ASCIDIAN NEWS*

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This has been a fairly quiet six months for me, ascidiologically. But next year Rosana Rocha and I will be teaching the next tunicate workshop in June in Panama; see the announcement below. And of course I hope to see many of you at the next Intl. Tunicata meeting in New York City in July.

There are **90** New Publications listed at the end of this issue. Please continue to send me your new papers, to be included in the next issue of AN.

***Ascidian News is not part of the scientific literature and should not be cited as such.**

NEWS AND VIEWS

1. The next **Taxonomy and Biology of Tunicates Workshop** at the Smithsonian's Bocas del Toro Tropical Research Institute in Panama will be **June 20-July 4, 2017**. **Deadline for applications is January 15, 2017**.
http://www.stri.si.edu/sites/taxonomy_training/future_courses/2017/2017_Taxonomy_Biology_Tunicates.html

The project ARTS: Integrative Research and Training in Tropical Taxonomy is coordinated by **Dr. Rachel Collin**, director of Bocas del Toro Smithsonian Tropical Research Station - STRI with the goal to integrate research with training to overcome the taxonomic impediment for six groups of tropical marine organisms: sponges, hydroids, sea anemones, tunicates, nemerteans, and algae. We are working together in Panama to enhance expertise and develop the next generation of taxonomists. Through a combination of original research, training workshops and development of online tools we hope to make the taxonomy and identification of these organisms more accessible to both expert and non-specialist workers in biodiversity and conservation. As a product of this project **Dr. Rosana M. Rocha** has developed a number of tools for training in tunicate identification, systematics, and taxonomy. This includes a series of How-To videos, an illustrated multilingual glossary of terms, and downloadable protocols. Detailed project information is available at http://bocasarts.weebly.com/ and the videos are available at http://bocasarts.weebly.com/tunicate-tools.html

2. The **9th Intl. Tunicata meeting** will be held **July 17-21, 2017** in New York City, at New York University. There will be a welcome reception on the evening of July 16th. For more information contact Lionel Christiaen (lc121@NYU.edu).

3. The next **International Summer Course** will be held at **Sugashima Marine Biological Laboratory**, Toba, Mie Prefecture, Japan, from **July 7 to July 14, 2017**. This course deals with experiments and lectures on basic developmental biology of sea urchins and ascidians, basic taxonomy, advanced course of experiments on genome editing and proteomics. Registration fee is 8,000 JPY (tentative).

Those who would like to attend are requested to send an e-mail to Dr. Hitoshi Sawada, Director, Sugashima Marine Biol. Laboratory (hsawada@bio.nagoya-u.ac.jp) by the end of March, 2017, using a subject name of "International Summer Course". Detailed information will be up-loaded at http://www.bio.nagoya-u.ac.jp/~SugashimaMBL/index-en.html.

4. The **next Intl. Invasive Sea Squirt Conference (IISSC)** will be **May 2-4, 2018** at Woods Hole Oceanographic Institution, Massachusetts. More information will be posted in future issues of AN. You can contact Mary Carman (mcarman@whoi.edu). For information on past conferences, see http://www.whoi.edu/main/sea-squirt-conference-v

5. From Cristian Cañestro (canestro@ub.edu): One thing that could be worthy to include in the Ascidian News is a "twitter account listing" with all researchers/labs that tweet about or love tunicates. Ours is for instance: @evodevogenomeUB.
If readers of AN would like to see a list included in the next AN, please send me (Gretchen) your twitter listing and I will include it in the next issue.

6. From your editor **Gretchen Lambert**: There are still new publications from Japan utilizing *Ciona robusta* but calling it *Ciona intestinalis*. As indicated last year in a previous issue of AN (#76) in great detail, and in 2 publications during 2015, the taxonomic proof that the Japanese species is *C. robusta* cannot be refuted. Please use this species name in future publications.

