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FOREWORD

Hydrozoan biology: the view from a workshop

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The Hydrozoan Society was founded in 1985 with the aim of promoting all aspects of the study of hydrozoans, from taxonomy, ecology and physiology to molecular biology. Instead of holding meetings with a formal agenda of talks and lectures, the Society has carried out its objectives by organizing workshops, which encourage internal work groups and new collaboration. Conference sessions and round tables are nevertheless an important activity of the Society and are where the most recent research in the field of hydrozoan biology is presented. The 6th Workshop of the Hydrozoan Society was held in June 2007 at Plymouth in collaboration with the Marine Biological Association of the United Kingdom. It followed the same philosophy as before and as usual the working atmosphere was very open and enthusiastic, making it easy for young scientists to collaborate with more experienced researchers. This propitious environment has always been a key factor in the Society's activities (Boero, 2007) and it has distilled into one of its best legacies. The Society does not have an official consolidated structure, since it is the work of researchers during and between the workshops that gives it direction and consistency. In addition, although the structure is not very rigid, this actually promotes collaboration and the participation of specialists in joint projects and other activities.

Like previous meetings, the Plymouth Workshop hosted a wide range of themes related to the biology of hydrozoans (Mills *et al.*, 2000). The diversity of the work presented, however, was even broader than hitherto. The scientific community has evolved to such an extent that, although basic research on taxonomy and ecology continues hydrozoans also offer a resource increasingly used for studies related to genetics and molecular biology. Papers from this meeting report a bright spectrum of discoveries but do not pretend to include all strands of contemporary research. Many of the authors work at only one remove from live material in the field. Indeed, the Society's meetings are held within sight of the sea (and where freshwater forms such as hydra are rare).

A group of papers on ecology and distribution is full of surprises. The exploration of new habitats, such as the mid-water ecosystems, has led not only to the discovery of new species but also to an understanding of the functions of mid-water habitats and of new aspects of the biology and ecology of their pelagic fauna (Lindsay *et al.*, 2008). The capture of large amounts of phytoplankton and its digestion confirm the omnivorous and also herbivorous feeding of hydroids and hence their significant role in transferring energy from pelagic to benthic ecosystems (Gili *et al.*, 2008). Detailed studies even of highly surveyed areas, such as the Mediterranean, provide unexpected observations concerning unknown species and their life cycles, which demonstrate that even in the best-known areas there is still much to discover (Gravili *et al.*, 2008). This has been the case in the rediscovery of *Protohydra leuckarti* near Plymouth (Kilvington *et al.*, 2008). The study of colonization processes in species with a patchy distribution has also given unforeseen results, such as asexual reproduction processes not being those which favour aggregation, whereas patchiness in some species is explained by the poor dispersion capacity of larvae with a sexual origin (Marfenin & Belorustseva, 2008). In epiphytic hydrozoan communities, the pattern of biodiversity is related to microhabitat characteristics associated with the algal host's morphology, on a scale very different from that of environmental processes such as the physical drivers of glacial activities in Arctic communities (Ronowicz *et al.*, 2008). A study of the morphological characteristics of different ecological strategies such as phalanx and guerilla phenotypes in *Hydractinia* suggests that the traditional view of guerilla growth as an adaptive strategy is no longer correct, and that in several species guerilla-like growth is better seen as poor adaptation (Ferrell, 2008). In populations of tropical hydroids, studies of seasonal variation show that seasonal trends are linked to rainfall and hence to abundant food availability (Di Camillo *et al.*, 2008). Environmental differences in temperature and salinity influence the timing of asexual budding in a hydromedusa (*Proboscidactyla*) (Kawamura & Kubota, 2008). In bivalve-inhabiting hydroids, the liberation of medusae occurs regularly, and although they are all released at sunset this is not related to a decrease in light intensity (Kubota, 2008a). Hydrozoans which form large colonies, such as the genus *Eudendrium*, host rich epibiontic organisms that show a highly heterogeneous distribution over the colony as well as some unexpected seasonal patterns (Bavestrello *et al.*, 2008).

One of the most complex tasks in the taxonomic study of a phylum such as the Cnidaria is not only to reorganize existing information and situate species correctly according to their

morphological characteristics but also to deal with their evolutionary and geographical characters. This is the case of the genus *Gymnogonos*, where the discovery of a species in the Pacific has led to the theory that it might have arisen by neotony from the tropical *Corymorphidae* during the period of glacial cooling (Stepanjants & Svoboda, 2008). The exploration of areas that have only recently become accessible has led to the discovery of very interesting new species in the Aleutian Islands, Alaska (Brinckmann-Voss & Linder, 2008; and front cover), and the very surprising case of hydrozoans that live inside Arctic marine ice (Piraino *et al.*, 2008). Close associations of hydrozoans with other species can lead to extreme examples, such as a sharing in both partners of morphological modifications that reinforce mutual or symbiotic relationships (Puce *et al.*, 2008a). The study of unknown life cycles may reveal aspects of hydroid life histories that cast doubt on the original descriptions of these species or apparently established features of their biology (Di Vito *et al.*, 2008).

