جامعة الملك عبدالعزيز
KING ABDULAZIZ UNIVERSITY

RED SEA
BIODIVERSITY PROJECT

SENCKENBERG
world of biodiversity

Red Sea Biodiversity Project

First Annual Report of Project Phase II

July 2015 – June 2016

King Abdulaziz University, Jeddah, Saudi Arabia

and

Senckenberg Nature Research Society, Frankfurt, Germany

The Faculty of Marine Sciences in Jeddah, Saudi Arabia and the Senckenberg Nature Research Society in Frankfurt, Germany are very grateful for the continuous support of the Red Sea Biodiversity Project by the high authorities of King Abdulaziz University.

Project leaders:

Dr. Ali M. Al-Aidaroos, Department of Marine Biology, Faculty of Marine Sciences, King Abdulaziz University, Jeddah
Dr. Moritz Sonnewald, Senckenberg Research Institute, Department of Marinne Zoology, Frankfurt a. M., Germany

Report compiled by:

Dr. Moritz Sonnewald, project leader and coordinator,

Senckenberg Research Institute, Frankfurt/ a. M., Germany, July 2016.

Cover picture:
Echinometra cf. mathaei (Blainville, 1825). A sea urchin recorded underwater near Al-Qunfudah by Sven Tränkner.

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Executive Summary

At the beginning of July 2015, the King Abdulaziz University (KAU) and the Senckenberg Research Institute (SRI) successfully entered into phase II of the Red Sea Biodiversity Project, a scientific research cooperation assessing the marine biodiversity of the Saudi Arabian sector of the Red Sea. The main goal of project phase II is to further explore, describe and document the present Saudi Arabian Red Sea biodiversity. Therefore, emphasis is put on continuing the thorough scientific description of all species collected during project phase I by means of multidisciplinary taxonomic identification methods, as well as the exploration of new realms and the liberation of results to science and public. The latter are achieved by cataloguing the species for the King Abdulaziz Marine Museum (KAUMM), the publication of results in high-ranked international journals and in a special issue about the Red Sea biodiversity, the setup of an exhibition at the Faculty of Marine Sciences in Jeddah and the information given in a new, Arabic version of the project homepage. In 2017 the exploration of new, yet undiscovered realms will be conducted in a research cruise with RV Al-Azizi to the deep-sea slopes of the north-eastern Red Sea, complemented by small-sized and aimed field trips to the surroundings of Jeddah. Most of these topics, along with the plans to lens a short documentary about the project, will be further developed on an upcoming project workshop in October 2016.

1. Project Governance

1.1 Change of the Project Governance Structure

The sudden decease of Prof. Dr. Michael Türkay from SRI at September 09, 2015, made necessary a change of the project governance structure, as he was one of the project leaders and member of the project steering committee.

At the second steering committee meeting of project phase II, which took place on Friday, November 27, 2015, a new project governance structure was adopted.

Hence, Prof. Dr. Pedro Martínez Arbizu from the German Center for Marine Biodiversity Research (a department of Senckenberg) in Wilhelmshaven was welcomed as a new member of the steering committee, while Dr. Moritz Sonnewald (SRI), in addition to his project coordinating duties, took over leading the project together with Prof. Dr. Ali Al-Aidaroos (KAU) (see chapter 1.2.2).

1.2 Steering Committee Meetings

1.2.1 First Steering Committee Meeting of Project Phase II

The first steering committee meeting of project phase II took place at SRI in Frankfurt am Main, June 7, 2015. The Steering Committee agreed on pursuing the following topics for the first year of project phase II:

- the start of project phase II was scheduled for July 01, 2015.
- shipping a share of identified and labelled samples back from Frankfurt to Jeddah for permanent storage at KAU
- limiting air tickets for the Steering Committee Meetings to economy class in order to minimize expenses
- limiting reimbursement for visiting scientists to a maximum of € 1.000 per month
- hiring Dr. Sonnewald as full-time project coordinator
- formulating an action plan for the due identification of the remaining samples from the Red Sea Surveys 2011-2014
- contacting an agency for the translation of the project homepage to Arabic
- accelerating the production of a field guide to the biodiversity of the Red Sea by preparing checklists of all animal groups as a first step
- adjusting the acknowledgements for project-related, scientific papers
- to schedule a workshop for all project scientists for 2017 for exchange of ideas and methods and the presentation of results
- to prepare an exhibition about the Red Sea biodiversity to be held in Jeddah

