian R., Kowol C.R., Trondl R., Arion V.B., Michael A., Jakupec M.A., Lichtscheidl I.K., Keppler B.K. (2009): Fluorescence properties and cellular distribution of the investigational anticancer drug Triapine (3-aminopyridine-2-carboxaldehyde thiosemicarbazone) and its zinc(II) complex. *Dalton Trans.*, 2010, 39: 704–706.
- Adlassnig, W., Mayer, E., Koller-Peroutka, M., Pois, W., Lichtscheidl-Schultz, I.(2010): Two American Sarracenia Species as Neophyta in Central Europe. *Phyton. Annales Rei Botanicae* 49: 279-292.
- Volgger, M., Lang, I., Ovecka, M., Lichtscheidl I. (2010): Plasmolysis and cell wall deposition in wheat root hairs under osmotic stress. *Protoplasma* 243: 51-62.
- Sassmann, S., Wernitznig, S., Lichtscheidl I., Lang, I. (2010): Comparing copper resistance in two bryophytes: *Mielichhoferia elongata* Hornsch. versus *Physcomitrella patens* Hedw. *Protoplasma* 246: 119-123.
- Vaculík M., Lux A., Luxová M., Tanimoto E., Lichtscheidl I.K. (2009): Silicon mitigates cadmium inhibitory effects in young maize plants. *Environmental and Experimental Botany* 67: 52–58.
- Adlassnig W., Steinhauser G., Peroutka M., Musilek A., Sterber J., Lichtscheidl I.K., Bichler M. (2009): Expanding the menu for carnivorous plants: uptake of potassium, iron and manganese by carnivorous pitcher plants. *Applied Radiation and Isotopes* 67: 2117-2122.
- Fillafer C., Ratzinger G., Neumann J., Guttenberg Z., Dissauer S., Lichtscheidl I.K., Wirth M., Gabor F., Schneider M.F. (2009): An acoustically-driven biochip - impact of flow on the cell-association of targeted drug carriers. *Lab on a Chip* 9: 2782–2788.

- Steinhauser G., Adlassnig W., Lendl T., Peroutka M., Weidinger M., Lichtscheidl I.K., Bichler M. (2009): Metalloid contaminated microhabitats and their biodiversity at a former antimony mining site in Schleining, Austria. *Open Environmental Sciences* 3, 30-35.
- Peroutka, M. Adlassnig, W., Volgger, M., Lendl, T., Url, W.G., Lichtscheidl, I. (2008): *Utricularia*: a vegetarian carnivorous plant? Algae as prey of bladderwort in oligotrophic bogs. *Plant Ecol* 199: 153-162.
- Ovečka M., Baluška F., Lichtscheidl I. (2008): Non-invasive microscopy of tip-growing root hairs as a tool for study of dynamic and cytoskeleton-based vesicle trafficking. *Cell Biol Int* 32, 549-553.
- Banasova, V., Horak, O., Ciamporova, M., Lichtscheidl I. (2008): Heavy metal contents in *Thlaspi caerulescens* J. et C. Presl growing on metalliferous and non-metalliferous soils in Central Slovakia. *Int J Environment and Pollution* 33, 133 – 145.
- Illés, P., Schlicht, M., Pavlovkin, J., Lichtscheidl, I., Baluska, F., Ovečka, M. (2006): Aluminium toxicity in plants: internalisation of aluminium into cells of the transition zone in Arabidopsis root apices relates to changes in plasma membrane potential, endosomal behaviour, and nitric oxide production. *J. Exp. Botany* 57, 4201-4213.
- Banasova, V., Horak, O., Ciamporova, M., Lichtscheidl I. (2008): Heavy metal contents in *Thlaspi caerulescens* J. et C. Presl growing on metalliferous and non-metalliferous soils in Central Slovakia. *Int J Environment and Pollution* 33, 133 – 145.
- Adlassnig, W., M. Peroutka, G. Eder, W. Pois, Lichtscheidl I. (2006): Ecophysiological observations on *Drosophyllum lusitanicum*. *Ecological Research* 21: 255 - 262.
- Plachno, B., L. Adamec, I. K. Lichtscheidl, M. Peroutka, W. Adlassnig, Vrba J. (2006): Fluorescence labelling of phosphatase activity in digestive glands of carnivorous plants. *Plant Biology*: 813 - 820.
- Steinhauser, G., W. Adlassnig, M. Peroutka, A. Musilek, J. H. Sterba, M. Bichler, Lichtscheidl I. (2006): Application of radiotracers in an exotic field of botany: How to feed carnivorous plants. *Journal of Radioanalytical and Nuclear Chemistry*.
- Ovečka, M. Lang I. Baluska F. Isamil A., Lichtscheidl I. (2005): Endocytosis and vesicle trafficking during tip growth of root hairs. *Protoplasma* 226, 39 – 54. Cover Picture for Protoplasma, Volume 226
- Adlassnig, W., Peroutka M., Lang I., Lichtscheidl I. K. (2005): Glands of carnivorous plants as a model system in cell biological research. *Acta Botanica Gallica* 152: 111 - 124.
- Adlassnig, W., Peroutka M., Lichtscheidl I. K., Lambers H. (2005): Roots of carnivorous plants. *Plant and Soil* 274: 127-140.
- Ovečka M, Lichtscheidl I, Baluška F, Šamaj J, Volkman D, Hirt H (2004): Regulation of root hair tip growth: can mitogen-activated protein kinases be taken into account? *NATO Series* . DOI 10.1007/978-1-4020-8843-8\_5.
- Šamaj J, Ovečka M, Hlavacka A, Lecourieux F, Meskiene I, Lichtscheidl I, Lenart P, Salaj J, Volkman D, Bögre L, Baluška F, Hirt H (2003): Involvement of MAP kinase SIMK and actin cytoskeleton in the regulation of root hair tip growth. *Cell Biology International* 27, 257-259
- Samaj J., Ovečka M., Hlavacka A., Lecourieux F., Meskiene I., Lichtscheidl I., Lenart P., Salaj J., Volkman D., Bögre L., Baluska F., Hirt H. (2002): Involvement of the mitogen-activated protein kinase SIMK in regulation of root hair tip growth. *The EMBO Journal* 21, 3296-3306.

