

Mideast Coral Reef Society

Issue 2

June 2015

Our Goals

- Promote collaboration among researchers
- Promote Knowledge Exchange with stakeholders outside academia
- Generate a deep understanding of Middle Eastern coral ecosystems
- Promote their conservation and sustainable use

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Welcome!

Dear all,

Welcome to Mideast Coral Reef Society's (MCRS) second newsletter for 2015. Thank you for your positive response to our first issue – we are confident that the current one will prove equally interesting and informative!

In February, a large number of international experts and regional stakeholders, including a high number of MCRS members from a range of different backgrounds met at the “Coral Reefs of Arabia” conference that took place in Abu Dhabi to exchange views and explore collaborative opportunities to improve regional coral reef management. A great event which gained us also a substantial number of new members – welcome on board!

In this issue we feature coral reef research of MCRS mem-

bers in the Red Sea and projects of the “Reefgenomics Lab” at KAUST. Finally, we invite you share Tamer Monir Attalla's fascination about some of the magic reef spots of southern Egypt.

If you are interested in the MCRS Initiative you can become a [member](#) and [subscribe](#) to receive the 6-monthly [newsletter](#) in our webpage <http://mideastcrs.org/>.

MCRS members get a 10% discount on membership to the International Society for Reef Studies (ISRS). To avail this discount, just go to the membership section of ISRS (<http://coralreefs.org/membership/>) and complete the form, adding MCRS15 as the Membership Code. Note that if you opt for a three year membership you get an additional 10% discount. All ISRS members will get dis-

counted rates for registration to the next ICRS Symposium to be held in Hawaii next year, so sign up now!

We welcome contributions about meetings and conferences relevant to the [Mideast Coral Reef Society](#) (MCRS), as well as outreach events and links to recent publications.

With best wishes

Prof. J. Burt

Prof. J. Wiedenmann





MCRS Initiative is jointly hosted by the New York University Abu Dhabi and the University of Southampton. Funding is contributed by the Natural Environment Research Council, UK.

Coral Reefs of Arabia: Exploring New Insights and Opportunities on Our Regional Reefs.

Conference 15-17 February 2015, New York University Abu Dhabi Conference Centre, Saadiyat Island, Abu Dhabi

This conference brought together leading marine scientists and managers from across Arabia to exchange recent research and to promote the development a region-wide collaborative network to deepen scientific knowledge and improve management of these unique ecosystems. By bringing international experts and regional stakeholders together, the conference provided a forum for collabora-

tion and exchange, enhancing our understanding of reef biology on the regional scale and providing opportunity for improved engagement of underrepresented nationals in regional reef science.

There were a total of 90 international and regional presenters representing 18 different countries, including all 6 GCC nations. Together with the high public attendance throughout



the duration of the 3 days, the situation was ideal for research-focused discussions. There were a total of 172 public registrants coming from a range of different backgrounds; representatives from local and re-

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gional Municipalities and Environment Agencies were present along with individuals from industry, environmental consultancies and regional universities.

Presentation themes were diverse and included : Adaptation to Extremes, The Coral Holobiont, Reef fish patterns & Processes, Coral Communities & Structure, Biophysical Processes, Coral Reproduction & Dispersal, Biogeography & Evolution and Reef Conservation & Management , The Coral Holobiont, Reef fish patterns & Processes, Coral Communities & Structure, Biophysical Processes, Coral Reproduction & Dispersal, Biogeography & Evolution and Reef Conservation & Management.



The MCRS stall at the conference.

A special issue of Marine Pollution Bulletin is currently in development which will be composed of >25 articles presented at this conference, reflecting the varied and progressive coral reef research within the Arabian region. Further collaborative research will continue over the next few years, and NYU Abu Dhabi will likely host a regional capacity-building workshop in 2016.

Coral reef research of MCRS members

1. The expeditions within the Jeddah Transect

By Yvonne Sawall, GEOMAR Helmholtz Centre for Ocean Research Kiel.



