

Dr. Amit Kumar

Scientist C

Centre for Climate Change Studies

Sathyabama University

Jeppiaar Nagar, Chennai

600119, India

Email: amit.kumar.szn@gmail.com

Phone: (+91) 9094486533

**Education**

Ph.D.	Life Sciences (Marine Biology)	Stazione Zoologica Anton Dohrn, Naples, Italy	2012-2015
M.Sc.	Marine Ecology and Toxicogenomics	Madurai Kamaraj University, Madurai, India	2008-2010
B.Sc.	Microbiology, Botany, Chemistry	Jiwaji University, Gwalior, India	2005-2008

Appointments

10/2016- Present	Scientist C, Centre for Climate Change Studies, Sathyabama University, Chennai, India
01/2016- 06/2016	Postdoctoral Fellow, Stazione Zoologica Anton Dohrn, Naples, Italy
2010-2012	Project Assistant, Indian institute of Science Education and Research-Kolkata, India

Research Interests

Adaptation, evolution and conservation of marine organisms under climate change, environment and ecological genomics, diversity, distribution and roles of marine microbes, molecular taxonomy, conservation and field ecology.

Research Experiences

Postdoctoral research Jan. 2016 – June 2016 **Stazione Zoologica Anton Dohrn, Naples, Italy**

Project: Adaptive response of benthic brown algae *Sargassum vulgare* to acidification (funded by RITMARE, Italy)
In this project, I studied the adaptation of *S. vulgare* at the natural acidified site by genetic and biochemical methods.

a) *S. vulgare* samples were collected from 5 different locations around Ischia Island, Italy and genetic variation was studied by analyzing polymorphic sites generated through transcriptome wide polymorphisms. DNA extraction, PCR amplification, Sanger sequencing, and bioinformatic analysis was performed.

b) Following short term *in situ* transplant of *S. vulgare* from control to acidified site and vice versa, biochemical and metabolic analysis was performed which included cellular redox state, molecular and enzymatic antioxidants, polyphenols, fatty- and amino- acid profiling, and sugars (in collaboration with Prof. Han Asard, Antwerpen University, Belgium).

PhD research Nov. 2012- Dec. 2015 **Stazione Zoologica Anton Dohrn, Naples, Italy**

Project: *Sargassum vulgare* adaptation under natural acidified conditions

During PhD, samples were collected from two different locations around Ischia Island, Italy including one control and one acidified site. In order to understand response and adaptation potential of *S. vulgare* to ocean acidification, I used multidisciplinary approach such as *de novo* transcriptome, quantitative proteomics, oxidative and nitrosative stress assays, and physiological measurements.

a) Global gene expression changes under acidified conditions were analyzed using RNA-Seq. RNA extraction, purification, library preparation, sequencing, *de novo* assembly and functional annotation was done. Differential gene expression was performed. Transcriptome wide polymorphisms were also performed to understand genetic variability

between samples from two sites. A part of this study was performed in collaboration with Prof. Massimo Delledonne (Univ. of Verona, Italy). Sequences were submitted in NCBI -TSA, and -GEO databases.

b) A number of physiological and biochemical variables including reactive oxygen species, nitric oxide, antioxidant capacity, lipid peroxidation, and nitrosylation was compared in natural population of *S. vulgare* growing at control and acidified sites. Also, these variables were analysed following short term *in situ* transplant of *S. vulgare* from control to acidified site and vice versa.

c) Global proteomic expression changes were measured using label free quantitative proteomics in collaboration with Prof Gabrielle Tedeschi (Univ. of Milan, Italy).

Project Assistant Sept. 2010- July 2012 Indian institute of Science Education and Research-Kolkata, India

Project: Molecular diversity of marine microbes in marine coastal and estuarine ecosystem

In this project, I worked on molecular diversity of archaea and bacteria in Indian coastal sites. I also did nematode barcoding and molecular diversity in Indian coastal sites and deep sea Southern Ocean using morphological identification and amplicon sequencing.

a) I performed environmental DNA extraction and purification, PCR amplification, bioinformatic analysis. I also measured physico-chemical parameters such as pH, temperature, salinity, turbidity, nutrients, chlorophyll etc.

b) I isolated individual nematodes from sediment samples. For imaging, I stained it and then stored for molecular identification. DNA extraction and PCR amplified using nuclear and mitochondrial markers were performed for individual samples. After purification, it was sequenced with Sanger's method, and data analysis was performed.

