

EDITORIAL

Marine biodiversity as source of new drugs

Life in the oceans has an extraordinary biodiversity, including most of plant and animal taxa. Ecological pressures, including competition for space, the fouling of the surface, predation, and successful reproduction have led to the evolution of secondary metabolites and proteins with various biological activities (Cammarata et al. 2011; Maisano et al. 2013). Therefore, marine biodiversity is an exceptional reservoir of natural products, with different structural features from those of terrestrial natural products (Ireland et al. 1988). Only less than 1% of the natural products isolated from marine organisms have been examined for pharmacological activities (Fusetani 2000). These molecules are important for their potential applications as medical drugs. The majority of bioactive (antibacterial, antifungal, antiviral, cytotoxic or antifouling) molecules have been isolated from benthic animals such as sponges, cnidarians, bryozoans, molluscs, polychaetes, echinoderms, and ascidians. These chemical compounds serve as a form of defense against predators, competitors, and invading microorganisms and parasites. The study of marine organisms for their bioactive potential has increased in recent years and now one-third of best-selling drugs are either natural products or have been developed based on lead structures provided by nature (Roch et al. 1996), and almost 60% of drugs approved for cancer treatment are of natural origin (Amador et al. 2003). About 15,000 pharmacologically active compounds have been isolated from marine species, many of which are structurally unique and absent in terrestrial organisms (Newman & Cragg 2004). Despite the benefits for human health provided by these bioactive molecules, marine biodiversity is impaired by a wide variety of human activities and environmental change, for example overfishing and the use of high-impact fishing (Astrauskas et al. 1998; Iannibelli & Musmarra 2008). Pollutants such as PCBs, PHA heavy metal and dioxins can affect benthic intertidal invertebrates and fishes (Ferrando et al. 2006) and climate change can produce negative effects on animal populations and threaten their survival (Lehtonen 1998; Fenoglio et al. 2010). Therefore, all actions undertaken to mitigate these negative effects on the marine environment will not only maintain marine biodiver-

sity – of which much remains to be discovered – at current levels, but, through research, new molecules can be found that are suitable for use in natural medicine.

The *Italian Journal of Zoology* solicits its potential contributors to publish original research articles, short communications, comments and reviews on the isolation and characterization of natural bio-active molecules from marine animals and their modes of action.

Vincenzo Arizza
Assistant Editor

References

- Amador ML, Jimeno J, Paz-Ares L, Cortes-Funes H, Hidalgo M. 2003. Progress in the development and acquisition of anticancer agents from marine sources. *Annals of Oncology* 14:1607–1615.
- Astrauskas A, Bernotas E, Didrikas T. 1998. The impacts of the Ignalina Nuclear Power Plant effluent on fishes in Lithuania. *Italian Journal of Zoology* 65:461–464.
- Cammarata M, Salerno G, Parisi MG, Benenati G, Vizzini A, Vasta GR, Parrinello N. 2011. Primary structure and opsonic activity of an F-lectin from serum of the gilt head bream *Sparus aurata* (Pisces, Sparidae). *Italian Journal of Zoology* 79:34–43.
- Fenoglio S, Bo T, Cucco M, Mercalli L, Malacarne G. 2010. Effects of global climate change on freshwater biota: A review with special emphasis on the Italian situation. *Italian Journal of Zoology* 77:374–383.
- Ferrando S, Maisano M, Parrino V, Ferrando T, Girosi L, Tagliaferro G. 2006. Gut morphology and metallothionein immunoreactivity in *Liza aurata* from different heavy metal polluted environments. *Italian Journal of Zoology* 73:7–14.
- Fusetani N. 2000. Introduction. In: Fusetani N, editor. *Drugs from the sea*. Basel: Karger. pp. 1–5.
- Iannibelli M, Musmarra D. 2008. Effects of anti-trawling artificial reefs on fish assemblages: The case of Salerno Bay (Mediterranean Sea). *Italian Journal of Zoology* 75:385–394.
- Ireland CM, Roll DM, Molinski TF, Mc Kee TC, Zabriskie TM, Swersey JC. 1988. Uniqueness of the marine environment: Categories of marine natural products from invertebrates. In: Fautin DG, editor. *Biomedical importance of marine organisms*. San Francisco: Academy of Sciences. pp. 41–47.
- Lehtonen H. 1998. Does global warming threaten the existence of Arctic charr, *Salvelinus alpinus* (Salmonidae), in northern Finland? *Italian Journal of Zoology* 65:471–474.
- Maisano M, Trapani MR, Parrino V, Parisi MG, Cappello T, D'Agata A, Benenati G, Natalotto A, Maucceri A, Cammarata M. 2013. Haemolytic activity and characterization

- of nematocyst venom from *Pelagia noctiluca* (Cnidaria: Scyphozoa). *Italian Journal of Zoology* 80:168–176.
- Newman DJ, Cragg GM. 2004. Marine natural products and related compounds in clinical and advanced preclinical trials. *Journal of Natural Products* 67:1216–1238.
- Roch P, Hubert F, van Der Knaap W, Noël T. 1996. Present knowledge on the molecular basis of cytotoxicity, antibacterial activity and stress response in marine bivalves. *Italian Journal of Zoology* 63:311–316.