## Book chapters

- Ovečka, M., Lichtscheidl, I., Samaj, J. (2014): Live Microscopy Analysis of Endosomes and Vesicles in Tip-Growing Root Hairs. In: Plant Endosomes: Methods and Protocols. From the Series "Methods in Molecular Biology" Vol 1209. Ed: Otegui MS.
- Ovečka, M., Illjes, P., Lichtscheidl, I., Derksen, J., Samaj, J. (2012): Endocytosis and vesicular recycling in root hairs and pollen tubes. Pp 81-106. In: Endocytosis in plants. J. Samaj, ed. Springer Berlin Heidelberg. DOI 10.1007/978-3-642-32463-5\_4

- Adlassnig, W., Wernitznig, S., Lichtscheidl I.K. (2011): Historical Copper Spoil Heaps in Salzburg/Austria: Geology, Mining History, Contamination and Vegetation. In: Kothe E., Varma a. (eds.): Bio-Geo-Interactions in Contaminated Soils. Springer Publishing, Berlin.
- Adlassnig, W., Lendl, T., Koller-Peroutka, M., Lang, I., Lichtscheidl, I. (2010): Deadly glue: adhesive traps of carnivorous plants. In: Adhesion Phenomena in Nature: from Structure to Application. Pp 15-28. Byern, J., Grunwald, I., eds. Springer Wien/New York.
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- Ovečka, M. & Lichtscheidl, I. (2005): Sterol Endocytosis and Trafficking in Plant Cells. In: Šamaj J., Baluška F., Menzel D. (eds.): The Plant Endocytosis. Springer Verlag
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### Scientific Films and other publications

