

ISBE International Society for Behavioral Ecology Newsletter

Editor: Mariella E. Herberstein
Macquarie University, NSW 2109, Australia
Phone: +61 2 9850 6276 Fax +61 2 9850 8245
Email: m.herberstein@bio.mq.edu.au

web.unbc.ca/isbe/

Outgoing Editor: Ken A. Otter
University of Northern British Columbia,
Prince George, BC, V2N 4Z9, Canada
Phone: +250 960 5019 Fax: 250 960 5539
Email: otterk@unbc.ca

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Editorial

Outgoing Editor

So long, and thanks for all the fish

For those not initiated into the oddities of Douglas Adams' world, the title of this article is also the title of the fourth book in Adams' Hitchhiker's Guide to the Galaxy series. The reference is to the mysterious disappearance of dolphins from the world's oceans; it turns out they have fled the planet just before it is destroyed to make way for a hyperspace expressway. The final message the dolphins leave to their human neighbors is the words in the title above. The message was meant to express the gratitude of the dolphins for a long association with a group that, surprisingly, seemed quite happy to provide them with resources. In some respects, this is not entirely unlike the flood of enthusiastic people in our society willing to read books or attend workshops/conferences and then take extra effort to provide written reviews to include into the Newsletter. Often, I did not even have to ask, people just volunteered to do this. Some did not even wait for me to send them the book, they just went out and bought it themselves and sent me a review (incidentally, Editors love these people). When I did send out requests for reviews, I was far more likely to receive replies of "yes" than of "no" – I would be curious to know how many journal editors can say the same. Further, people always seem to pull me over at meetings and tell me how much they liked the Newsletter and that they wanted to contribute. I can honestly say that it is these people who have made the Newsletter what it has become over the years; the Editor has typically had the role of just sorting the material that comes in. To all of you who have contributed over the years, all I can say is "thanks, it truly has been a privilege".

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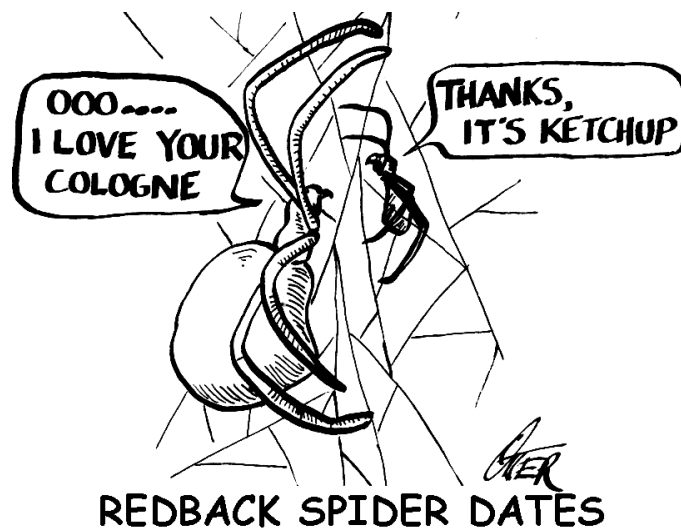
I have been the Editor of the Newsletter since spring of 2001, so this issue marks my 14th in a 6.5 year run. I have seen the Newsletter expand its content during this period, as well as make its debut on the web. One of the most fascinating things (for me) that happened during this time was the compilation of all the Newsletters, from Vol. 1 onwards, into pdf format so that we could create a complete archive on the website. When our Archivist, Wendy King sent these to me, I spent the better part of two days reading them all, and I was amazed to see the diversity of ideas and articles that have come and gone in the dynamic Newsletter this society runs. I feel very honored to have been a part of the history of this publication.

When one has been working on something for this long, it seems only natural that you would be a little reluctant to let it go. However, it is also extremely important to acknowledge what you have left to contribute to such an endeavor and, when ideas starts to dwindle, to realize it is time to let go and make way for someone else to reinvigorate things. This process started for me a year ago when we considered a number of nominees for the Associate Editor's position, who would ultimately take over from me. Mariella graciously agreed to step into the role of Associate Editor, and quickly began suggesting new ideas for content and themes. She brought that needed boost for me to make this torch-passing final year a very exciting time, and I think the society has been lucky in identifying a promising new Editor.

In reality, I have had to do very little for this current issue, as Mariella has taken on the task of contacting all the contributors, gathering and assimilating the content, pasting things together and passing it to me for feedback. I have had the relatively easy task of doing final edits on a largely-completed Newsletter! It is a wonderful feeling to know that I am leaving the Newsletter in good hands. In the issues to come, you will begin to see the implementation of various ideas that Mariella has come up with, or were suggested in a survey she developed and sent out this winter (the results of which are reported in this Newsletter). One of these that I am particularly keen to see develop is spotlighting current research themes and projects being conducted by ISBE members, particularly with a focus on work being done by students and young faculty/researchers. This is a venture that I think is very important, and I would encourage people to suggest either their own work or that of colleagues and peers they know for consideration; our society, like the Newsletter, needs the constant rejuvenation that comes with new ideas and fresh perspectives.

