conservation purposes to understand the phylogeographic patterns between these populations.

Molecular conservation genetics

Molecular conservation genetics seeks to manage biological threats by protecting, maintaining and restoring unique species and their genetic diversity. The integration of population distribution mapping, identification of extrinsic environmental factor(s) and population genetic theory play a significant role in the qualitative and quantitative assessment of species status and determination of sustainable conservation strategies. Candidate organisms for molecular conservation genetic analysis typically have small fragmented populations and suffer from loss of genetic diversity due to inbreeding. This results in a decreased ability to evolve in response to stochastic events and thus a decline in population. For this reason, minimising the loss of genetic diversity from inbreeding and isolation is a major objective in genetic conservation and management.

Research at the University of Malta

The intention of this research is to conserve and manage the local population of the highly endangered marine fish species *Epinephelus marginatus* in the Maltese archipelago. Our lab will use conservation genetics to determine species sustainability within the Maltese populace. Data collected from microsatellite and mitochondrial DNA (mtDNA) molecular markers will be used to determine population differentiation within the Maltese population of dusky groupers and to determine their relatedness to proximal populations within the Mediterranean Sea. We will also be probing locally for the possible development of cryptic species and speciation. Devoid of the application of population genetics, we may preserve the incorrect population or squander precious rights on a populace that has become increasingly rare but not at risk of extinction.

Anyone interested in helping with this conservation project in the form of sample donation should please contact Molly Buchholz Sørensen.

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Conservation genetics

Its use in assessing the population structure of the Bluntnose Sixgill Shark

By Noel Vella

A wide range of elasmobranch species are caught annually around the Maltese Islands, in the central and southern Mediterranean, some of which are categorised as near-threatened, vulnerable, endangered, or even critically endangered, by the IUCN. Examples include *Hexanchus griseus* (bluntnose sixgill shark), *Squalus acanthias, Centrophorus granulosus* and *Leucoraja melitensis* (IUCN, 2006).

Nevertheless, even though their survival is being compromised, local scientific data that could back up and improve any management or conservation action plans for the protection of both the elasmobranchs and the markets associated with them has only begun to be compiled in recent years (Dalli, 2004; Dalli & Vella, 2006: poster presentation at the MarBEF Conference on Marine Research and General Assembly in Lecce, Italy, May 2006; Dalli & Vella, in prep.).

Over the past years, anthropological effects, mainly the development of better fishing strategies, have led to continuous exploitation of elasmobranchs, including sharks, both as target species and as by-catch. Due to this, there is growing concern regarding the decline of many shark species. Moreover, vulnerability is enhanced due to slow growth rates, high age of maturity, low offspring production per litter and lack of biological and demographical data, thus making them a special group of marine organisms for which more data needs to be collected and conservation strategies need to be designed. For this purpose, elasmobranchs need to be considered separately from teleost fishes as the latter have a different biology and exhibit different population structures and life-histories. Furthermore, there are a few hundred known shark species, each of which responds differently to the pressures imposed by exploitation. However, elasmobranchs are usually tackled as a single entity due to the

Bluntnose sixgill shark *Hexanchus griseus.*

lack of information on them, and this makes species-specific, effective conservation and sustainable harvesting plans impossible.

For this purpose, the bluntnose sixgill shark *Hexanchus griseus* was chosen as a candidate species requiring further study in the Central Mediterranean, since it is caught on a regular basis by fishermen (both as target and as by-catch) and data on its catches, biology and stocks are extremely limited.
Through this study, which has been running since 2004, a detailed assessment of its vulnerability to fisheries exploitation can be conducted on scientific data collected both from the field and through the use of genetic markers. Such research shall assess the genetic variability within the stock/s being exploited, thus determining the genetic structure and diversity within and among populations of this shark species, mainly around the Maltese Islands. Also, since sampling is being conducted over a period of years, data collected will help to pinpoint not only present genetic variation but also identify any seasonal/yearly changes in local stocks. Better understanding of genetic variation will ensure that, in the implementation of management plans, present and future generations will be protected through the maintenance of genetic variability that leads to reproductive vitality, resistance to disease and the ability to adapt to changing conditions.

Thus, with the aid of ecological, biological, economic and genetic data, a more holistic approach towards the conservation and long-term persistence of wild stocks, together with their genetic character and diversity, can be conducted. In this regard, both the FAO and IUCN admit a lack of knowledge and highlight the necessity for more scientific research in the area. Within this scenario, elasmobranch conservation is important for the important role that elasmobranchs play within marine ecosystems, where they usually occur among the top predators. In other terms, the latter may mean that a decline in elasmobranchs could have a significant effect on marine ecosystems, allowing other species to increase rapidly in number. This would be rather ironic considering that elasmobranchs have played a role in the equilibrium of the marine environment for more than 400 million years. Thus, this study aims to make an effective contribution to the better understanding of this deep-sea shark species and, furthermore, should provide a clearer picture of the present genetic stock in the Central Mediterranean region, thus helping to protect the species and the future of the fishermen who earn a living using this resource.

