Curriculum Vitae
YEALA SHAKED

Interuniversity Institute for Marine Sciences, Eilat.
Institute of Earth Sciences, Hebrew University, Jerusalem.
Phone: 972-8- 6360139 Email: Yeala.shaked@mail.huji.ac.il

EDUCATION

1997 – 2002 Ph.D. Environmental and Earth Sciences, The Hebrew University, Jerusalem, Israel.
Dissertation: *Iron redox dynamics and biogeochemical cycling in the epilimnion of Lake Kinneret*. Co-advisors: Drs. Yigal Erel and Assaf Sukenik.

1994 – 1997 B.Sc. Environmental and Earth Sciences, The Hebrew University, Jerusalem, Israel. *cum laude*.

EMPLOYMENT

2021 – present Full Professor, Interuniversity Institute for Marine Sciences, and Institute of Earth Sciences, Hebrew University.

2015 – 2021 Associate Professor, Interuniversity Institute for Marine Sciences, and Institute of Earth Sciences, Hebrew University.

2010 – 2015 Senior Lecturer (tenured), Interuniversity Institute for Marine Sciences, and Institute of Earth Sciences, Hebrew University.

2005 – 2010 Lecturer, Interuniversity Institute for Marine Sciences, and Institute of Earth Sciences, Hebrew University.

2002 – 2005 Postdoctoral Research Associate, Princeton Environmental Institute, Department of Geosciences, Princeton University, with Prof. Francois M. M. Morel.
Theme: Kinetics and mechanisms of trace metals and major nutrients acquisition by marine phytoplankton

RESEARCH INTERESTS

Iron bioavailability to Phytoplankton. Biogeochemical cycling, redox dynamics and chemical speciation of trace metals in aquatic ecosystems. Dust as a nutrient source to marine Phytoplankton. Phytoplankton's extra-cellular enzyme activity - geochemical and environmental significance. Photochemical cycling of iron and reactive oxygen species in natural waters. Biological production and detoxification of reactive oxygen species. Biogeochemical cycling of DMS/P in the coral reef.

RESEARCH AND TEACHING EXPERIENCE

2016– 2017 Visiting Professor at the University of British Columbia, Canada (sabbatical)

2005 –present Hebrew University's Earth Sciences Inst, and IUI. Courses – Biological Oceanography, Introduction to the ecosystem of the Gulf of Aqaba, Marine biogeochemistry, Nutrient biogeochemistry and uptake, Research Methods in Oceanography, Practical Oceanography.

Summer 2004 Princeton University, Quest- teacher training program, Guest lecturer.

1997 – 2002 The Hebrew University of Jerusalem, Teaching and Research Assistance.

Summer 2000 IMCS, Rutgers University, Research Internship with Dr. Paul Falkowski.
Theme: Iron availability, cellular iron-quotas and nitrogen fixation of the marine cyanobacteria *Trichodesmium*.

Summer 1999 NOAA laboratory, North Carolina, Research Internship with Dr. William Sunda.
Theme: Trace metals-phytoplankton interactions in Chesapeake Bay.

1996 - 1997 The Hebrew University of Jerusalem, Research Assistance.
Subject: Radon measurements in springs along the African-Syrian Rift.

Summer 1996 Cranfield University, UK, Research Internship with Dr. Simon Parsons.
Theme: Prevention of limescale formation in cooling towers.

OTHER PROFESSIONAL ACTIVITIES

2022-present Member of GEOTRACES Intercalibration & Standards Committee
2021- present President of the Israeli Association for Aquatic Sciences (IAAS)
2021-present Member of SCOR working group: Reducing Uncertainty in Soluble aerosol Trace Element Deposition (RUSTED)
2017- present Member of GEOTRACES Scientific Steering Committee
2016– present Full member of SCOR working group: Iron Model Intercomparison Project (FeMIP)
2017- 2021 Head of the Oceanography Program, Hebrew Univ
2019 Co-organizer of the 7th Kaplan symposium on Trace Elements and their Isotopes in the Ocean
2013 – 2016 Member of the organizing committee of the Israel Association for Aquatic Sciences
2014 Co-organizer of the 5th Kaplan symposium on Biogeochemistry
2010 – 2012 Collaborator in the ESF Research Networking Program: The Functionality of Iron Minerals in Environmental Processes (FIMIN)
2011 – present Review Editor, Frontiers in Microbiological Chemistry
2009 – 2013 Member of COST action ES801
2003 Cruise to the Bering Sea, R/V Kilo Moana, research scientist
2002 NATO advanced study Inst workshop: Ocean carbon cycle & climate, METU, Turkey.