1.2.2 Second Steering Committee Meeting of Project Phase II

The second steering committee meeting of project phase II again took place at SRI in Frankfurt am Main, November 27, 2015. The main reason for this extraordinary meeting was the sudden decease of the SRI project manager Prof. Dr. Michael Türkay. The following decisions were made at this second meeting:

- the project governance structure was changed as mentioned in chapter 1.1
- priority was given to accelerate the translation of the homepage
- the discussion about the production of a field guide was moved to the project workshop in 2016
- the locality for the Red Sea Biodiversity exhibition was set to Obhur with a preferred opening in November 2016, being funded out of the project budget up to € 20.000, with Dr. Götz Reinicke from the German Oceanographic Museum (GOM) as a contact person for first planning
- the place for the project workshop was set to Wilhelmshaven in northern Germany, with the project coordinator assembling a list of participants and reserving the venue, at a total below or equal to € 30.000
- return of collections to KAU: a list of storage boxes and jars to be acquired for storage of the collections at KAU had to be assembled by the project coordinator; a first shipment was expected to be ready in April 2016
- thoughts were exchanged about the possibility producing a short documentary about the project
- as deep sea biodiversity research at the Red Sea is one of the main goals od project phase II, the possibility to use RV Al Azizi was discussed

1.2.3 Third Steering Committee Meeting of Project Phase II

The third steering committee Meeting took place at the German Center for Marine Biodiversity Research (DZMB) in Wilhelmshaven (Germany) at April 23, 2016, being an opportunity for the KAU steering committee members to get familiar with the workshop location and this marine SRI department conducted by Prof. Pedro Martínez Arbizu, the new member of the steering committee. Moreover, Dr. Götz

Reinicke (GOM) was invited to join the second part of the meeting in order to focus on the exhibition planning.
The following decisions were made during this third meeting:

- as the website translation was finished, Dr. Mohammed Ba-Akdah (KAU) was elected helping the project coordinator to continuously update the Arabic version of the homepage once running
- a first shipment containing identified and catalogued molluscs and crustaceans should be sent to KAU during may
- identification of species from the surveys should be further pursued by KAU and SRI scientists

2. Achievements during the first year of project phase II

2.1 Species identification and cataloguing

During the first year of project phase II (July 2015 - June 2016), 2109 series have already been catalogued at Senckenberg for KAUMM, while 746 series, containing 526 crustacean and 220 mollusc series were already sent back to Jeddah. The identification and cataloguing of stony corals was further pursued and is expected to be finished by October 2016. The share of catalogued series for KAUMM will be shipped back to Jeddah by then. In parallel, bryozoan identification is continuing.

2.1.1 Sponges

The Red Sea sponge biodiversity was accessed by Dr. Dirk Erpenbeck from the LMU in Munich by setting up a sponge barcode inventory of the Red Sea Surveys (Erpenbeck et al. 2016). Now, the identification of the sponges collected during the field surveys 2011-2013 is much easier. The barcodes, together with the outward appearance of the colonies, thin sections and spicula preparations will lead towards rapid species identification. Therefore, Dr. Nicole Voogd from Naturalis in Leiden was recently contacted, as she has a very good knowledge of Red Sea sponge taxonomy.

Dr. Voogd agreed together with her assistants to provide the species identification of Red Sea sponges whithin an adequate timeframe. Moreover, a publication by Dr. Oliver Voigt about the calcareous sponges from the Red Sea surveys will appear in the Red Sea Biodiversity special issue (see chapter 2.4).
Hence, the goal of project phase II concerning the sponges will be the majority to be identified, catalogued for the King Abdulaziz Marine Museum (KAUMM) and SRI, with the share for KAUMM being shipped to Jeddah and stored there according to current systematics.