Master's thesis Dec. 2009- Apr. 2010 Madurai Kamaraj University, Madurai, Tamil Nadu

Project: Effect of lowered pH on calcification of marine shellfish-An understanding towards global warming and ocean acidification

In this project, I measured changes in antioxidant enzymes, DNA damages, and mineral contents of Shells of mollusks *Donax faba* and crab *Leucosia sp.* after acute exposure to acidified conditions.

Summer project May 2009- Aug. 2009 National Institute of Oceanography, RC-Kochi, India

Project: Characterization of Bacteria associated with coral *Porites lutea* mucus and their response to temperature

a) Coral mucus was collected by snorkel, and then bacteria were isolated on specific media. The cultures were purified. These cultures were screened for their UV absorption capacity. The cultures were identified with biochemical, and molecular methods. The response of bacterial cultures to higher temperature was studied.

Honors and Awards

2012-2015	SZN-OU fellowship for pursuing PhD research at Stazione Zoologica Anton Dohrn, Italy
2015	Early career travel award, ASLO to participate in ASLO Aquatic Sciences Meeting at Granada, Spain
2014	Part of winning team of team working exercise of the SZN PhD program
2013	SZN travel award to participate in CeMEB advance course on marine evolution under climate change at Kristineberg, Sweden
2011	Early career travel award to participate in workshop on acidification in aquatic environments at Tromso, Norway
2011	Best poster award in workshop on acidification in aquatic environments at Tromso, Norway.
2010 & 2012	Qualified GATE (Graduate Aptitude Test in Engineering)
2009	III rd prize for oral presentation (evolution of bacterial pathogenesis) in state level seminar on evolution- from molecules to mankind 2009, Madurai, India

Publications

Total impact factor: ~14; Citation: 47+ (Google scholar)

1. **Kumar, A.**, Castellano, I., Patti, F.P., Palumbo, A., Buia, M.C. 2015. Nitric oxide in marine photosynthetic organisms. *Nitric Oxide* 47, 34-39.
2. **Kumar, A.**, Patti, F.P., Castellano, I., Delledonne, M., Palumbo, A., Buia, M.C. 2015. *Sargassum vulgare* adaptation in acidified waters at natural CO₂ vents (Ischia Island, Italy). *European Journal of Phycology* 50, 195-195.
3. **Kumar, A.**, Sen, D., Bhadury, P. 2015. Unraveling free-living marine nematode community structure from biodiversity-rich tropical coastal setting based on molecular approaches. *Marine Biodiversity* 45, 537-547.
4. Grech, D., Chiarore, A., Fioretti, S., **Kumar, A.**, Mulas, M., Buia, M.C., Patti, F.P. 2015. The importance of an integrated approach in the study, conservation and restoration of fucales. *Congresso della Società Italiana di Biologia Marina* 22, 32-33.
5. Harvey, B.P., Al-Janabi, B., Broszeit, S., Cioffi, R., **Kumar, A.**, Aranguren-Gassis, M., Bailey, A., Green, L., Gsottbauer, C.M., Hall, E.F., Lechler, M., Mancuso, F., Pereira, C., Ricevuto, E., Schram, J., Stapp, L., Stenberg, S., Rosa, L. 2014. Evolution of marine organisms under climate change at different levels of biological organization, *Water* 6, 3545-3574.
6. Garrard, S.L, Hunter, R.C., Frommel, A.Y., Lane, A.C., Phillips, J.C., Cooper, R., Dineshram, R., Cardini, U., McCoy, S.J., Arnberg, M., Rodrigues Alves, B.G., Annane, S., Orte, M.R., **Kumar, A.**, Aguirre-Martínez, G.A., Maneja, R.H., Basallote, M.D., Ape, F., Torstensson, A., Bjoerk, M.M. 2013. Biological impacts of ocean acidification: a postgraduate perspective on research priorities, *Marine Biology* 160, 1789-1805.
7. Bhadury, P., **Kumar, A.**, Maiti, M. 2013. Nesting status of Sea Turtles in West Bengal- The East Midnapore scenario. In *Marine Turtles along the Indian Coast* (Kurian, A. eds.), WWF-India, pp. 85-91.
8. Ravindran, J., Kannapiran, E., Manikandan, B., Francis, K.X., Arora, S., Karunya, E., **Kumar, A.**, Singh, S.K., Jose, J. 2013. UV-absorbing bacteria in coral mucus and their response to simulated temperature elevations. *Coral Reefs* 32, 1043-1050.
9. Murgan, P., **Kumar, A.**, Anand, M., Kumaraguru, A.K.K., Palanikumar, P. 2011. Influence of pH on Calcification and Biomarker enzymes of soft shell wedge clam *Donax faba* (Gmelin). *Proceedings of International conference on Impact of Climate Change on Coastal Ecosystem* pp.141-145.

