

Nata a Roma il 12-10-1967

- Dal 2016 ad oggi: Professore Associato 05/A1 – SSD BIO/01 Botanica generale
- Dal 2000 al 2016: Ricercatore 05/A1 – SSD BIO/01 Botanica generale
- Abilitazione prima fascia 05/A1 – SSD BIO/01 Botanica generale (prima tornata 2012, seconda tornata 2022)
- Abilitazione prima fascia 07/I1 Microbiologia Agraria – SSD AGR/16 Microbiologia Agraria (seconda tornata 2022)
- *h*-index:29
- *ORCID* 0000-0002-9363-2415

### **Formazione**

1992 - Laurea in Science Biologiche 110/110 e lode (Sapienza)

1996 - Dottorato di Ricerca in Biologia Cellulare e Molecolare (Tor Vergata)

1999 - Specializzazione in Applicazioni Biotecnologiche (Tor Vergata)

1997 - 1998 - Post-doc, Florida State University, Polar Desert Research Center, Tallahassee, FL, USA

1998 - 2000 - Post-doc, Virginia Tech Center for Genomics, Blacksburg, VA, USA

### **Afferenza gruppi di lavoro**

–ASI: Sistemi Biorigenerativi, Astrobiologia, Microbiologia Spaziale

–ESA: Astrobiology (co-chair), Lunar biosciences, Space Synthetic Biology

-UNITOV: Space Sustainability Center

### **Attività di ricerca**

Astrobiologia, Sistemi biorigenerativi, Biologia sintetica

i) Studio delle basi molecolari dell'adattamento di cianobatteri a condizioni estreme nei deserti caldi e freddi

ii) Caratterizzazione dei limiti di sopravvivenza/adattabilità dei cianobatteri estremofili a condizioni spaziali e planetarie utilizzando piattaforme spaziali e condizioni simulate a Terra

iii) Sviluppo di tecnologie basate su cianobatteri per l'utilizzo delle risorse disponibili in situ a sostegno di avamposti umani su Luna e Marte

iv) Utilizzo di cianobatteri in applicazioni di biologia sintetica a supporto dell'esplorazione spaziale umana

v) Approcci biomimetici per la resistenza a condizioni spaziali.

### **Responsabilità in progetti finanziati**

2023-2026: ASI project ASTERIA - Adaptability of cyanobacteria from extreme environments to stellar UV radiation. Coordinator.

2023-2025: Prin2022: Extending the red limit of oxygenic photosynthesis: basic principles and implications for future applications (WP PI)

2023-2026: EU Horizon-Space project ALCYONE - Autonomous Living Cell analysis ON-chip for Evaluation of space Environment Effects. UNITOV

2023-2026: PNRR: Space it Up (WP life support, tbd) Space Sustainability Center

2019–2023: ASI REBUS - In-situ Resource Bio-Utilization to Support Life in Space (WP- Cyanobacteria; PI)

2019–2023: ASI Life in Space – Origin, Presence, Persistence of life in Space, from molecules to extremophiles (WP Cyanobacteria under planetary simulation; P.I)

2018-2022: ASI BIOSIGN-Cyano BIO-Signatures and habitable Niches (PI)

2017-2021: PNRA: MIncrobial Diversity within the Vicinity of the Concordia Antarctic Station.

2014-2016: PNRA2013/AZ1.17: Biodiversity and distribution of epi - endolithic community to study the limits

of life in Victoria Land in Antarctica (PI research unit).

2013-2017: ASI BOSS\_Cyano - Biofilm Organisms Surfing Space (PI)

2013-2017: ASI BIOMEX\_Cyano -Biology and Mars Experiment (PI)

2011-2013: Italian Minister of Foreign Affairs - Selected Significant Bilateral Project (USA, NASA) - Cyanobacteria from extreme deserts to space (Italian coordinator)

2008-2010: Italian Minister of Foreign Affairs - Selected Significant Bilateral Project (USA, NASA) - Development of a gene space cargo (Italian coordinator)

2011-PNRA2009/A1.01 Extremofiles in sub-glacial Lakes (PI)

2006-2009: ASI project "From Molecules to Man" (Co-PI WP: 1B1211-X3 FAI-MoMa)

2005-2009: Tor Vergata University Research Grants (PI)