2.1.2 Corals

The Red sea stony corals from the surveys 2011 and 2012 are currently reworked by Christian von Mach, an experienced researcher with a vast species knowledge. By October 2016, the stony corals are thus expected to be identified to species level in principal, being readily catalogued and photo-documented for KAUMM and SRI and to be shipped to Jeddah around the same time. Presumably, the stony corals will then be set up for KAUMM in systematic order at the first half of 2017.
The Red Sea soft corals are currently processed by Dr. Götz Reinicke from the German Oceanogeraphic Museum (GOM) by microscopic analyses and photographs. Dr. Reinicke will then contribute with this results to a special issue in the Journal “Marine Biodiversity”, called “Red Sea Biodiversity” (see chapter 2.4).

2.1.3 Polychaetes

Same as for sponges and corals, the polychaetes are expected to be principally identified, divided and catalogued for KAUMM and SRI with the share for KAUMM finally shipped to Jeddah within project phase II. Actually, the identification and microscopic documentation of the Family Polynoidae will potentially be part of a dissertation under supervision of Prof. Guillermo San Martin from the University of Madrid. Additionally it is likely Dr. Patricia Lattig from the National Museum of Natural Sciences (MNCN) in Madrid, Spain, will examine the sponge-associated Syllidae from the Red Sea Surveys in the near future.

2.1.4 Crustaceans

The Red Sea crustaceans are continuously identified and catalogued by Dr. Moritz Sonnewald, Dr. Vassily Spiridonov, Dr. Bernd Werding and Dr. Zdenek Duris together with Ahmad Al-Haj and Prof. Dr. Ali Al-Aidaroos from KAU.

Several contributions (Porcellanidae, Penaeidae, Palaemonidae and others) are planned for the Red Sea Biodiversity special issue in the Journal “Marine Biodiversity” (see chapter 2.4).

An expansive monograph by Dr. Spiridonov, Dr. Sonnewald and Dr. Türkay (deceased) about the Red Sea swimming crabs (Portunoidea) is expected to be published whithin 2016.

Overall, 600 crustacean series are already catalogued for KAUMM and about the same amount is expected to be catalogued until the end of project phase II.

A first shipment of catalogued crustaceans securely arrived at Jeddah for systematic arrangement in June 2016, while other shipments will follow in a short time period.

2.1.5 Molluscs

The identification of Red Sea macro-molluscs to species level has been successfully completed in early 2016. Cataloguing of these is expected to be finished in late 2016. A huge quantity of Molluscs catalogued for KAUMM has already been sent to Jeddah for systematic arrangement. Since the Red Sea macro-molluscs are already known very well, no extraordinarily new findings worth to be published were made.

Currently, the fine fractions containing micro-molluscs are being sorted and identification successfully began. The mollusc researchers Dr. Mohammed Baakdah and Dr. Adel Naguib from KAU, together with Dr. Ronald Janssen, head of SRI Malacology expect these micro-samples to provide new findings which may be also published in the beforementioned special issue.

2.1.6 Bryozoans

The Red Sea Bryozoans are pretty unknown to science. Therefore the identification of the samples from the Red Sea Surveys needs a lot of time. With new imaging technologies (Nano-CT) and 3D printing methods, Dr. Joachim Scholz (SRI head of Bryozoology), Dr. Adnan Salama (KAU), Dr. Andrei Grischenko (Perm State University) and colleagues are currently investigating the fine structures of motile bryozoan colonies. They achieved yet unpublished but pioneering results towards the bryozoan evolution, which are expected to be worth a contribution in an extraordinarily high-ranked Journal.

2.1.7 Fish

Research on Red Sea fish remarkably advanced in the first year of project phase II. Based on the determined species from the Red Sea Surveys and supported by the examination of reference- and type-material from various other international museums (Vienna, Leidern, Washington, Hawaii etc.), Dr. Ahmad Mal (KAU), Sergey Bogorodsky and colleagues already released three publications on new fish species from the Red Sea. Various other studies and contributions are in press, under review or planned for submission to the special issue in “Marine Biodiversity”.

