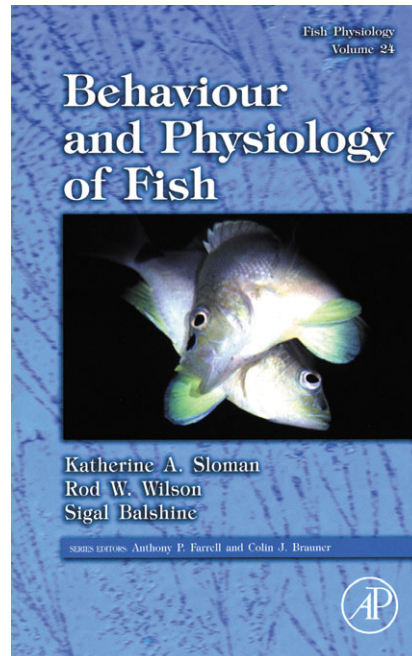


THERE'S SOMETHING FISHY GOING ON



Behaviour and Physiology of Fish

Edited by K. A. Sloman, R. W. Wilson and S. Balshine

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Animal behaviour and animal physiology have traditionally been studied in isolation but recently it has become increasingly fashionable to combine these two disciplines to address two fundamental questions: why do animals do what they do and what consequences does behaviour have upon whole-animal biology? In *Behaviour and Physiology of Fish*, Katherine Sloman, Rod Wilson and Sigal Balshine have eminently addressed the intimate interplay of the underlying physiological processes and behavioural output that enable us to better understand the proximate mechanisms and functions of fish behaviour. This text forms part of the renowned *Fish Physiology Volumes*, where cutting edge research is discussed by leaders in the particular field. Here, the editors have chosen to describe the physiological regulation, mechanisms and consequences of specific behaviours, namely antipredator strategies, circadian rhythms, communication, host–parasite interactions, learning and memory, salmonid migration, reproductive

behaviours, social status and finally the impact of contaminants upon these selected behaviours. Recent integrative studies have yielded important insights into changes at the molecular, cellular and physiological level that correlate with behavioural performance using fish models. Fish, being one of the most diverse animal taxa, also display an enormous diversity in life history, sensory systems and abiotic and biotic requirements, yet their physiology is comparable with that of other vertebrates and generally they are much easier and cheaper to maintain in the laboratory than mammals. Therefore, fish models have led to major advances in the field of animal behaviour and physiology that would be of interest to a wide audience.

A particular highlight is the entertaining and informative chapter on the physiology of antipredator behaviour, or as Mark Abrahams correctly states “*what you do with what you’ve got*”. Abrahams provides a thorough and delightful account of how to avoid being eaten *via* early detection of predators using a variety of sensory systems and fast-start escape responses that involve Mauthner cells in the brain, as well as detailing the environmental trade-offs made in the art of self defence.

A poorly understood area is that of host–parasite relationships. Most research has focused upon parasite biology, yet the host undergoes a variety of fascinating behavioural and physiological changes that dramatically alter phenotype. Obvious morphological and behavioural changes are visible in parasitized fish; for example, the ‘chin’ and bloated belly of sticklebacks infected with *Schistocephalus* and the impaired swimming performance of cyprinid fish infected with brain-dwelling trematodes. Sensory damage is also seen as a consequence of infections where myxosporean parasites destroy the inner ear of salmonids, causing erratic circular swimming, and eyefluks cause major impairments in visual acuity that can have detrimental effects on predator avoidance. Apart from having extremely unpleasant effects on their victims, parasites are of welfare concern in aquaculture since they cause major tissue damage to the host and result in economic loss. Therefore, the chapter describing the profound changes in parasitized fish behaviour and physiology by Iain Barber and Hazel Wright is especially enlightening. Outlining the remarkable changes in central nervous system and sensory function that are seen, Barber and Wright also describe how the infection imposes energetic costs that alter the behavioural output of many species but these changes are advantageous to the

parasite and ensure their transmission. Barber's excellent research on parasitized sticklebacks has demonstrated impaired antipredator behaviour that results in higher mortality from avian predators, who participate in the next phase of the parasite life cycle.

Reproduction and contribution to the next generation is the true measure of Darwinian fitness, and of course 'sex sells'. Therefore, Rui Oliveira's chapter on alternative reproductive tactics is particularly attractive. Intraspecific variation in securing matings is incredibly topical, and Oliveira's description of the underlying physiological correlates of reproductive phenotypes examines the neural and hormonal mechanisms of alternative mating strategies. Underhand tactics such as mimicking females in bass or sneaking in when fertilization takes place and releasing sperm in many salmonid species result in many small 'sneaker' males successfully securing matings in the face of competition by larger, competitive males. Sexual behaviour is further discussed by Norm Stacey and

Peter Sorensen in a comprehensive chapter about the attraction, specificity and action of reproductive pheromones. Pheromones are believed to have potent effects on the opposite sex in all animals, and the amazing consequences of these bile-based compounds in the aquatic world are thought to mediate large-scale migrations in sea lamprey. Hormone-based pheromones can have immediate behavioural responses on the male goldfish from first attraction through competition and precopulatory behaviour to postcopulatory behaviour that is completely dependent upon the release of specific pheromones from the female.

This text ends with examples of how anthropogenic contaminants disrupt the behaviours detailed in the preceding chapters, and here Sloman and Wilson discuss recent research on the interference of metals upon sensory systems through to impairments in whole-animal behaviour.

With reference to the title of this book review, there is indeed something fishy going on, and the link between behaviour

and physiology is detailed exquisitely here. I highly recommend this book to undergraduates and postgraduates who are interested in either realm or who intend to study a combination of mechanistic and functional questions regarding behaviour. Any fish biologist who wishes to understand the current state of the art should also read this book as a base for future studies. I do hope to see a second edition of this book since the editors tantalisingly mention genomics and proteomics in their introduction. Post-genomic technology should provide fresh new insight into the, as yet, elusive causes of particular behaviours in future studies. This is an exciting time for the field of behaviour and physiology and this book will provide an interesting read for those who share my enthusiasm.

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