The expedition team in Farasan

Are that corals and their symbionts capable of acclimatization or adaptation to elevated temperatures?



Incubation chamber used to measure metabolic rates of corals. Developed by Yvonne Sawall and built by the workshop at GEOMAR.

The Red Sea is special in terms of their environmental conditions, it features a strong temperature gradient from north to south, as well as a strong nutrient gradient. This makes the southern Red Sea a rather extreme environment for corals and particularly attractive to be studied in the context of ocean warming.

During our expeditions within the Jeddah Transect Project, a collaboration between the King Abdulaziz University in Jeddah, Saudi Arabia, and the Helmholtz Center for Ocean Research in Kiel, Germany, we investigated the performance of a widely distributed and abundant coral species, *Pocillopora verrucosa*, in off-shore reefs along the Saudi Arabian coast.

Our aim was to create a baseline of understanding of coral physiology and population genetics in order to address questions on which corals are able to cope with these extreme conditions in the south. Are that corals and their symbionts capable of acclimatization or adaptation to elevated temperatures? Understanding this, is important in order to understand, how (fast) corals might be able to adjust to ocean warming.

Main results: We found strong indications for *P. verrucosa* zooxanthellae adaptation rather than of the coral host. This is supported by a) change of *Symbiodinium* clades or types at the extreme ends of the Red Sea and b) by adaptive or long-term acclimative behaviour to regional environmental conditions of the *Symbiodinium* type (*S. microadriaticum*) from the remainder of the Red Sea. (Sawall et al. 2014b). For the coral host, this is supported by a) a low inter-regional variation of genotypes throughout the Red Sea and b) a strong temperature dependency of calcification across regions, despite pronounced differences in temperature regimes (Sawall et al. 2015).

Main conclusion and the meaning for the Red Sea: The data suggest variable acclimatization potential to ocean warming of coral populations across the Red Sea: high acclimatization potential in northern coral populations, but limited ability to cope with ocean warming in southern populations which already live close to their upper thermal limits.

Meaning for corals worldwide: There seems to be potential for corals to adjust to warming, at least to a certain degree, since we already find corals living at high temperature regimes. This might mostly be attributable to the zooxanthellae (uni-cellular, potentially fast evolving) and less to adjusting mechanisms of the coral host.

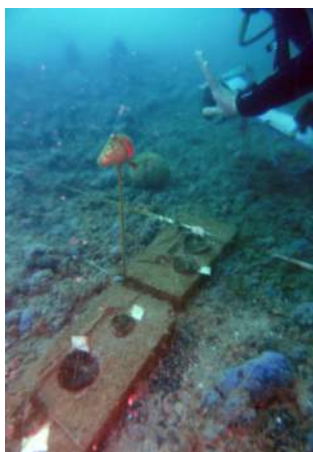
2. Coral salinity exposure

By Till Röthig, 'Reefgenomics lab', KAUST

The increasing demand of fresh water around the Arabian Peninsula is mostly covered by desalination plants. A seawater reverse osmosis desalination plant (SWRO) covers all potable water needs at the King Abdullah University of Science and Technology (KAUST), where I am conducting a PhD on "Functional Ecology of Red Sea Corals", but discharges about 40,000m³ high

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Fungia granulosa at ambient salinity fixed to concrete bricks along a transect off the desalination plant discharge structure.

saline brine into the coral reef environment. This brine may considerably impact the surrounding marine ecosystems; however there is a lack of research on precise effects. Scleractinian corals may be of particular risk - they are generally assumed to be stenohaline osmoconformers and therefore not able to adjust to changes in salinity.