7. From **Francesco Mastrototaro** (francesco.mastrototaro@uniba.it): Riccardo Brunetti and I have completed a manual prepared for the Italian Zoological Society (UZI). It is presently in press on the series of "Fauna d'Italia" : ASCIDIACEA of the European Waters by Brunetti, Riccardo & Mastrototaro, Francesco. Fauna D'Italia Vol. LI, Calderini Publications, Bologna (Italy).

The aim of the volume is to provide a summary of the current knowledge of the ascidian fauna of the European waters delimited by the Arctic Ocean to the latitude 25°N with the western boundary marked by the Mid-Atlantic Ridge.

Every species is briefly described, paying attention to the morphological characters useful for species identification.

The work being addressed to a readership broader than the group specialists, a space devoted to the biology of the group has been felt useful to a better understanding of the original descriptions and illustrations, when available, integrated with the contributions of subsequent reviewers. Only consolidated synonyms as well as papers where more extensive descriptions of the individual taxa are given are included in the species accounts.

Dichotomus keys leading to the identification of all known families and genera and tabular keys with diagnostic characters for the European species within each genus are given.

We hope that our work will help young researchers in environmental studies, and excite renewed interest in taxonomy, a field of zoological research too much and too long neglected. The paper is divided in two parts**:**
Part one: Introduction; an overview of morphology and biology of Ascidians
Part two: Description of the species: a short description of 380 species (136 Aplousobranchiata; 67 Phlebobranchiata and 177 Stolodibranchiata) and their distribution in European waters.

WORK IN PROGRESS

1. From **John Ryland** (j.s.ryland@swansea.ac.uk):

John Ryland has, for some months, been working on the second (and highly revised) edition of the **Handbook of the Marine Fauna of North-west Europe** (P J Hayward and J S Ryland, eds), in which the Ascidiacea comprise most of Chapter 13 (Acorn-Worms and Sea Squirts). The biggest changes to this chapter are a consequence of the influx of non-native species now found in southern marinas and harbours and, in some cases, also spreading along open shores. These, sometimes unwelcome, arrivals include *Didemnum vexillum* Kott, *Perophora japonica* Oka, *Corella eumyota* Traustedt, *Asterocarpa humilis* (Heller), *Botrylloides diegensis* Ritter & Forsyth, and *B. violaceus* Oka, now included in the book. Some nomenclature in *Molgula* has been corrected but the genus overall remains in desperate need of study in European waters. As in the first edition (1995), there are dichotomous keys and line drawings to aid identification, some included for the first time. During an ascidian workshop held in Portaferry, Northern Ireland, in August 2008, difficulties were experienced with the main key; a corrected replacement was prepared but seems not to have been incorporated until the 2012 reprint. Unlike its predecessor, the new edition will include some colour plates, including one with photos of newly introduced ascidian species.

ABSTRACTS FROM RECENT MEETINGS

1. XIX Iberian Symposium on Marine Biology Studies. Porto (Portugal), 5-9 Sept. 2016.

Spatial heterogeneity, temporal homogeneity: genetic structure in harbor populations of the introduced ascidian *Styela plicata*. Mari Carmen Pineda[1], Beatriz Lorente[2], Susanna López-Legentil[3], Creu Palacin[2] and Xavier Turon[4]. [1] Australian Institute of Mar. Sci., Australia; [2] Univ. of Barcelona, Biodiversity Research Institute (IRBIO), Dept. of Animal Biology, Spain; [3] Univ. of North Carolina Wilmington, Dept. of Biol. & Marine Biol. and Center for Marine Science, USA; [4] Centre for Advanced Studies of Blanes (CEAB-CSIC), Spain xturon@ceab.csic.es