In order to maximize the ichthyological publicatory output, it will be necessary to undertake additional, limited field surveys around the area of Jeddah in order to gain samples for comparison and to ensure the validity of pontenial new species, as in many cases, only one individual of a potentially new species is exisiting in the collections of the field surveys from 2011 to 2014.

All identified fish species from the Red Sea Surveys are about to be catalogued for KAUMM and SRI. A first shipment of fish series for KAUMM should be ready at the end of 2016.

2.2 New Project Homepage

The project homepage (www.redseabiodiversity.org) was transferred to a new design. The most important new feature concerning public awareness is the fully available translation of the homepage to Arabic (Fig. 1).

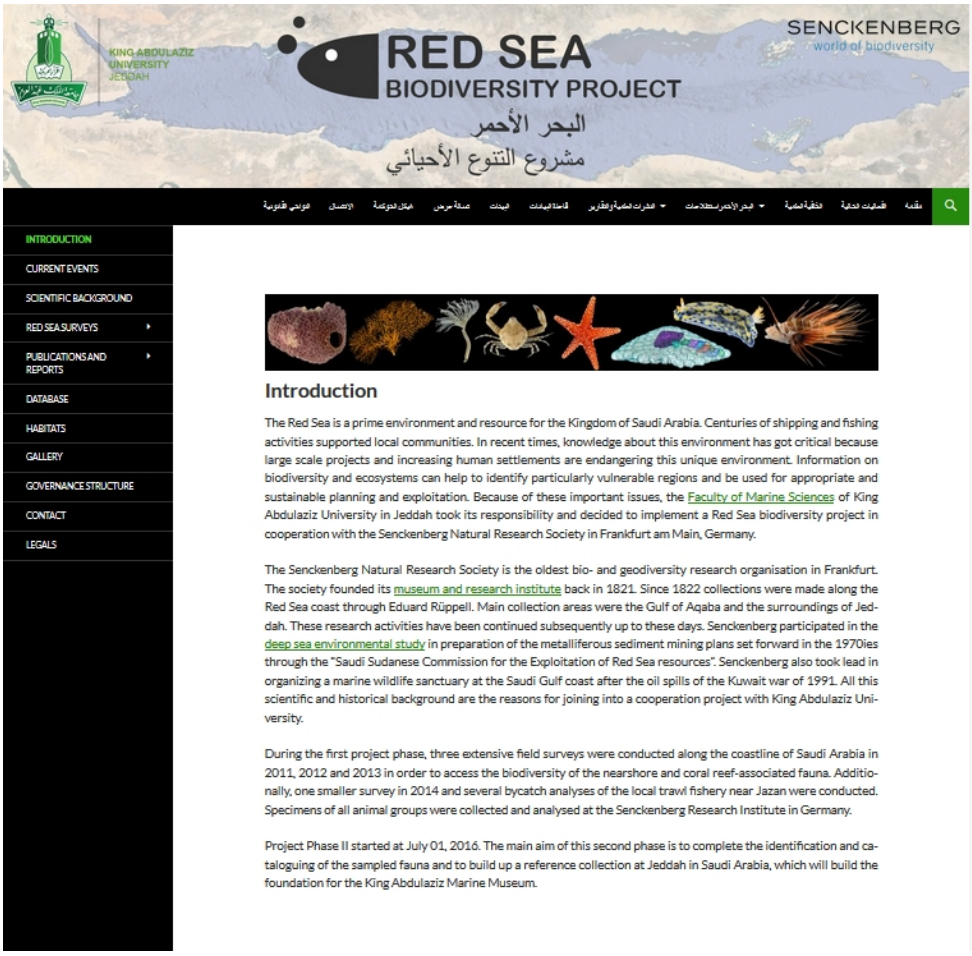

Fig. 1 New design of the project homepage (www.redseabiodiversity.org)

2.3 Red Sea Biodiversity Exhibition

First steps were taken for the setup of an exhibition, demonstrating the biodiversity of the Red Sea and the outcomes of the Red Sea Biodiversity project to scientists, students and to the public. The exhibition will take place near the marine station of the Faculty of Marine Sciences in Obhur (Jeddah, SA). There, a new building with a space of 250 m² to host the exhibition will be available, with its construction currently being

finished. The preferred date for the opening of the exhibition was in November 2016, but it turned out the quality of the exhibition would suffer sticking to this tight schedule.

