

THE ASTROBIOLOGY LECTURE COURSE NETWORK: ABC-NET. G. Horneck¹, F. Raulin², N. Savage³, P. Galeone³ and F. Westall⁴, ¹DLR, Institute of Aerospace Medicine, 51170 Cologne, Germany, gerda.horneck@dlr.de; ²LISA, UMR CNRS 7583, Université Paris Est Créteil et Université Paris Diderot, Institut Pierre Simon Laplace, France, francois.raulin@lisa.u-pec.fr; ³ESA ESTEC, Directorate of Human Spaceflight and Operations, Noordwijk, Keplerlaan 1, The Netherlands, Nigel.Savage@esa.int and Piero.Galeone@esa.int, ⁴Centre de Biophysique Moléculaire, CNRS, rue Charles Sadron, 45071 Orléans Cedex 2, France, westall@cnrs-orleans.fr.

Introduction: ABC-Net (Astrobiology Lecture Course Network) is a European live tele-teaching programme connecting several universities. It is scientifically coordinated by the European Astrobiology Network Association (EANA) (<http://eana-net.eu/>) and technically managed by the Education Office of the European Space Agency ESA. It was created in 2005 and provides biannually a full course in astrobiology to registered university students.

Rationale for a Pilot Study: The idea to generate a live tele-teaching system for astrobiology in Europe was born during the 4th European Workshop on Exo/Astrobiology, 23-25 November 2004 in Milton Keynes, UK, based on the observation that a growing number of students were becoming interested in astrobiology, but - because of the multidisciplinary character of astrobiology - the full expertise in all fields of astrobiology was not always available at a single university. As a first step, a pilot study for an astrobiology lecture course network was suggested, involving 4-5 universities that committed themselves to actively contributing to the lecture course. It was required that (i) the universities agreed on a common lecture plan, (ii) the lectures were scheduled simultaneously, (iii) for each lecture one university would be the host giving the lecture in front of students, and the other universities would participate through available communication technologies, and (iv) the lectures would be followed by a live question and answer period with all students involved. A final examination was required to connect the lectures to the European Credit Transfer and Accumulation System (ECTS). ESA had offered the technical expertise and management required for that pilot study. The four universities participating in this first ABC-Net in the academic year 2005/06 were: University of Dresden (Germany), Open University at Milton Keynes (UK), University of Paris 12 (France) and University of Turku (Finland). The course started with an overview on astrobiology "From life on Earth to life in the Universe" followed by "From Big Bang to the molecules of life", "Basic prebiotic chemistry", "From molecular evolution to cellular life", "Extremophiles, the physico-chemical limits of life (growth and survival)" "Habitability in our solar system and beyond", "Astrodynamics and

technology aspects of astrobiology missions in our solar system", "Astrobiology of terrestrial planets with emphasis on Mars", "Astrobiology of the moons of the giant planets with emphasis on Titan and Europa", "Presentation of experiment facilities and instrumentation for space experiments in astrobiology", and "ESA involvement in astrobiology missions: Earth orbit and solar system exploration (present and future)". The lectures were available on the internet and published in a text book [1]. During the lessons learned meeting at the end of this pilot study a continuation of ABC-Net was strongly recommended.

ABC-Net program: Since the winter semester 2007/2008 ABC-Net courses have been organized three times and the scope of lectures and number of participating universities has gradually increased. The following universities were added to the existing group: University of Nantes (France), CBM Orléans (France), University Braunschweig/Göttingen (Germany), University of Napoli (Italy), University of Viterbo (Italy), University of Szczecin (Poland) and RAS Institute of Cytology St Petersburg (Russia). Lectures are available at <http://www.youtube.com/playlist?list=PLbyvawxScNbIA9s5konCrvXPtyYzIA5zy>.

Conclusions and Outlook: ABC-Net, the Annual Workshops of EANA and the creation of several national astrobiology societies (e.g. [2]) have contributed to build up an active and engaged astrobiology community in Europe, which has now developed a large number of geographically spread teaching initiatives [3]. In some European countries greater efforts still need to be made to introduce astrobiology teaching into mainstream teaching. A continuation of ABC-Net will certainly play an essential role in engaging the next generation of scientists in this exciting field of astrobiology.

References: [1] Horneck G. and Rettberg P. (eds) (2007) Complete Course in Astrobiology, Wiley-VCH, Berlin New York. [2] Dartnell L. R. and Burchell, M.J. (2009). *Astrobiology*, 9, 717-730. [3] Horneck G. et al. (2015) *Acta Astronautica*, 110, 145-154.