Spatio-temporal changes in genetic structure among populations provide crucial information on the dynamics of secondary spread of introduced marine species. However, the temporal component has been rarely taken into consideration in studies of population genetics of non-indigenous species. The present work analyses the genetic structure over spatial and temporal scales of Styela plicata, a solitary ascidian introduced in harbours and marinas of tropical and temperate waters. A fragment of the mitochondrial gene Cytochrome Oxidase

subunit I (COI) was sequenced in 395 individuals from 9 harbours along the NW Mediterranean coast and adjacent Atlantic waters (spatial span >1,200 Km) at two time points 5 years apart (2009-2014). The levels of gene diversity were relatively low for the 9 locations in both years. Analyses of genetic differentiation and distribution of molecular variance revealed a strong genetic structure, with significant differences among populations in many instances, but without appreciable differences among years. A low, but marginally significant, correlation between geographic distance and gene differentiation was found. Our results showed marked spatial structure but temporal genetic homogeneity, suggesting a limited role of recurrent, vessel-mediated transport of organisms in networks of small to medium-size harbours. Our study area is representative of many highly urbanized littorals with dense harbour settings. In these environments it seems that the episodic chance arrival of colonisers determines the structure of the harbour populations, and the genetic composition of these first-in individuals persists in the respective harbours at least over moderate time frames (5 years), encompassing ca. 20 generations of this species.

2. American Society for Microbiology, North Carolina Branch, Wilmington NC (USA) Oct. 1, 2016.

Aiding and abetting: characterizing the diversity, host-specificity, and potential function of microbial symbionts in introduced North Carolina ascidians. Evans J, López-Legentil S, Shenkar N, Erwin PM. LopezLegentils@uncw.edu

Several ascidian species have been introduced around the world, exhibiting remarkable success in crossing geographic borders and adapting to local environmental conditions. To examine the potential role of microbial symbionts in the success of these introductions, we determined the host-specificity of microbial communities inhabiting three ascidian species commonly found off the North Carolina coast and compared them with seawater samples. Replicate samples (n=5) of 2 worldwide introduced species: *Polyandrocarpa zorritensis* and *P. anguinea* were collected with replicate samples of ambient seawater (n=4) at the Wrightsville Beach Marina in September and October 2015, and one cryptogenic species: *Distaplia bermudensis* was collected at the Bridge Tender Marina (located 170 m away from the previous location) in July 2014. Microbial communities of ascidian hosts and ambient seawater were characterized by next-generation (Illumina) sequencing of 16S rRNA gene sequences. Ascidians hosted unique and diverse symbiont communities, consisting of 5,696 unique microbial OTUs (at 97% sequenced identity) from 47 bacterial and 3 archaeal phyla. Permutational multivariate analyses of variance revealed clear differentiation of ascidian symbionts compared to bacterioplankton in surrounding seawater and distinct microbial communities in each ascidian host species. Further, 103 universal core OTUs (present in all replicates of all 3 host ascidians) were identified, some of which have been previously described in the microbiome of marine invertebrates and have been linked to ammonia-oxidization, denitrifaction, pathogenesis, and heavy-metal processing, among other functions. These results suggest that the microbial symbionts in ascidians exhibit a high degree of host-specificity, forming intimate associations with their hosts that may contribute to their adaptation to new environments via increased tolerance thresholds and enhanced holobiont function.

3. The 10th Intl. Vanadium Symposium, Nov. 6-9, 2016, Taipei, Taiwan.

Vanadium accumulation and reduction in ascidians: contribution of symbiotic bacteria. T. Ueki, T. Maeshige, T. Hino, Tri K. Adi, and Romaidi (ueki@hiroshima-u.ac.jp).