Panel member and advisor for funding agencies (including: BSF, ISF, Fulbright, MOST).

Manuscript reviewer for scientific journals (including: *Science*, *Environmental Science &Technology; Marine Chemistry; Limnology & Oceanography; Journal of Phycology; Microbial Ecology; Journal of Geophysical Research-atmosphere*; *Analytica Chimica Acta; Chemosphere, Sensors, Journal of Sea Research, Deep Sea Research, Aquatic Biology, Biogeosciences Discussions, Environmental Microbiology, Environmental Microbiology Reports, Frontiers in Microbiological Chemistry, Frontiers in Marine Sciences, ISME, Plos One, Scientific Reports)*

Proposal reviewer for funding agencies (including: NSF, Swiss National Science Foundation, French National Foundation Betty and Moore foundation, Scmidt Foundation, ISF)

STUDENT MENTORING

Undergrads

Nir Klein-Kedem, Raviv Harris, Adi Katsir, Avi Schneider, Omer Segal

MSc

2019 – 2021 Roi Feinstein
2015 – 2017 Uria Tal (with Alon Amrani)
2011 – 2013 Yaron Halevy
2010 – 2013 Guy Levi (with Nava Moran)
2008 – 2010 Chana Kranzler (with Nir Keren continued to a pHd)
2007 – 2009 Eldad Saragosti (with Dan Tchernov),
2007 – 2009 Maxim Rubin (with Ilana Berman-Frank)
2007 – 2009 Hagar Lis (continued to a pHd)

PhD

2017 – 2023 Siyuan Wang
2013 – 2018 Nivi Kessler (with Nir Keren)
2010 – 2016 Chana Kranzler (with Nir Keren)
2009 – 2015 Hagar Lis (with Nir Keren)
2005 – 2012 Efrat Meeder (with Boaz Lazar)

Post-Doc

2021 – present Dr. Anna-Neva Visser
2020 – present Dr. Coco Koedooder (with Maxim Rubin)
2020 – present Dr. Futing Zhang
2018 – 2019 Dr. Yitzhak Jacobson (with Alon Angert)
2018 – 2019 Dr. Meri Eichner (with Dirk De Beer)

2014 – 2019 Dr. Subhajit Basu
2012 – 2014 Dr. Rachel Armoza-Zvoluni

GRANTS

2021-2025 Israel Science Foundation (ISF) research grant. Dust as a source of Phosphorus to *Trichodesmium* - a globally important marine N_2-fixer.

2022-2026 United States – Israel Binational Science Foundation (BSF) research grant (with Rene Boiteau). Ocean Fertilization by Dust – Studying how marine microorganisms 'mine' nutrients from dust.

2018-2021 Israel Science Foundation (ISF) – National Science Foundation China (NSFC) research grant (with Dalin Shi). Primary Production in the Changing Ocean - Effects of Ocean Acidification on Trichodesmium metabolism and iron utilization from dust.

2018-2020 FICUS Award for research at EMSL & JGI National US facilities (with R. Boiteau, R. Stuart and M. Gledhill). Interactive mechanisms of mineral dissolution by a microbial consortia.

2018-2021 German-Israeli Foundation for Scientific Research and Development (GIF) research grant (with M. Gledhill and E. Achterberg). Dust iron utilization by natural *Trichodesmium* colonies.

2015-2019 Israel Science Foundation (ISF) research grant. Bioavailability of particulate iron to planktonic cyanobacteria.

2011-2015 Israel Science Foundation (ISF) research grant. Dynamics of Reactive Oxygen Species in Coral Reefs – Sources, Sinks and Roles.

2009-2013 United States – Israel Binational Science Foundation (BSF) research grant (with Francois. M. M. Morel). Iron bioavailability to phytoplankton: do different taxa share similar uptake mechanisms?

2011 Ring Foundation for Environmental Studies research grant (with N. Keren). Iron acquisition strategies of open ocean phytoplankton.

2009 Israel Science Foundation (ISF), institutional basic equipment grant. *In situ* measuring and sampling system for oceanography (leading PI).

2007 – 2011 Israel Science Foundation (ISF) research grant. Atmospheric iron inputs to the ocean: Can phytoplankton significantly affect aerosol Fe solubility and redox chemistry?