### Didattica dal 2002

- Dipartimento di Biologia: Biologia Sintetica e Bioimaging (dal 2014- ad oggi); Astrobiologia (dal 2008- ad oggi); Inglese per Biologici (dal 2018- ad oggi); Metodi Molecolari in Citologia Vegetale (2002 - 2010); Laboratorio di Botanica (2002-2010); Evoluzione e Adattamenti dei Vegetali (2011-2014)
- Dipartimento di Matematica: Modulo Astrobiologia, Master II livello Scienza e Tecnologia Spaziale (dal 2010- ad oggi)
- Dipartimento di Fisica: Modulo Astrobiologia, Master II livello Professione Formatore in Didattica delle Scienze (2013 – 2018)

### Pubblicazioni dal 1996

- 1 Fagliarone C, Mosca C, Di Stefano G, Leuko S, Moeller R, Rabbow E, Rettberg P, and **Billi D (2023)**. Enabling deep-space experimentations on cyanobacteria by monitoring cell division resumption in dried *Chroococcidiopsis* sp. 029 with accumulated DNA damage. *Front Microbiol.* 14, 1150224.
- 2 Elsaesser A, Burr DJ, Mabey P, Urso RG, **Billi D**, et al. (2023) Future space experiment platforms for astrobiology and astrochemistry research. *NPJ Microgravity* 9, 43
- 3 Gallego Fernandez B, Rothschild LJ, Fagliarone C, Chiavarini S, **Billi D (2023)** Feasibility as feedstock of the cyanobacterium *Chroococcidiopsis* sp. 029 cultivated with urine-supplemented Moon and Mars regolith simulants. *Algal Research* 71, 10304
- 4 Fagliarone C, Gallego Fernandez B, di Stefano G, **Billi D (2023)** Insights into the chaotropic tolerance of the desert cyanobacterium *Chroococcidiopsis* sp. 029 (Chroococcidiopsales, Cyanobacteria). *J. Phycology* (in press)
- 5 Antonaru, L.A., Selinger, V.M., Jung, .....**Billi D.**, Nürnberg DJ (2023) Common loss of far-red light photoacclimation in cyanobacteria from hot and cold deserts: A case study in the Chroococcidiopsales. *ISME Commun.* 3, 113 (2023).
- 6 Stoppiello G.A, Coleine, C, Moeller, R, Ripa, C., **Billi, D.** Selbmann L. (2023) Seasonality is the main determinant of microbial diversity associated to snow/ice around Concordia Station on the Antarctic polar plateau. *Biology* 12, 1193.
- 7 Napoli A, Coleine C, Ulrich JN, Moeller R, **Billi D**, Selbmann L. (2023) Snow surface microbial diversity at the detection limit within the vicinity of the Concordia Station, Antarctica. *Life* (Basel)
- 8 Fardelli E, D'Arco A, Lupi S, **Billi D**, Moeller R, Cestelli Guidi M (2023) Spectroscopic evidence of the radioresistance of *Chroococcidiopsis* biosignatures: A combined Raman, FT-IR and THz-TDs spectroscopy study. *Spectrochim Acta Part A Mol Biomol Spectrosc* 288, 122148
- 9 Baqué M, Backhaus T, Meeßen J ... **Billi D** et al. (2022) Biosignature stability in space enables their use for life detection on Mars. *Science Advances* 8, 36
- 10 **Billi D**, Blanco Y, Ianneo A, Moreno-Paz M, Aguirre J, Baqué M, Moeller R, J-P de Vera, Parro V (2022) Mars-like UV flux and ionizing radiation differently affect biomarker detectability in the desert

cyanobacterium *Chroococcidiopsis* as revealed by the Life Detector Chip antibody microarray. *Astrobiology* 22, 1199-1209.