Work in progress

10. **Kumar, A.**, Castellano, I., Patti, F.P., Delledonne, M., Abdelgawad, H., Beemster, T.S.G., Asard, H., Palumbo, A., Buia, M.C. Molecular response of *Sargassum vulgare* population to elevated CO₂ at underwater volcanic vents - insights from transcriptomic analysis. *Molecular Ecology* (under revision).
11. **Kumar, A.**, Abdelgawad, H., Castellano, I., Patti, F.P., Delledonne, M., Beemster, T.S.G., Asard, H., Palumbo, A., Buia, M.C. Physiological and biochemical analysis provide new insights into the response of *Sargassum vulgare* to ocean acidification. *Ecology Letters* (submitted).
12. **Kumar, A.**, Abdelgawad, H., Castellano, I., Patti, F.P., Delledonne, M., Beemster, T.S.G., Asard, H., Palumbo, A., Buia, M.C. Ocean Acidification influences the macromolecular composition and mineral contents of brown macroalgae *Sargassum vulgare*. *Biogeosciences* (submitted).
13. **Kumar, A. et al.** Proteomic and metabolic response of *Sargassum vulgare* to *in situ* acidification. (in prep.)
14. Chiarore, A., **Kumar, A.**, Buia, M.C., Patti F.P.P. Morphological and molecular assessment of *Sargassum vulgare* (Fucales: Phaeophyceae) around Ischia Island (Gulf of Naples), Italy. (in prep.)

WORKSHOPS/CONFERENCES/TRAININGS

- Short-term workshop in molecular phylogenetics, Indian Institute of Science, Bangalore, India. 1-5 August 2016.

- 12th summer course on Marine Ecological & Evolutionary Genomics (MEEG 2016), Biologique de Roscoff, Roscoff, France. 12-24 June 2016
- EuroMarine workshop on management of bioinvasions in the Mediterranean Sea - the way forward, Ischia, Italy. 4-5 May 2016
- 6th European Phycology Congress (EPC6) 2015, London, UK. 22-28 August 2015
- 12th Plant oxygen group conference (SFFR) 2015, Verona, Italy. 23-26 June 2015
- ASLO aquatic science meeting 2015, Granada, Spain. 22-28 February 2015
- Scientific meeting of Stazione Zoologica Anton Dohrn (Ischia retreat) 2014, Ischia, Italy. 7-8 July 2014
- Open university PhD course on Chemical Ecology: goals, methods and challenges 2014, Naples, Italy 5-9 May 2014
- CeMEB advance course on marine evolution under climate change 2013, Kristineberg, Sweden. 17-22 November 2013
- Annual scientific reunion of Italian algology society 2013, Venice, Italy. 18-19 October 2013
- Workshop on acidification in aquatic environment 2011, Tromso, Norway. 26-28 September 2011
- Frontiers in modern biology, Indian Institute of Science Education and Research-Kolkata, India. 26-27 February 2011
- Young Ecologist Talk and Interact (YETI) 2011, Indian Institute of Technology, Guwahati, India. 13-15 December 2011
- Workshop on animal cell culture techniques 2010, Anamalai University, Chidambaram, India. 13-15 March 2010.
- Workshop BEST entrepreneur training (Government of India) 2010, Bangalore, India. 29 July- 1 August 2010
- Workshop in Bioinformatics, Siksha 'O' Anusandhan University, Bhubaneswar, India. 7-8 August 2010.
- Seminar on standardization of crude drugs 2009, MMS university, Tirunelveli, India. 23 December 2009.
- Intercollegiate state level seminar on evolution – from molecules to mankind 2009, Thiagrajar College, Madurai, India. 26 February 2009
- National science conference on organismal and functional genomics 2009, Madurai Kamaraj University, Madurai, India. February 2009
- National level seminar on current trends in marine science and techniques 2009, Madras Christian College, Chennai, India. 22-24 January 2009