2007 – 2009 United States – Israel Binational Science Foundation (BSF) research grant (with F. M. M. Morel). Availability of organically bound iron to marine phytoplankton.

2006 Ring Foundation for Environmental Studies research grant (with N. Keren). Linking phytoplankton's iron homeostasis and iron recycling in the ocean.

AWARDS

2006 Yakov Livland Award, The Hebrew University

2002 –2004 Bikura fellowship for postdoctoral research. National Academy of Sciences, the Israel Science Foundation

2000 – 2002 Ben-Nun fellowship for doctoral research. Israel Limnology and Oceanography Research

2002 Student Poster Award, Faculty of Sciences, Hebrew University

2002 Student Poster Award, ASLO summer meeting

1996 & 1997 The Carples Award, The Hebrew University

PAPERS

1). Berman-Frank, I., Cullen, J. T., Shaked, Y., Sherrell, R. M. and Falkowski, P.G., 2001. Iron availability, cellular iron-quotas and nitrogen fixation in *Trichodesmium*, *Limnology and Oceanography*, **46**(6): 1249-1260.

2). Shaked, Y., Erel, Y., Sukenik, A., 2002. Phytoplankton mediated redox cycle of iron in the epilimnion of Lake Kinneret, *Environmental Science and Technology*, **36**: 460-467.

3). Shaked, Y., Erel, Y., Sukenik, A., 2004. The biogeochemical cycle of iron and associated elements in Lake Kinneret, *Geochemica et Cosmochemica Acta*, **68**(7): 1439-1451.

4). Shaked, Y., Kutska, A. B., Morel, F. M. M., and Erel, Y., 2004. Simultaneous determination of iron reduction and uptake by Phytoplankton, *Limnology and Oceanography Methods* **2**: 137-145.

5). Shaked, Y., Kutska, A. B., and Morel, F. M. M., 2005. A general kinetic model for iron acquisition by eukaryotic phytoplankton*, Limnology and Oceanography,* **50**(3): 872-882.

6). Kutska, A. B., Shaked, Y., Milligan, A. J., King W. D., and Morel, F. M. M. 2005. Extracellular production of superoxide by marine diatoms: contrasting implications for Fe redox chemistry and bioavailability*, Limnology and Oceanography*, **50**(4): 1172-1180*.*

7). Shaked, Y., Xu, Y., Leblanc, K., Morel, F. M. M., 2006. Zinc availability and alkaline phosphatase activity in *Emiliania huxleyi*: Implications for Zn-P co-limitation in the ocean, *Limnology and Oceanography*, **51**(1): 299-309.

8). Xu, Y., Wahlund, T. M, Feng, L., Shaked, Y., Morel, F. M. M. 2006. A novel alkaline phosphatase in the coccolithophore *Emiliania huxleyi* and its regulation by phosphorus, *Journal of Phycology*, **42**(4): 835-844.

9). Shcolnick, S., Y. Shaked, N. Keren. 2007. A role for mrgA, a DPS family protein, in the internal transport of Fe in the cyanobacterium Synechocystis sp. PCC6803, *Biochimica et Biophysica Acta,* 814-819.

10). Xu, Y., D. Tang, Y. Shaked, and F. M. M. Morel. 2007. Zinc, cadmium, and cobalt inter-replacement and relative use efficiencies in the coccolithophore Emiliania huxleyi. *Limnology and Oceanography*, **52**(5): 2294-2305.

11). Castruita, M., L. A. Elmegreen, Y. Shaked, E. I. Stiefel, and F. M. M. Morel. 2007. Comparison of the kinetics of iron release from a marine (Trichodesmium Erythraeum) Dps protein and mammalian ferritin in the presence and absence of ligands. *Journal of Inorganic Biochemistry*, 101 (11-12) 1686-1691.

12). Morel, F. M. M., Kutska, A. B., and Y. Shaked. 2008. The role of unchelated Fe in the iron nutrition of phytoplankton, *Limnology and Oceanography*. **53**(1): 400-404.

13). Castruita, M., Shaked, Y., Elmegreen, L. A ., Stiefel, E. I., and F. M. M. Morel. 2008. Availability of iron from iron storage proteins to marine phytoplankton, *Limnology and Oceanography*. **53**(3): 890-899.

14). Y. Shaked. 2008. Iron redox dynamics in the surface waters of the Gulf of Aqaba, Red Sea. *Geochemica et Cosmochemica Acta,* **72**(6): 1540-1554.