Phylogenetic studies of Hydrozoa bear on wider perspectives of the Cnidaria, and the use of molecular methods may suggest evolutionary sequences. Current studies confirm the monophyletic character of Leptothecata and Siphonophorae but cast doubt on the situation of Anthothecata. The two groups considered until now, Filifera and Capitata, could be subdivided into four separate filiferan clades (Cartwright *et al.*, 2008). A consideration of molecular data has shown that Trachymedusae is diphyletic, as well as suggesting that the polyp stage has been lost independently at least twice during trachyline evolution (Collins *et al.*, 2008).

The significance of new data from morphological and behavioural studies, especially those using living material, should not be underestimated. In Leptomedusae the discovery and description of rare morphotypes leads to an understanding and reconstruction of the morphogenetic evolutionary scenario (Kosevich, 2008). The cytomorphological study of *Polypodium*, a unique cnidarian parasite of fish eggs, suggests that this species is not aberrant as previously thought but is a relic of a major hydrozoan group (Raikova, 2008). Study of the organization of soft tissue in hydroids has shown that their structural complexity, comprising something more than two epithelial layers, does not contravene limits to the ground plan of this group of Hydrozoa (Pyataeva & Kosevich, 2008). A revision of the symbiotic relationships of hydrozoans with other phyla demonstrates that together with ecological processes, symbioses are a source of evolutionary diversity (Puce *et al.*, 2008b). In live specimens of well-known hydrozoan species, measurement of their morphological characteristics has led to the discovery of new species and of group structures (Gravier-Bonnet, 2008a): examples include colonial polymorphism (Gravier-Bonnet, 2008b), colonization processes in extreme situations (Kubota, 2008b) and aspects of bioluminescence of as yet unknown biological significance (Kubota *et al.*, 2008).

These contributions on the biology of Hydrozoa confirm their unusual morphological, ecological and physiological plasticity and a remarkable degree of adaptability to environmental conditions during their evolution. New advances are supported on one hand by more classical studies of taxonomy and morphology, and on the other by new genetic and molecular investigations. The hydrozoans are a zoological group whose wide distribution throughout marine environments is due in part to diversification of phases in the life cycle. In seeking to understand their biology, faunistic data and current developments in ecology and physiology show that whether in respect of their environment, geographical area or species, we still have a long way to go. The detailed papers which follow are full of new questions and contribute to the mainspring of zoological research across much broader horizons.

REFERENCES

Bavestrello G., Cerrano C., Di Camillo C., Puce S., Romagnoli T., Tazioli S. and Totti C. (2008) The ecology of protists epibiontic on marine hydroids. *Journal of the Marine Biological Association of the United Kingdom* 88, 1611–1617.

Boero F. (2007) The story of the Hydrozoan Society, 1983–2007. *Invertebrate Zoology* 4, 209–215.

Brinckmann-Voss A. and Lindner A. (2008) *Monocoryne colonialis* sp. nov., a colonial candelabrid hydroid (Cnidaria: Hydrozoa: Candelabridae) from the North Pacific. *Journal of the Marine Biological Association of the United Kingdom* 88, 1631–1635.

Cartwright P., Evans N.M., Dunn C.W., Marques A.C., Miglietta M.P., Schuchert P. and Collins A.G. (2008) Phylogenetics of Hydroidolina (Hydrozoa: Cnidaria). *Journal of the Marine Biological Association of the United Kingdom* 88, 1661–1670.

Collins A.G., Bentlage B., Lindner A., Lindsay D., Haddock S.H.D., Jarms G., Norenburg J.L., Jankowski T. and Cartwright P. (2008) Phylogenetics of Trachylina (Cnidaria: Hydrozoa) with new insights on the evolution of some problematical taxa. *Journal of the Marine Biological Association of the United Kingdom* 88, 1671–1683.

De Vito D., Boero F., Di Camillo C.G., Megina C. and Piraino S. (2008) Redescription of the zooxanthellate *Eudendrium moulouyensis* (Eudendriidae: Hydrozoa) from the Mediterranean Sea. *Journal of the Marine Biological Association of the United Kingdom* 88, 1653–1660.

Di Camillo C.G., Bavestrello G., Valisano L. and Puce S. (2008) Spatial and temporal distribution in a tropical hydroid assemblage. *Journal of the Marine Biological Association of the United Kingdom* 88, 1589–1599.

Ferrell D.L. (2008) Field fitness, phalanx–guerilla morphological variation, and symmetry of colonial growth the encrusting hydroid genus *Hydractinia*. *Journal of the Marine Biological Association of the United Kingdom* 88, 1577–1587.

Gili J-M., Duró A., Garcia-Valero J., Gasol J. M. and Rossi S. (2008) Herbivores in small carnivores: the benthic hydroids as an example. *Journal of the Marine Biological Association of the United Kingdom*, 1541–1546.