Skills

DNA, RNA, Protein extraction, PCR, Variants of PCR (Colony PCR, Nested PCR, Touch Down PCR, and Others), ligation, transformation, cloning, purification of biomolecules using agarose gel electrophoresis, SDS PAGE, 2D gel electrophoresis, protein expression using western blotting, HPLC, GC, ABI Prism 3730 Genetic Analyzer, real time-qPCR, next gen sequencing library preparation (RNA-Seq using Illumina HiSeq), 16S-amplicon-seq analysis, phylogenetic analysis methods, population genetics- and genomics- analysis, microbiological techniques- streaking, plating, maintenance of bacterial and diatom pure cultures, microscopy, statistical and bioinformatics tools, Basic R and python, physiological and biochemical measurements such as photosynthetic measurement, antioxidants enzyme assays, phenolic content etc. for seaweeds, seaweed culturing, collection of marine samples (microbes, phytoplankton, Zooplankton, Nematodes, Shell fishes) and their preservation and identifications, coral reef survey, coral mucus collection, **open water diving (certified by PADI)**, MS office, adobe photoshop, bibliographic and editing tools.

Professional Memberships

- Society for Free Radical Research-Europe(SFFR-E)
- Association for the Sciences of Limnology and Oceanography (ASLO)
- Indian polar Research Network (IPRN)

Synergistic Activities

Volunteer in field survey projects and conferences:

1. Survey of Olive Ridley turtle along the coast of East Midnapore, West Bengal, India
2. Developing with dolphins: ecological and anthropogenic factors affecting estuary use and behaviour of humpback dolphins in the southwest coast of India.
3. Student volunteer in ASLO aquatic science meeting at Granada, Spain
4. Member in organising committee for Sundarbans Pavilion - International Transboundary Workshop at IISER-K

Results dissemination within scientific community:

1. Presented my results in over 20 scientific meetings across world.
2. Delivered seminars at SZN, Italy; Antwerp University, Belgium; Satyabhama University, India.
3. Contributed raw and processed RNA-Seq data of *Sargassum vulgare* in NCBI Gene Expression Omnibus (GEO) and Transcriptome Shotgun Assembly (TSA) database; more than 200 partial gene sequence for bacterial 16S, archaeal amoA, nematodes 18S and COI in NCBI Genbank.

Contribution in public projects

1. Contributed as annotator in connect to decode program '10 for *Mycobacterium tuberculosis* Gene Ontology annotation (OSDD CSIR project, Govt. of India)

Education outreach and teaching

1. Spreaded awareness about importance of sea turtles in the coastal villages of West Bengal through door to door campaign during turtle survey project.
2. Conducted science experiments in the residential societies and parks in Delhi for school students as part of our ScienceX project (www.facebook.com/www.scienceX.co.in/?fref=ts). This project was meant to enhance awareness about general scientific phenomenon among young school students. Over 150 students were benefitted with this program.
4. Unofficially advised and helped summer trainees and Master thesis students at IISER-K and SZN.

Developing science projects

1. ScienceX project got selected among top 73 projects (second round) out of 5147 teams in the Eureka competition being organized by IIT Bombay.
2. BabyPRO (a probiotics based nex gen baby food), project was selected among top 20 projects in ABLE BEST 2010 organized by Department of Biotechnology, Govt. of India.
3. Microbial biodegradation of rocks and statue (summer project during B.Sc.) was selected upto interview round in Kishore Vaigyanik Protsahan Yojana (KVPY) in 2006 being conducted by IISc Bangalore.

Advisors

Master's thesis:	Dr. M. Anand (MKU, India),
Project Assistant:	Dr. Punyasloke Bhadury
Graduate:	Dr. Maria Cristina Buia (SZN, Italy); Dr. Anna Palumbo (SZN, Italy); Prof. Massimo Delledonne (Univ. Of Verona, Italy)
Postdoctoral:	Dr. Maria Cristina Buia (SZN, Italy)

Contact information for the references

Dr. Maria Cristina Buia , Senior Researcher	Dr. Anna Palumbo , Research Director	Dr. Punyasloke Bhadury , Associate professor
Department of Integrative Marine Ecology	Department Of Biology and Evolution of Marine Organisms	Department of Biological Sciences
Stazione Zoologica Anton Dohrn, Naples, Italy	Stazione Zoologica Anton Dohrn Naples, Italy	Indian Institute of Science Education and Research- Kolkata, Kolkata, India