15). Lis, H. and Y. Shaked. 2009. Probing the bioavailability of organically bound iron – a case study in the *Synechococcus* rich waters of the Gulf of Aqaba. *Aquatic Microbial Ecology* **56**(2-3):241-253.

16). Shaked, Y. Harris, R., and N. Klein-Kedem. 2010. Hydrogen Peroxide Photocycling in the Gulf of Aqaba, Red Sea. *Environmental Science and Technology* **44**(9): 3238–3244.

17). Saragosti, E., Katsir, A., Tchernov, D. and Y. Shaked. 2010. Extracellular Production and Degradation of Superoxide in the Coral *Stylophora pistillata* and Cultured *Symbiodinium*. PLoS *ONE* 5(9): e12508. doi:10.1371/journal.pone.0012508

18). Rubin, M., Berman-Frank, I., and Y. Shaked. 2011. Dust- and mineral-iron utilization by the marine dinitrogen-fixer *Trichodesmium. Nature Geosciences* **4**(8): 529–534.

19). Kranzler, C., Lis, H., Shaked, Y., and N. Keren. 2011. The role of reduction in iron uptake processes in a unicellular, planktonic cyanobacterium. *Environmental Microbiology* **13**: 2990–2999. doi: 10.1111/j.1462-2920.2011.02572.x

20). Shaked, Y and H. Lis. 2012. Disassembling iron availability to phytoplankton. *Frontiers in Microbiological Chemistry* **3**: 123. doi: 10.3389/fmicb.2012.00123

21). Meeder, E., Mackey, K. R. M., Paytan, A., Shaked, Y., Iluz, D., Stambler, N., Rivlin, T., Post, A.F., and B. Lazar. 2012. Nitrite dynamics in the open ocean—clues from seasonal and diurnal variations. *Marine Ecology Progress Series* **453**:11-26.

22). Shaked, Y and A. Rose. 2013. Seas of Superoxide. *Science* **430**: 1176-1177.

23). Amrani, A., Said-Ahmad, W., Shaked, Y. and R. P. Kiene. 2013. Sulfur isotope homogeneity of oceanic DMSP and DMS. *Proceedings of the National Academy of Sciences USA* **110**(46): 18413-18418.

24). Shaked, Y and R. Armoza-Zvoluni. 2013. Dynamics of hydrogen peroxide in a coral reef: sources and sinks. *Journal of Geophysical Research: Biogeosciences* **118**: 1793–1801. doi:10.1002/2013JG002483

25). Kranzler, C., Lis, H., Finkel, O. M., Schmetterer G., Shaked, Y., and N. Keren. 2014. Coordinated Transporter Activity Shapes High Affinity Iron Acquisition in Cyanobacteria. *The ISME Journal* **8:** 409–417. doi:10.1038/ismej.2013

26). Armoza-Zvoluni, R and Y. Shaked. 2014. Release of H_2O_2 and antioxidants by the coral *Stylophora pistillata* to its external *milieu*. Biogeosciences **11**(17): 4587-4598.

27). Horwitz, R., Borell, E. M., Fine, M., and Y. Shaked. 2014. Trace element profiles of the sea anemone *Anemonia viridis* living nearby a natural CO_2 vent. *PeerJ **2***: e538.

28). Lis, H., Shaked, Y., Kranzler, C., Keren, N. and F. M. M Morel. 2015. Iron bioavailability to phytoplankton - an empirical approach. *The ISME Journal* **9:** 1003-1013 doi:10.1038/ismej.2014.199

29). Lis, H., Kranzler, C., Keren, N. and Y. Shaked. 2015. A comparative study of iron uptake rates and mechanisms amongst marine and fresh water cyanobacteria, Life, (special issue "cynaobacteria: Ecology, Physiology and Genetics"). http://www.mdpi.com/2075-1729/5/1/841.