- 11 **Billi D**, Napoli A, Mosca C, Fagliarone C, de Carolis R, Balbi A, Scanu M, Selinger V.M., Antonaru L and Nürnberg DJ (2022) Identification of far-red light acclimation in an endolithic *Chroococcidiopsis* strain and associated genomic features: Implications for oxygenic photosynthesis on exoplanets. *Front Microbiol* 13, 933404
- 12 Napoli, A., Micheletti, D., Pindo, M., Larger, S., Cestaro, A., de Vera, J. and **Billi D** (2022). Absence of increased genomic variants in the cyanobacterium *Chroococcidiopsis* exposed to Mars-like conditions outside the space station. *Scientific Reports* 12, 8437.
- 13 Mosca C, Napoli A, Fagliarone C, Fujimori A, Moeller R and **Billi D** (2022) Role of DNA repair pathways in the recovery of a dried, radioresistant cyanobacterium exposed to high-LET radiation: Implications for the habitability of Mars. *Int J Astrobiol* 21, 380-391.
- 14 Kozyrovska N.O., Reva O, Podolich O., Kukhareenko O., Orlovska I, Terzova V, Zubova A, Trovatti Uetanabaro A.P., Góes-Neto A, De Carvalho Azevedo VA, Barh D. Verseux C, **Billi D**, Kolodziejczyk A.M., d Foing B, R and De Vera J-P (2021) To other planets with upgraded millennial kombucha in rhythms of sustainability and health support. *Front Astron Space Sci* 8.
- 15 Napoli A., Federico Iacovelli F., Fagliarone C., Pascarella, G., Falconi M., **Billi D.** (2021) Genome-wide identification and bioinformatics characterization of superoxide dismutases in the desiccation-tolerant cyanobacterium *Chroococcidiopsis* sp. CCMEE 029. *Front Microbiol* 12, 1271.
- 16 Mosca C, Fagliarone C, Napoli A, Rabbow E, Rettberg P, **Billi D.** (2021). Revival of anhydrobiotic cyanobacterium biofilms exposed to space vacuum and prolonged dryness: Implications for future missions beyond low Earth orbit. *Astrobiology* 21(5), 541-550.
- 17 Mahnert A, Verseux C, Schwendner P, Koskinen K, Kumpitsch C, Blohs M, Wink L, Brunner D, Goessler T, **Billi D**, Moissl-Eichinger C. (2021) Microbiome dynamics during the HI-SEAS IV mission, and implications for future crewed missions beyond Earth. *Microbiome* 9(1):27.
- 18 **Billi D**, Gallego Fernandez B, Fagliarone C, Chiavarini S, Rothschild LJ. (2021) Exploiting a perchlorate-tolerant desert cyanobacterium to support bacterial growth for in situ resource utilization on Mars. *Int J Astrobiol* 20 (1), 29-35.
- 19 **Billi D** (2020) Challenging the survival thresholds of a desert cyanobacterium under laboratory simulated and space conditions. In *Extremophiles as Astrobiology Models*. Seckbach J. and Stan-Lotter H (eds) Scrivener Publishing, pp 183-195.
- 20 Fagliarone C, Napoli A, Chiavarini S, Baqué M, de Vera J-P, **Billi D.** (2020) Biomarker preservation and survivability under extreme dryness and Mars-like UV flux of a desert cyanobacterium capable of trehalose and sucrose accumulation. *Front Astron Space Sci* 7, 31.
- 21 Baqué M, Napoli A, Fagliarone C, Moeller R, de Vera J-P, **Billi D.** (2020) Carotenoid Raman signatures are better preserved in dried cells of the desert cyanobacterium *Chroococcidiopsis* sp. CCMEE 029 than in hydrated counterparts after high-dose gamma irradiation. *Life* 10(6), 83.
- 22 **Billi D**, Mosca, C., Fagliarone C., Napoli, A., Verseux, C., Baqué, M., de Vera J-P. (2019) Exposure to low Earth orbit of an extreme-tolerant cyanobacterium as a contribution to lunar astrobiology activities. *Int J Astrobiol* 19(1) 53-66.
- 23 Cosciotti B, Balbi B, Ceccarelli A, Fagliarone C, Mattei E, Lauro SE, Di Paolo F, Pettinelli E, **Billi D.** (2019) Survivability of anhydrobiotic cyanobacteria in salty ice: Implications for the habitability of icy worlds. *Life* 9(4), 86
- 24 Mosca C, Rothschild LJ, Napoli A, Ferré F, Pietrosanto M, Fagliarone C, Baqué M, Rabbow E, Rettberg P and **Billi D.** (2019) Over-expression of UV-damage DNA repair genes and ribonucleic acid persistence contribute to the resilience of dried biofilms of the desert cyanobacterium *Chroococcidiopsis* exposed to Mars-like UV flux and long-term desiccation. *Front Microbiol* 10, 2312.
- 25 de Vera J-P, Alawi M, Backhaus, T., Baqué M, **Billi D**, et al. (2019) Limits of life and the habitability of Mars: The ESA space experiment BIOMEX on the ISS. *Astrobiology* 19:145-157.