Therefore it was decided to further develop the exhibition structure and goals during the upcoming project workshop at the German city of Wilhelmshaven in October 2016.

2.4 Special issue „Red Sea Biodiversity“

We are glad we were able to engage the Journal “Marine Biodiversity”, with an impact factor of 1.915 to welcome submissions to a special issue with the title “Red Sea Biodiversity” until October 01, 2016. This contribution towards a better understanding of the Red Sea Biodiversity is open not only to project members but to all interested scientists. The special issue will have the following focus:

The geographical focus of this special issue will be Saudi Arabian Red Sea territorial waters. Authors are encouraged to include data from other parts of the Red Sea for comparative purposes. Contributions should cover a broad range of topics concerning marine biodiversity research, including works on taxonomy and systematics, ecology, ecosystem health and management, long-term trends, neobiota and other related subjects.

This volume in “Marine Biodiversity” is expected to be an extraordinary contribution towards a better understanding of the faunal richness, as well as towards the ecology and preservation of the Red Sea.

2.5 Publications

In the first year of project phase II, five new publications (see below) were already released, while other contributions of project participants are currently reviewed for the special issue in the journal “Marine Biodiversity” (chapter 2.4). According to the results of a recent poll processed by all project participans, the special issue will contain another 12 publications about the material collected during the surveys.

Craig M., Bogorodsky, S.V., Randall, J.E. & Mal, A.O., 2015. *Lepadichthys bilineatus*, a new species of clingfish from Oman (Teleostei: Gobiesocidae), with a redescription of Lepadichthys erythraeus Briggs and Link from the Red Sea. Zootaxa 3990 (1): 113-122.

Hoese, D.F., Bogorodsky, S.V. & Mal, A.O., 2015. Description of a new species of *Trimma* (Perciformes: Gobiidae) from the Red Sea, with a discussion of the generic separation of Trimma and Priolepis. Zootaxa 4027 (4): 538-550.

Sakai, K., Türkay, M. & Al-Aidaroos, A. 2015. One new species of a new genus, *Kuwaitupogebia* gen. nov., in a new family, Kuwaitupogebiidae fam. nov., from Kuwait, and two new species of the genus Upogebia from the Red Sea (Decapoda, Thalassinidea). Crustaceana 88 (10-11) 1221-1234.

Erpenbeck, D., Voigt, O., Al-Aidaroos, A., Berumen M.L., Büttner , G., Catania, D., Guirguis, A.N., Paulay, G., Schätzle, S. & Wörheide, G. 2016. Molecular biodiversity of Red Sea demosponges. Marine Pollution Bulletin, in press. Available online 7 January 2016. doi: 10.1016/j.marpolbul.2015.12.004

Kovacic, M., Bogorodsky, S.V. & Mal, A.O. 2016. A new species of *Coryogalops* (Perciformes: Gobiidae) and the first adult record of *Feia nympha* from the Red Sea. Zootaxa 4097 (3): 341–352. DOI: 10.11646/zootaxa.4097.3.3

3. Perspectives

In the coming one-year period (July 2016 to June 2017), priority will be given to the development of an exhibition at Jeddah documenting the Red Sea biodiversity, which will also be a central topic at a workshop for project members at the German city Wilhelmshaven in October 2016. This workshop will also be a platform for scientific exchange among the project participants, the planning of a short project documentary, the planning of a field guide for the Saudi Arabian Red Sea coast and talks about a

planned three weeks research cruise with RV Al-Azizi to the deep-sea slopes (50 to 1000 m) of the north-eastern Red Sea to be conducted in spring 2017.

Besides, species identification and cataloguing along with publication works will proceed with particular emphasis.