Gravier-Bonnet N. (2008a) The hydranth of *Salacia tetracythara* (Cnidaria: Hydrozoa: Sertulariidae) and its modified tentacles. *Journal of the Marine Biological Association of the United Kingdom* 88, 1721–1727.

Gravier-Bonnet N. (2008b) Polymorphism in hydroids: the extensible polyp of *Halecium halecinum* (Cnidaria, Hydrozoa, Haleciidae). *Journal of the Marine Biological Association of the United Kingdom* 88, 1729–1734.

Gravili C., D'Ambrosio P., Di Camillo C., Renna G., Bouillon J. and Boero F. (2008) *Clytia hummelincki* (Hydroidomedusae: Leptomedusae) in the Mediterranean Sea. *Journal of the Marine Biological Association of the United Kingdom* 88, 1547–1553.

Kawamura M. and Kubota S. (2008) Influences of temperature and salinity on asexual budding by a hydromedusa. *Journal of the Marine Biological Association of the United Kingdom* 88, 1601–1606.

Kilvington C.C., Collins A.G., Kosevich I.A., Pyataeva S.V. and Robson E.A. (2008) *Protohydra leuckarti* near Plymouth (Cnidaria:

https://doi.org/10.1017/S0025315408003202 Published online by Cambridge University Press

Hydrozoa). *Journal of the Marine Biological Association of the United Kingdom* 88, 1555–1557.

Kosevich I.A. (2008) Decoding the morphogenetic evolution of thecate hydroids. *Journal of the Marine Biological Association of the United Kingdom* 88, 1685–1692.

Kubota S. (2008a) Constant timing of medusa release in bivalve-inhabiting hydrozoans of the genus *Eugymnanthea* (Hydrozoa: Leptomedusae: Eirenidae). *Journal of the Marine Biological Association of the United Kingdom* 88, 1607–1609.

Kubota S. (2008b) Basal-disc creeping combined with rotation, an undescribed behaviour with preferred directionality in bivalve-inhabiting hydrozoans (Cnidaria: Hydrozoa: Leptomedusae). *Journal of the Marine Biological Association of the United Kingdom* 88, 1735–1739.

Kubota S., Pagliara P. and Gravili C. (2008) Fluorescence distribution pattern allows to distinguish two species of *Eugymnanthea* (Leptomedusae: Eirenidae). *Journal of the Marine Biological Association of the United Kingdom* 88, 1741–1744.

Lindsay D., Pagès F., Corbera J., Miyake H., Hunt J.C., Ichikawa T., Segawa K. and Yoshida H. (2008) The anthomedusan fauna of the Japan Trench: preliminary results from *in situ* surveys with manned and unmanned vehicles. *Journal of the Marine Biological Association of the United Kingdom* 88, 1519–1539.

Marfenin N.N. and Belorustseva S.A. (2008) How the distribution of hydroid colonies of *Laomedea flexuosa* is limited to a narrow belt along the lower littoral zone. *Journal of the Marine Biological Association of the United Kingdom* 88, 1559–1566.

Mills C.E., Boero F., Migotto A. and Gili J.M. (eds) (2000) Trends in hydrozoan biology—IV. *Scientia Marina* 64 (Supplement 1), 1–284.

Piraino S., Bluhm B.A., Gradinger R. and Boero F. (2008) *Sympagohydra tuuli* gen. nov. and sp. nov. (Cnidaria: Hydrozoa) a cool hydroid from the Arctic sea ice. *Journal of the Marine Biological Association of the United Kingdom* 88, 1637–1641.

Puce S., Cerrano C., Di Camillo C.G. and Bavestrello G. (2008a) Hydroidomedusae (Cnidaria: Hydrozoa) symbiotic radiation. *Journal of the Marine Biological Association of the United Kingdom* 88, 1713–1719.

Puce S., Di Camillo C. G. and Bavestrello G. (2008b) Hydroids symbiotic with octocorals from the Sulawesi Sea, Indonesia. *Journal of the Marine Biological Association of the United Kingdom* 88, 1643–1651.

Pyataeva S.V. and Kosevich I.A. (2008) Soft tissue organization in some sertulariid colonial hydroids (Hydrozoa: Sertulariidae). *Journal of the Marine Biological Association of the United Kingdom* 88, 1701–1711.

Raikova E.V. (2008) Cytomorphological peculiarities of *Polypodium hydriforme* (Cnidaria). *Journal of the Marine Biological Association of the United Kingdom* 88, 1693–1700.

Ronowicz M., Wlodarska-Kowalczuk M. and Kuklinski P. (2008) Factors influencing hydroids (Cnidaria: Hydrozoa) biodiversity and distribution in Arctic kelp forest. *Journal of the Marine Biological Association of the United Kingdom* 88, 1567–1575.

and

Stepanjants S.D. and Svoboda A. (2008) The genus *Gymnogonos* (Anthoathecata: Capitata: Corymorphidae)—redescription of known species and description of a new species from the North Pacific. *Journal of the Marine Biological Association of the United Kingdom* 88, 1619–1629.