- 26 **Billi D**, Staibano C, Verseux C, Fagliarone C, Mosca C, Baqué M, Rabbow E and Rettberg P. (2019) Dried biofilms of desert strains of *Chroococcidiopsis* survived prolonged exposure to space and Mars-like conditions in low Earth orbit. *Astrobiology* 19(8), 1008-1017
- 27 **Billi D**, Verseux C, Fagliarone C, Napoli A, Baqué M and de Vera J-P. (2019) A desert cyanobacterium under simulated Mars-like conditions in low Earth orbit: Implications for the habitability of Mars. *Astrobiology* 19, 158-169.
- 28 de Vera J.P., Baqué M, **Billi D**, Böttger U, Cockell C, et al. (2019) A systematic way to life detection – combining field, lab and space research in low Earth orbit. In: Biosignatures for Astrobiology. Eds Cavalazzi B and Westal F pp 111-122.
- 29 **Billi D**. (2019) Desert cyanobacteria under space and planetary simulations: A tool for searching for life beyond Earth and supporting human space exploration. *Int. J. Astrobiol.* 18, 483–489
- 30 Olsson-Francis K, **Billi D**, de Vera J-P and Teske A. (2018) Editorial: Habitability beyond Earth. *Front Microbiol* 9:2645
- 31 Fagliarone C, Mosca C, Ubaldi I, Verseux C, Baqué M, Wilmotte A, **Billi D**. (2017) Avoidance of protein oxidation correlates with the desiccation and radiation resistance of hot and cold desert strains of the cyanobacterium *Chroococcidiopsis*. *Extremophiles* 21: 981-991
- 32 Cottin H, Kotler JM, **Billi D**, Cockell C, Demets R et al. (2017) Space as a Tool for Astrobiology: Review and recommendations for experimentations in Earth orbit and beyond. *Space Sci Rev* 209:83–181
- 33 Verseux C, Baqué M, Cifariello R, Fagliarone C, Raguse M, Moeller R, **Billi D**. (2017) Evaluation of the resistance of *Chroococcidiopsis* spp. to sparsely and densely ionizing irradiation. *Astrobiology* 17:118- 12
- 34 Moeller R, Raguse M, Leuko S, Berger T, Hellweg CE, Fujimori A, Okayasu R, Horneck G, Kawaguchi Y, Yokobori S-I, Yamagishi A, Rettberg P, Verseux C, Baqué M, Cifariello R, Fagliarone C, **Billi D**, et al. (2017) STARLIFE -An international campaign to study the role of galactic cosmic radiation in astrobiological model systems. *Astrobiology* 17: 101-109
- 35 **Billi D**, Baqué M, Verseux C, Rothschild LJ, de Vera J-P. (2017) Desert Cyanobacteria - Potential for Space and Earth applications. In: Adaption of Microbial Life to Environmental Extremes second edition (eds Stan-Lotter H, Fendrihan F) Springer pp 133-146.
- 36 Verseux C, Paulino-Lima IG, Baqué M, **Billi D**, Rothschild LJ (2016) Synthetic biology for space exploration: Promises and societal Implications. In: Ambivalences of Creating Life. Societal and Philosophical Dimensions of Synthetic Biology eds: Hagen K, Engelhard M, Toepfer G). Series Ethics of Science and Technology Assessment, Springer, Heidelberg, pp 73-100.
- 37 Baqué M, Verseux C, Böttger U, Rabbow E, de Vera J-P, **Billi D**. (2016) Preservation of biomarkers from cyanobacteria mixed with Mars--like regolith under simulated Martian atmosphere and UV flux *Orig Life Evol Biosph* 46, 289-310.
- 38 Claudi R, Erculiani MS, Galletta G, **Billi D**, Pace E, Schierano D, Giro E, D’Alessandro M. (2016) Simulating super Earth atmospheres in the laboratory. *Int J Astrobiol* 15, 35-44. doi:10.1017/S1473550415000117.
- 39 Rizzo V, Farias ME, Cantasano N, **Billi D**, Contreras M, Pontenani F, Bianciardi G. (2015) Structures/textures of living/fossil microbialites and their implications in biogenicity. An astrobiological point of view. *Applied Cell Biology* 4: 65-82
- 40 Verseux C, Baqué M, Lehto K, de Vera J-P, Rothschild LJ, **Billi D**. (2016) Sustainable life support on Mars - the potential roles of cyanobacteria. *Int J Astrobiol* 15, 65-92.
- 41 **Billi D**, Berlingeri A, Balbi A, Catena LM. (2014) Hands-On space experiments: Out-of-School astrobiology activities at the University of Rome Tor Vergata. *J. Astrobiology & Outreach* 2:3.
- 42 Baqué M, Verseux C, Rabbow E, de Vera J-P, **Billi D**. (2014) Detection of macromolecules in desert cyanobacteria mixed with a lunar mineral analogue after space simulations. *Orig Life Evol Biosph* 44:209–22.