5. Gallery

Fig. 2 *Trimma quadrimaculatum* n. sp, female holotype from Obhur creek (Hoese et al. 2015)

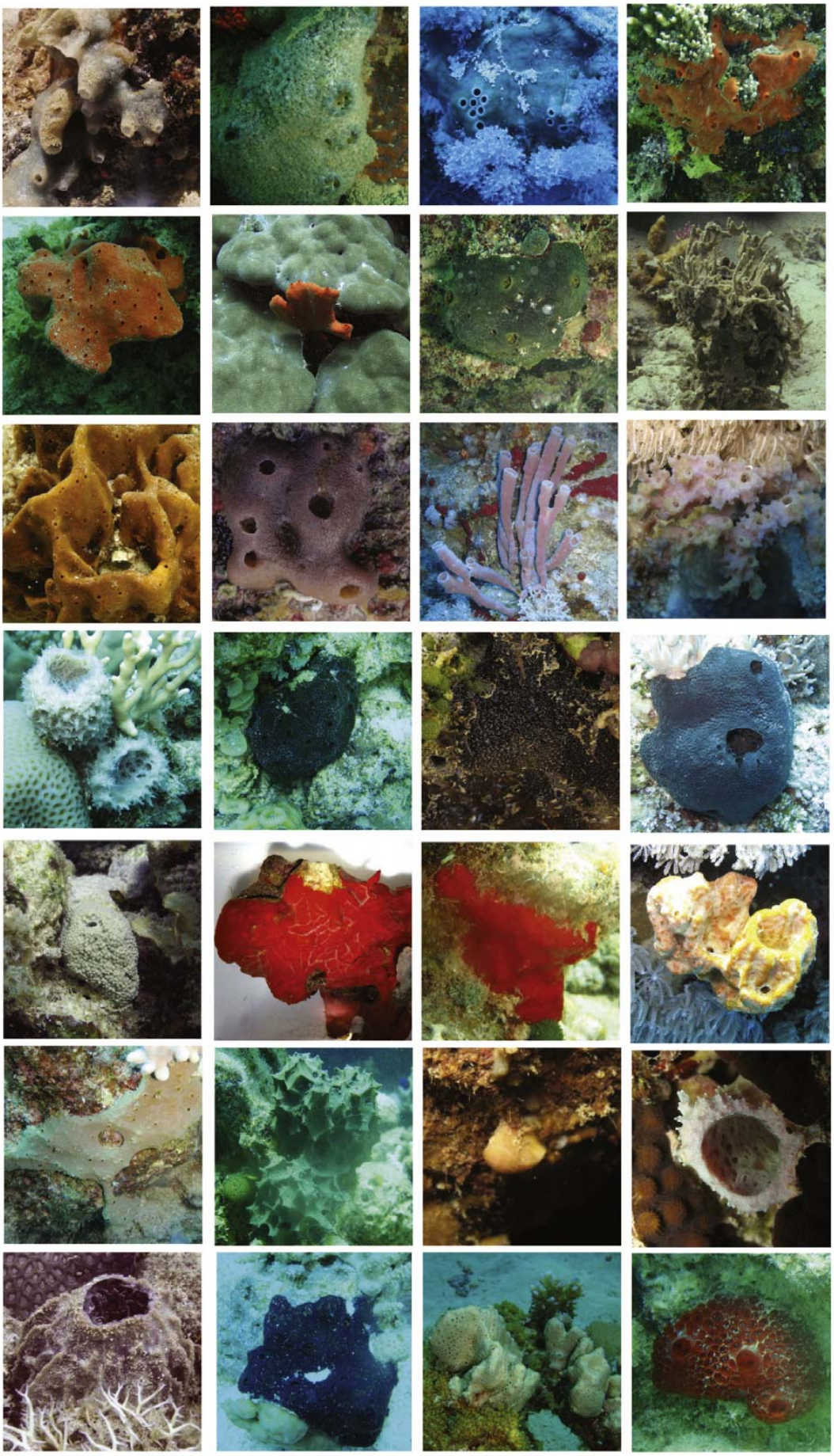

Fig. 3 Red Sea sponge diversity (after Erpenbeck et al. 2016)

Fig. 4 *Coryogalops nanus* sp. nov. holotype male from the Farasan Archipelago (after Kovacic et al. 2016)