Ascidians, also known as sea squirts or tunicates, can accumulate a high level of vanadium ions in blood cells. *Ascidia gemmata* has been reported to accumulate the highest levels of vanadium at 350 mM, which is 107-fold higher than the vanadium concentration in seawater. Vanadium ions are absorbed from natural seawater in a +5 state, reduced to a +4 state through the branchial sac, intestine, and blood plasma and are stored in a +3 state in vanadocytes. Several genes and proteins involved in this accumulation and reduction have been identified by our group in each organ. One of our currents topics is to study the contribution of bacteria for the accumulation and reduction of vanadium. The presence of specific group of symbiotic bacteria is often regarded as a correlation to nutrient absorption, immune response, and pathogenic interactions. Especially, the intestinal organ is internally exposed to natural seawater and harbors huge variety of bacteria, so called gutmicrobes. Intestinal bacteria are thought to be the first organisms affected by heavy metal discharge into the environment, which results in an increase in metal-resistant bacteria in the microenvironment. Thus, we started both metagenomic analysis and screening of bacteria that habit the intestine of vanadium-rich ascidians, as well as branchial basket which is also known as the organ to absorb vanadium from outer environment. We recently reported the isolation of vanadium-accumulating bacteria. These studies could contribute to both understanding the systematic mechanism of vanadium accumulation and reduction as well as the application use of bacteria for heavy metal accumulating system.

4. The 2016 mid-year meeting of The Crustacean Society, at the National University of Singapore, Singapore.
Investigating the symbiotic relationship between the caridean shrimp *Odontonia sibogae* and its ascidian hosts. Levitt-Barmats Y, Shenkar N. noa.shenkar@gmail.com

5. SETAC Europe 26th Annual Meeting, Nantes, 2016.
The solitary ascidians *Microcosmus exasperatus* and *Phallusia nigra* as potential bio-indicators of heavy metals contamination in marine environments. Tzafriri R. Shenkar N. noa.shenkar@gmail.com

6. The Israeli Association for Aquatic Sciences Annual meeting.
Siphon and neural complex regeneration in stolidobranch ascidians. Gordon T, Shenkar N. noa.shenkar@gmail.com

7. ParrotNet training school (EU COST actions) *Making a difference in Invasion Biology: Improving links between research, policy and practice*, 15-16 November, 2016, Marseille, France.
Assessing which biotic and a-biotic factors contribute to non-indigenous ascidians establishment on natural substrates. Gewing M, López-Legentil S, Shenkar N. noa.shenkar@gmail.com

8. Israel Zoological Society Annual Meeting December, 2016, Rehuvut, Israel.
Ascidians as bio-indicators of micro-plastic and phthalates in marine environments. Vered G, Kaplan A, Avisar D, Shenkar N. noa.shenkar@gmail.com

THESIS ABSTRACTS

Masako Mino received a Ph.D. from **Nagoya University** in March 25, 2016; her advisor was Dr. Hitoshi Sawada (hsawada@bio.nagoya-u.ac.jp). The main part of her Doctoral Dissertation has been published in Molecular Reproduction and Development 83: 347-358 (2016): Follicle cell trypsin-like protease HrOvochymase: Its cDNA cloning, localization, and involvement in the late stage of oogenesis in the ascidian *Halocynthia roretzi*.

NEW PUBLICATIONS

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deMayo, J. A., Maas, K. R., Klassen, J. L. and Balunas, M. J. 2016. Draft genome sequence of *Streptomyces* sp. AVP053U2 isolated from *Styela clava*, a tunicate collected in Long Island Sound. Genome Announc. **4**: epub.

Di Falco, F., Cammarata, M. and Vizzini, A. 2016. Molecular characterisation, evolution and expression analysis of g-type lysozymes in *Ciona intestinalis*. Dev. Comp. Immunol. **epub**:

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Ellis, V., Filip, N., Bishop, C. D., DeMont, M. E., Smith-Palmer, T. and Wyeth, R. C. 2016. A true test of colour effects on marine invertebrate larval settlement. J. Exp. Mar. Biol. Ecol. **483**: 156-161.

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Jeffery, W. R. 2016. The comparative organismal approach in evolutionary developmental biology: insights from ascidians and cavefish. In: Wassarman, P. M. (ed.), Current Topics in Developmental Biology. Burlington, Academic Press, pp. 489-500.

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