Samples of the species are being collected from various locations in the Mediterranean, and anyone wishing to contribute to this conservation molecular genetics research project through samples is most welcome to do so by contacting myself or Dr Adriana Vella (contact details below).

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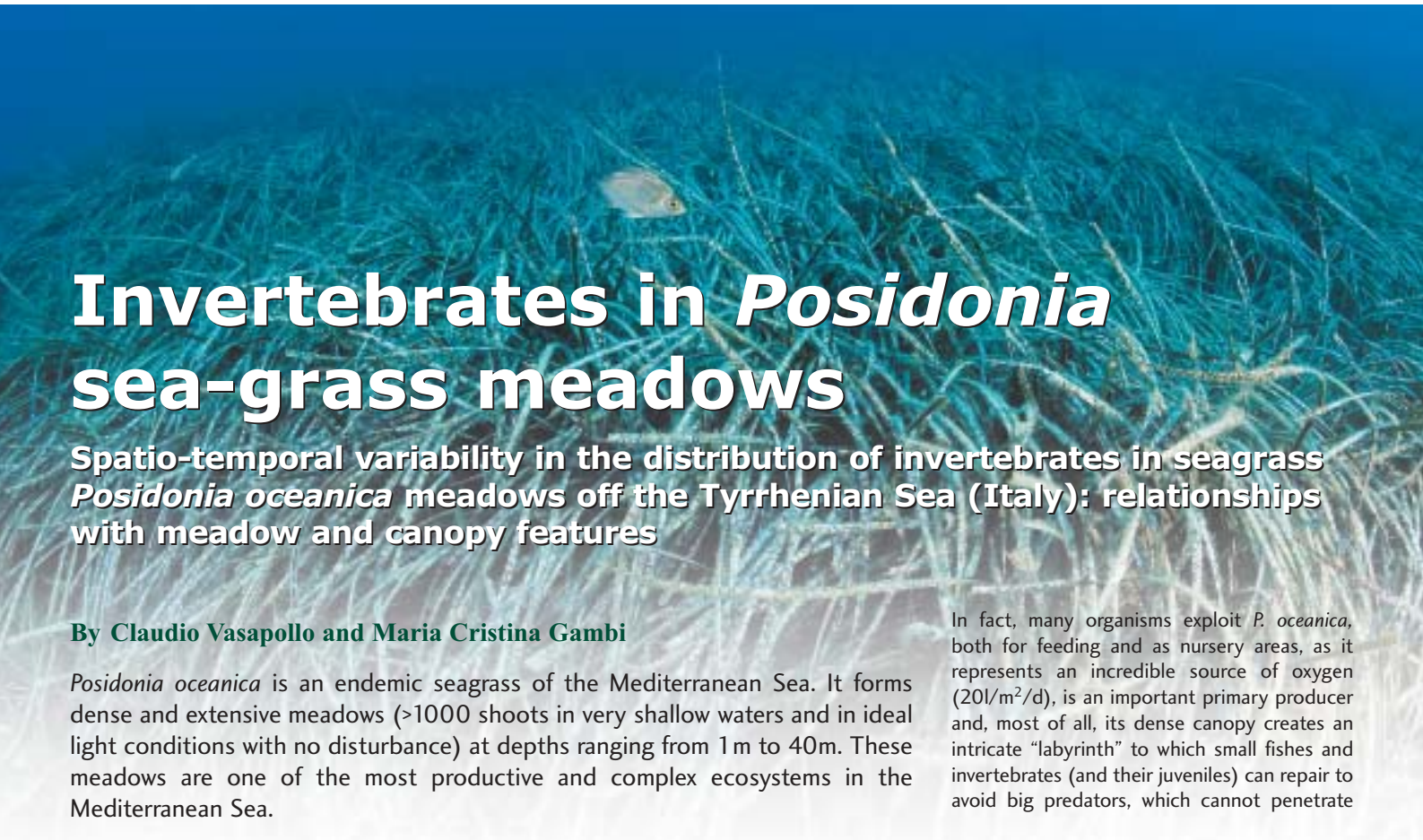

Invertebrates in *Posidonia* sea-grass meadows

Spatio-temporal variability in the distribution of invertebrates in seagrass *Posidonia oceanica* meadows off the Tyrrhenian Sea (Italy): relationships with meadow and canopy features

By Claudio Vasapollo and Maria Cristina Gambi

Posidonia oceanica is an endemic seagrass of the Mediterranean Sea. It forms dense and extensive meadows (>1000 shoots in very shallow waters and in ideal light conditions with no disturbance) at depths ranging from 1 m to 40m. These meadows are one of the most productive and complex ecosystems in the Mediterranean Sea.

In fact, many organisms exploit *P. oceanica*, both for feeding and as nursery areas, as it represents an incredible source of oxygen (20l/m^2/d), is an important primary producer and, most of all, its dense canopy creates an intricate "labyrinth" to which small fishes and invertebrates (and their juveniles) can repair to avoid big predators, which cannot penetrate