- 43 Smith HD, Baqué M, Duncan AG, Lloyd CR, McKay CP, **Billi D.** (2014) Comparative analysis of cyanobacteria inhabiting rocks with different light transmittance in the Mojave Desert: a Mars terrestrial analogue. *Int. J. Astrobiology*, 13: 271-277.
- 44 **Billi D**, Baqué M, Smith D.H, C.P. McKay. (2013) Cyanobacteria from extreme deserts to space. *Adv Microbiol* 3: 80-86
- 45 Baqué M, Scalzi G, Rabbow E, Rettberg P, **Billi D.** (2013) Biofilm and planktonic lifestyles differently support the resistance of the desert cyanobacterium *Chroococcidiopsis* under space and Martian simulations. *Orig Life Evol Biosph* 3:377-89. doi: 10.1007/s11084-013-9341-6.
- 46 Baqué M, de Vera J-P, Rettberg P, **Billi D.** (2013) The BOSS and BIOMEX space experiments on the EXPOSE-R2 mission: endurance of the desert cyanobacterium *Chroococcidiopsis* under simulated space vacuum, Martian atmosphere, UVC radiation and temperature extremes. *Acta Astronaut* 91:180–186.
- 47 Tashyreva D, Elster J, **Billi D.** (2013) Multiparameter assessment of cell heterogeneity in *Phormidium* populations (Cyanobacteria) employing fluorescent dyes. *PLoS ONE* 8(2): e55283.
- 48 Baqué M, Viaggiu E, Scalzi G, **Billi D.** (2013) Endurance of the endolithic desert cyanobacterium *Chroococcidiopsis* under UVC radiation. *Extremophiles* 17:161-169
- 49 Zammit G, **Billi D**, Albertano P. (2012) The subaerophytic cyanobacterium *Oculatella subterranea* (Oscillatoriales, Cyanophyceae) gen. et sp. nov: a cytomorphological and molecular description. *Eur J Phycol* 47:341-354
- 50 **Billi D.** (2012) Plasmid stability in dried cells of the desert cyanobacterium *Chroococcidiopsis* and its potential for GFP imaging of survivors on Earth and in space. *Orig Life Evol Biosph* 42, 235-245.
- 51 de Vera J-P, Boettger U, de la Torre R, Sánchez FJ, Grunow D, Schmitz N, Lange C, Hüber H-W, **Billi D** et al. (2012) Supporting Mars exploration: BIOMEX in Low Earth Orbit and further astrobiological studies on the Moon using Raman and PanCam technology. *Planet Space Sci* 74:103–110,
- 52 Stivaletta N, Barbieri R, **Billi D.** (2012) Microbial colonization of the salt deposits in the driest place of the Atacama Desert (Chile). *Orig Life Evol Biosph* 42:143-52
- 53 **Billi D.** (2012) Anhydrobiotic Rock-Inhabiting Cyanobacteria: Potential for Astrobiology and Biotechnology. In: *Adaptation of Microbial Life to Environmental Extremes: Novel Research Results and Application* (eds Stan-Lotter H, Fendrihan F) Springer Wien-New York, pp 119-132.
- 54 Zammit G, **Billi D**, Shubert E, Kaštovský J, Albertano P. (2011) The biodiversity of subaerophytic phototrophic biofilms from Maltese hypogea. *Fottea* 11:187–201.
- 55 **Billi D**, Viaggiu E, Cockell CS, Rabbow E, Horneck G, Onofri S. (2011) Damage escape and repair in dried *Chroococcidiopsis* spp. from hot and cold deserts exposed to simulated space and Martian conditions. *Astrobiology* 11:65-73.
- 56 **Billi D.** (2010) Genetic tools for desiccation-, radiation-tolerant cyanobacteria of the genus *Chroococcidiopsis*. In *Current Research, Technology and Education Topics in Applied Microbiology and Microbial Biotechnology*. Vol II Formatex Research Center (ed. A. Méndez-Vilas) Spain, pp 1517-1521.
- 57 **Billi D.** (2009) Subcellular integrities in *Chroococcidiopsis* sp. CCMEE 029 survivors after prolonged desiccation revealed by molecular probes and genome stability assays. *Extremophiles* 13:49-57.
- 58 **Billi D.** (2009) Loss of topological relationships in a Pleurocapsalean cyanobacterium (*Chroococcidiopsis* sp.) with partially inactivated *ftsZ*. *Ann Microbiol* 59, 1-4.
- 59 Bruno L, **Billi D**, Bellezza S, Albertano P. (2009) Cytomorphological and genetic characterization of troglobitic *Leptolyngbya* strains isolated from roman hypogea. *Appl. Environ. Microbiol* 75, 608-617.
- 60 Cockell CS, Schuerger AC, **Billi D**, Friedmann EI, Panitz C. (2007) Photosynthetic organisms on Mars-prospects and limitations. In *Responses of microorganisms to the Martian environment-Report of the ROME topical Team*, (eds Horneck G, Cockell CS,). ESA SP-1298, European Space Agency, Noordwijk, The Netherlands. pp. 99-116.
- 61 Grilli Caiola M, **Billi D.** (2007) *Chroococcidiopsis* from desert to Mars. In *Algae and Cyanobacteria in Extreme Environments*. Series: Cellular Origin, Life in Extreme Habitats and Astrobiology, Vol.11, (ed Seckbach J), Springer-Verlag, Berlin, pp. 553-568