30). Armoza-Zvuloni R., Schneider A., Sher D. and Y Shaked. 2016. Rapid Hydrogen Peroxide release from the coral *Stylophora pistillata* during feeding and in response to chemical and physical stimuli. *Scientific Reports* 6, #21000

31). Armoza-Zvuloni R., Schneider A., and Y. Shaked. 2016. Rapid release of Hydrogen Peroxide during coral-bacteria interactions. *Frontiers in Marine Sciences* **3** (1142), doi: 10.3389/fmars.2016.00124

32). Kranzler, C., Kessler, N., Keren, N. and Y. Shaked. 2016. Enhanced ferrihydrite dissolution by a unicellular, planktonic cyanobacterium: insights into the bioavailability of particulate iron. *Environmental Microbiology and Environmental Microbiology Reports*. doi:10.1111/1462-2920.13496

33). Schoffman H, Lis H, Shaked Y and N. Keren .2016. Iron–Nutrient Interactions within Phytoplankton. *Frontiers in Plant Sciences*. **7**(1223). doi: 10.3389/fpls.2016.01223

34). Torfstein A, Teutsch N, Tirosh O, Shaked Y, Rivlin T, Zipori A, Stein M, Lazar B, and Y. Erel. 2017. Chemical characterization of atmospheric dust from a weekly time series in the north Red Sea between 2006 and 2010, *Geochimica et Cosmochimica Acta*, **211**: 373-393.

35). Basu S and Y. Shaked. 2018. Mineral iron utilization by natural and cultured *Trichodesmium* and associated bacteria, *Limnology and Oceanography* **63**: 2307-2320. doi:10.1002/lno.10939

36). Eichner MJ, Basu S, Gledhill M, de Beer D, and Y Shaked. 2019. Hydrogen dynamics in *Trichodesmium* colonies and their potential role in mineral iron acquisition. *Frontiers in Microbiology. 10(1565)*. doi: 10.3389/fmicb.2019.01565

37). Basu S, Gledhill M, de Beer D. Matondkar S.G and Y. Shaked. 2019. Colonies of marine cyanobacteria *Trichodesmium* interact with associated bacteria to acquire iron from dust, *Communication Biology* **2**(1), 1-8. doi: 10.1038/s42003-019-0534-z

38). Gledhill M, Basu S, and Y Shaked. 2019. Metallophores associated with *Trichodesmium erythraeum* colonies from the Gulf of Aqaba, *Metalomics.* **11**(9), 1547-1557. doi: 10.1039/C9MT00121B

39). Kessler N, Armoza-Zvuloni R, Basu S, Wang S, Weber PK, Stuart RK, and Y. Shaked. 2020. Selective collection of iron-rich dust particles by natural *Trichodesmium* colonies, *The ISME Journal.* **14**(1):91-103. doi: 10.1038/s41396-019-0505-x

40). Eichner MJ, Basu S, Wang S, de Beer D, and Y Shaked. 2020. Mineral iron dissolution in *Trichodesmium* colonies: The role of O_2 and pH microenvironments. *Limnology and Oceanography.* **65**(6), 1149-1160.

41) Shaked Y, Buck KN, Mellett T, and MT Maldonado. 2020. Insights into the bioavailability of oceanic dissolved Fe from phytoplankton uptake kinetics. *The ISME Journal.* **14** (5), 1182-1193. https://doi.org/10.1038/s41396-020-0597-3

42). Kessler N, Kraemer SM, Shaked Y and W. DC Schenkeveld. 2020. Investigation of siderophore-promoted and reductive dissolution of dust in marine microenvironments such as *Trichodesmium* colonies. Frontiers Marine Sciences. DOI:10.3389/fmars.2020.00045

43). Shaked Y, Twining B, Tagliabue A, and Maldonado MT. 2021. Probing the bioavailability of dissolved iron to ocean phytoplankton using *in situ* single cell iron quotas. Global Biogeochemical Cycles. e2021GB006979. https://doi.org/10.1029/2021GB006979

44). Qiu GW*, Koedooder C*, Qiu, BS, Shaked Y and Keren N. 2021. Iron transport in cyanobacteria - from molecules to communities. Trends in Microbiology.

45). Wang S, Kessler N, Koedooder C, Zhang F, Shi D and Shaked Y. 2021. Colonies of the marine cyanobacterium *Trichodesmium* optimize dust utilization by selective collection and retention of nutrient-rich particles. iScience, 103587

46). Koedooder C, Landou E, Zhang F, Wang S, Basu S, Berman-Frank I, Shaked Y and Rubin-Blum M. 2022. Metagenomes of Red Sea subpopulations challenge the use of morphology and marker genes to assess *Trichodesmium* diversity. Frontiers in Microbiology.

47). Shaked Y. et al. 2022. Co-acquisition of mineral-bound iron and phosphorus by natural *Trichodesmium* spp. colonies. Limnology and Oceanography