- Anselm Pavlik: Regnum Plantae - Das Pflanzenreich: Grünalgen - Chlorophyta  
(Regnum Plantae - The Kingdom of Plants: Green Algae - Chlorophyta). Full video on Youtube
- Martin Kogler: Regnum Plantae - Das Pflanzenreich: Charophyceen, Herkunft der Landpflanzen  
(Charophyceae - The origin of land plants)
- Matthias Steinböck: Myxomyceten - die Welt der Schleimpilze (Myxogastria - The world of slime molds)
- Pogöschnik G., Zechmeister H., Lichtscheidl I., 2011: Das Pflanzenreich: Moose. Film for Teaching and Education, 20 min, including accompanying publication.  
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- Pranjic, K., W. Adlassnig, M. Peroutka, W. Pois, E. Mayer, and I. K. Lichtscheidl., 2008: Flora and ecology of the ombrogenic fen "Schwarzes Moos". *Verhandlungen der Zoologisch-Botanischen Gesellschaft in Österreich*
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- Adlassnig, M., Peroutka, W., Pois, & Lichtscheidl, I. K. (2005): *Aldrovanda vesiculosa* and its Cohabitant Algae in Culture. *Carnivorous Plant Newsletter*
- Tschumpel S., Lichtscheidl I., 2002: Capture and digestion of prey in *Utricularia vulgaris*, a carnivorous plant.
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- Bauer S., Lichtscheidl I.K., 2001: Tip growth of pollen tubes. Scientific Film for research and education.
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- Bauer S., Ismail A., Derkesen J., Pierson E., Lichtscheidl I.K., 2000: Vesicle dynamics in the apex of tip growing cells: a comparison of *Vaucheria*, root hairs and pollen tubes. NATO Advanced Research Workshop
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- Lichtscheidl, I.K., 1994: Organelle motility in onion bulb scale inner epidermal cells. Scientific Film, ÖWF (Vienna/A), P 2540.
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- Lichtscheidl, I.K., Url, W.G., 1987: Osmotische Erscheinungen bei Pflanzenzellen: Protoplasmaquellung und Vakuolenzerklüftung. *Drosera*. Scientific Film, E 2970, IWF (Göttingen/BRD).
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- Lichtscheidl, I.K., Weiss, D.G., 1995: The cytoplasm of *Allium cepa* inner epidermal cells observed by AVEC-DIC microscopy. Film P 2117, Wiss. Film 47, 79-93.

## eLearning Activities

In case you are interested please visit our websites

Volgger, M., Lichtscheidl, I.K., 2008: Mikroskopie. Ein elektronisches Skriptum über die Grundlagen der Lichtmikroskopie.

[www.univie.ac.at/mikroskopie](http://www.univie.ac.at/mikroskopie)

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## RECENT AND CURRENT PROJECTS

**SIGNALS:** The role of anionic phospholipids in the regulation of endocytosis in tip-growing plant cells. WtZ CZ 11/2019. 2019-2021.

**TrinumPerfectum:** Plant, fungal and bacterial symbiosis: three are needed for success. WtZ PL 07/2018; 2018-2020.

**MOVE-ON:** ÖAD/EPU Summer School about Mongolian vegetation in heavy metal polluted soil, 2018-2019.

**MOVE:** ÖAD/EPU Project about Mongolian vegetation in heavy metal polluted soil, 2017-2018.

**BIOREM:** Appeal Project (ÖAD/OEZA) about bioremediation of heavy metal contaminated sites in Peru and Nicaragua, 2011-2014.

**UMBRELLA:** EU Project on "Using Microbes for the Regulation of heavy metal mobility at ecosystem and landscape scale: an integrative approach for soil remediation by geobiological processes", 2009-2012. ENV.2008.3.1.2.1 "Recovery of degraded soil resources".

**SALIX:** Partner in FWF Project L433-B17 "Evaluation of heavy metal responses in *Salix caprea* for the improvement of phytoextraction strategies", 2008-2011.

**DUMP LIFE:** Bilateral Project RO/05/2009 with Romania on "Life in heavy metal rich soil", 2009-2010

**PROMOTE:** Bilateral Project RO/08/2012 with Romania on "Plants specific for Romanian Ecosystems contaminated by toxic metals and their application for re-cultivation", 2012-2013.

**TIPNET:** 2002-2005, HPRN-CT-2002-00265 about growth and development of elongated tip-growing plant cells.

## TEACHING ACTIVITIES AT THE UNIVERSITY OF VIENNA

Lectures and Lab Courses about	General Biology
	Cell Biology
	Ecology and Physiology of Plant Cells
	Light and Video Microscopy
	Ecology of Carnivorous Plants
	Ecology of Heavy Metal Plants
	Science Documentation by Photo and Video