- 62 Bruno L, **Billi D**, Urzì C, Albertano P. (2006) Genetic characterisation of epilithic cyanobacteria and their associated bacteria. *Geomicrobiol J* 23, 293-299.
- 63 Bruno L, **Billi D**, Albertano, P. (2005) Optimization of molecular techniques applied to the taxonomy of epilithic *Leptolyngbya* strains. *Algol Studies* 117:197-207.
- 64 Cockell CS, Schuerger AC, **Billi D**, Friedmann EI, Panitz C. (2005) Effects of a Simulated Martian UV Flux on the cyanobacterium, *Chroococcidiopsis* sp. 029. *Astrobiology* 5:127-140.
- 65 **Billi D**, Potts M. (2002) Life and death of dried prokaryotes. *Res. Microbiol.* 153:7-12.
- 66 **Billi D**, Friedmann EI, Helm RF, Potts M. (2001) Gene transfer to the desiccation-tolerant cyanobacterium *Chroococcidiopsis*. *J. Bacteriol.* 183: 2298-2305.
- 67 **Billi D**, Wright DJ, Helm RF, Prickett T, Potts M, Crowe JH. (2000) Engineering desiccation tolerance in *Escherichia coli*. *Appl. Environ. Microbiol.* 66:1680-1684.
- 68 **Billi D**, Friedmann EI, Hofer KG, Grilli Caiola M, Ocampo-Friedmann R. (2000) Ionizing-radiation resistance in the desiccation-tolerant cyanobacterium *Chroococcidiopsis*. *Appl. Environ. Microbiol.* 66:1489-1492.
- 69 **Billi D**, Potts M. (2000) Life without water: responses of prokaryotes to desiccation. In: Environmental stressors and gene responses (eds Storey KB, Storey JM). Amsterdam, Elsevier, pp. 181-192.
- 70 **Billi D**, Grilli Caiola M, Paolozzi L, Ghelardini P. (1998) A method for DNA extraction from the desert cyanobacterium *Chroococcidiopsis* and its application to identification of *ftsZ*. *Appl. Environ. Microbiol.* 64:4053-4056.
- 71 Grilli Caiola M, **Billi D**, Friedmann EI. (1996) Effect of desiccation on envelopes of the cyanobacterium *Chroococcidiopsis* sp. (Chroococcales). *Eur J. Phycol* 31:97-105.
- 72 **Billi D**, Grilli Caiola M. (1996) Effects of nitrogen and phosphorus deprivation on *Chroococcidiopsis* sp. (Chroococcales). *Arch. Hydrobiol. Algol Stud* 83:93-105.
- 73 **Billi D**, Grilli Caiola M. (1996) Effects of nitrogen limitation and starvation on *Chroococcidiopsis* sp. (Chroococcales). *New Phytologist* 133: 563-571.