In the "Reefgenomics lab" in KAUST we exposed *Fungia granulosa* in a long-term (29 days) transplantation transect experiment to highly increased salinities resulting from SWRO discharge. During the experiment we assessed physiological reactions of the coral host as well as its algal symbionts. We found *F. granulosa* to be very resilient to high salinities (~50 PSU) over a prolonged period (29 days) without measurable physiological effects - indicating osmoregulatory processes and an acclimation processes. In the future we plan to assess the potential role of associated bacterial assemblages in short- and long-term response to increased salinities. The full story can be found [here](#): van der Merwe R, Röthig T, Voolstra CR, Ochsenkühn MA, Lattemann S and Amy GL (2014) High salinity tolerance of the Red Sea coral *Fungia granulosa* under desalination concentrate discharge conditions: an in situ photophysiology

experiment. *Front. Mar. Sci.* 1:58. doi: 10.3389/fmars.2014.00058.

However, not all corals tolerate salinity changes equally well and long-term exposure to altered salinity can readily kill them or reduce their temperature stress tolerance. (D'Angelo et al. 2015, Local Adaptation Constrains the Distribution Potential of Heat-Tolerant Symbiodinium from the Persian/Arabian Gulf. *ISME J*, 2015.)



Fungia granulosa exposed to highly increased salinities in the discharge screen of the KAUST seawater reverse osmosis desalination plant during the 29 day experiment.

3. Coral microbial communities within the coral holobiont

By Ghaida Hadaidi, 'Reefgenomics lab', KAUST



The role of coral microbial communities within the coral holobiont is not well understood but there is even less data on their role in coral bleaching.

My research is focused on coral mucus-associated bacteria since this is where a substantial number of bacteria reside. I am investigating their role in coral bleaching. By using 16S rRNA amplicon sequencing, I plan to assess community differences between healthy and bleached *Porites* colonies from the Red Sea and the Arabian Gulf.



The southern Egyptian Red Sea at Marsa Shouna (Shouni Kebir)

Text and Images: Tamer Monir Attalla

A favourite spot of liveboards and daily boats alike, Shouna is one of those areas where you can have magic encounters. Sites include:

Ras Shouna - The corner and outside north of Shouna is unique for its sprawling sand plateau. Littered in table corals of all shapes and sizes, pick your depth on the gradual slope and see what's hiding beneath each one.

Aquarium - The name says it all - this is the site to come to for that fish-tank feel. Cleaning stations up and down the reef serve the resident schools of snappers, batfish, goatfish and fusiliers. Crocodilefish, lionfish and scorpionfish lay in wait for the meals to come to them and the keen eye will spot more camouflaged critters on this site than any other.

Shouna Seagrass - This is a classic dive where you won't have to go far to see large whiptail rays and green turtles. Ghost



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pipefish, snake eels and shrimpfish are regularly seen but one of the greatest sights is the large school of golden trevallies that hunt in the seagrass like a pack of dogs.

Sha'ab Sireer - The 'bed reef' could be named after the lazy speed we find works best to take in the scenery - but actually it's so called for the fact that more often than not we encounter sleeping green turtles at about 20mt. Massive male George and cute female Tracy are the most regularly spotted, but there are plenty of others that make cameo appearances.

Sha'ab Abu Khaled - Named after one of our captains, this reef is characterised by steep sloping reef tongues extending down from the reef wall, separated by sandy areas. These sandy areas reflect the sun, lighting up the profuse colourful soft corals and giving another opportunity to see big sleeping green turtles.



Photos taken in the southern Egyptian Red Sea at Marsa Shouna

Recent Publications of MCRS members

1. D'Angelo, Cecilia, Benjamin C. C. Hume, John Burt, Edward G. Smith, Eric P. Achterberg and Jorg Wiedenmann, "Local Adaptation Constrains the Distribution Potential of Heat-Tolerant Symbiodinium from the Persian/ Arabian Gulf." ISME J, (2015), Free Download: [doi:10.1038/ismej.2015.80](https://doi.org/10.1038/ismej.2015.80)
2. Sedeer El-Showk, Thermo-tolerant Red Sea corals at edge of coping capacity, [Nature Middle East](https://doi.org/10.1038/nmiddleeast.2015.57), Published online, 25 March 2015 (<http://www.natureasia.com/en/nmiddleeast/article/10.1038/nmiddleeast.2015.57>)
3. Hume, B. C. C., C. D'Angelo, E. G. Smith, J. R. Stevens, J. Burt and J. Wiedenmann, "Symbiodinium Thermophilum Sp. Nov., a Thermotolerant Symbiotic Alga Prevalent in Corals of the World's Hottest Sea, the Persian/ Arabian Gulf." Sci. Rep. 5, (2015), Free Download: <http://dx.doi.org/10.1038/srep08562>
4. Javid Kavousi, Parviz Tavakoli-Kolour, Maria Mohammadzadeh, Arezoo Bahrami, Abbas Barkhordari, Mass coral bleaching in the northern Persian Gulf, *Scientia Marina* 78(3), (2014), Free Download: [10.3989/scimar.03914.16A](https://doi.org/10.3989/scimar.03914.16A)
5. Riegl, B., P. W. Glynn, E. Wieters, S. Purkis, C. d'Angelo and J. Wiedenmann, "Water Column Productivity and Temperature Predict Coral Reef Regeneration across the Indo-Pacific." Sci. Rep. 5, (2015). Free Download: <http://www.ncbi.nlm.nih.gov/pubmed/25653128>
6. Parviz Tavakoli-Kolour, Javid kavousi, Hamid Rezaei, Outbreak of growth anomalies in coral communities of Qeshm Island, Persian Gulf, *International Aquatic Research* 7(2) :151-156, (2015), Free Download: [10.1007/s40071-015-0100-3](https://doi.org/10.1007/s40071-015-0100-3)
7. Sawall Y, Al-Sofyani A, Biology of Red Sea Corals: Metabolism, Reproduction, Acclimatization, and Adaptation. In: Rasul NMA, Stewart ICF (eds) *The Red Sea*. Springer Berlin Heidelberg, pp487-509, (2015).
8. The "Field Guide to the Hard Corals of South Yemen" in Arabic. First published in English in 2010 by Biotope Editions and the Museum National d'Histoire Naturelle, Paris, has been released recently and copies were made available to the participants in the "Coral reefs of Arabia" conference held at NYUAD in February. Its production is the result of the combination of funding provided by the YLNG Company as part of the regional capacity building drive inscribed in the company's policy, and the publishing expertise offered by IUCN (Global Marine and Polar Programme). A PDF version (14.45 MB) is available for [download from the IUCN Library](https://portals.iucn.org/library/node/44729?dm_i=2GI3,87YI,40EMOA,I9LG,I) System. https://portals.iucn.org/library/node/44729?dm_i=2GI3,87YI,40EMOA,I9LG,I



Contributing to the newsletter:

Contributions are invited to the newsletter via email. Potential news can be references of publications in the interest areas of the MCRS Initiative, descriptions of research projects, job advertisements, etc. We cannot guarantee that all contributions can be accepted and we reserve the right to shorten contents.

Please submit your suggestion via email to newsletter@mideastcrs.org

Contact / Subscribe : The Mideast Coral Reef Society Initiative mideastcrs.org (general contacts)

Prof John Burt
Faculty of Science
New York University-Abu Dhabi, PO Box 129188, Abu Dhabi, United Arab Emirates
Web: <http://nyuad.nyu.edu/academics/faculty/john-burt.html>
Email John.Burt@nyu.edu
Tel +97150221-+971502219269

Prof Jörg Wiedenmann
National Oceanography Centre, Southampton
University of Southampton, European Way, SO14 3ZH, Southampton U.K.
Web: <http://www.southampton.ac.uk/oes/research/staff/jwlw07.page>
Email: joerg.wiedenmann@noc.soton.ac.uk
Tel +44/0 7912 564356