I am sure this will not be my final involvement in the Newsletter – I have to have somewhere to send my cartoons. However, I am looking forward to watching from the sidelines to see where we go from here. Thank you for the confidence and freedom the society has given me to run with my ideas, and I will see you all in Cornell in 2008.

Ken Otter
Outgoing Editor



Newsletter Editor Don't Panic

I, too, am familiar with Douglas Adam's work, and indeed, did not panic when Jack Bradbury asked me if I would agree to become the Associate Newsletter Editor with a view to taking over from Ken Otter in 2007. Working with Ken on the last 2 issues of the ISBE newsletter has been by far more enjoyable and interesting than many of my other everyday duties. So I am very grateful for having been nominated for this post.

Ken is handing over a newsletter that is not only in great shape but is also great looking. It is thanks to his commitment, hard work and enthusiasm that I now take over a smooth and slick production of the ISBE newsletter. Under Ken's editorship, the newsletter has produced many important discussions, has gone online and has finally distilled the humor of behavioral

ecologists in the shape of cartoons. I am particularly thankful to Ken for his help and support that made my first newsletter so easy and enjoyable!

As with previous editors, the newsletter is shaped by needs and demands of the members of the society. Feedback received from the questionnaire in December 2006 (see page 6 for full details) suggests that members want to see more society news, especially about the newer members. A new newsletter item (*Spotlight on...* see page 8 for details) is designed to address this request. I look forward to receiving more suggestions, request and submissions for the ISBE newsletter.

Mariella Herberstein
Newsletter Editor

CONTRIBUTING TO THE ISBE NEWSLETTER

The ISBE Newsletter publishes Book Reviews, Conference and Workshop Reviews and Commentary Articles of interest to the *International Society for Behavioral Ecology*. *The ISBE Newsletter will only consider work that is not already published or intended to be submitted for publication elsewhere.*

Book Reviews: Reviews are generally solicited by the Editor as new books arrive at the office, and are deemed to be of interest to the society. Persons involved in the publishing of books who would like these to be considered for review in the Newsletter may contact the Editor and arrange for their publisher to forward a review copy to this office. Authors may submit a list of possible reviewers. Alternately, members who wish to review a particular text should contact the Editor. The Editor will provide reviewers with instructions and a style sheet. Reviews are typically 1500-2000 Words.

Workshop/Conference Reviews: Workshop and/or Conference reviews should be prepared in one of the following two formats. **Brief synopses** (max 1500 words) may be submitted by either participants or conference organizers at the regular newsletter deadlines. These can include synopses of workshops that will be published in more detailed accounts (book or special journals), and should include information as to where the information will be published. **Longer reports** (max 3000 words) will be considered from large workshops/conferences for which other publications are not stemming. The purpose of the latter format is to provide a venue to disseminate information and discussions that would otherwise not be available to non-conference participants. Anyone attending such a workshop and wishing to publish in the Newsletter should contact the Editor at least **one month** prior to submission deadlines. Reports should aim at a critical assessment of the conference, as well as a synthesis of the convergent ideas presented. A synopsis of future directions of research that were reached at the end of the conference should also be included. Anyone attending the workshops may submit reports, but preference will be given to submissions not authored by conference organizers. A single application for a workshop will be considered, so it may be appropriate to agree upon a reporter at the conference. Graduate students and postdocs are strongly encouraged to consider contributing to writing these reports.

Commentaries: Responses to commentary articles published in the newsletter or articles eliciting discussion on topics relevant to the society will be considered for publication. Authors of such articles should contact the Editor at least **one month** prior to regular submission deadlines to outline the content of the article. The Editor may request submission of the article earlier than regular deadline should outside reviewing be deemed necessary.

Cartoons: Cartoonists and other artists are encouraged to submit artwork, either in hardcopy, or as TIFF or high resolution (300 dpi) GIF files. All cartoons published in the newsletter will be credited to the illustrator, and will appear on the Newsletter's website (web.unbc.ca/isbe/newsletter).

Deadlines for submission to the Autumn newsletter will be 1 September 2007.

Current Executive

President

Marlene Zuk

Department of Biology
Spieth Hall 3344
University of California
Riverside, CA 92521
Tel: +1 951 827 3952
Fax: +1 951 827 4286
E-mail: marlene.zuk@ucr.edu

Past-President

Jack Bradbury

Cornell University Lab of Ornithology
159 Sapsucker Woods Road
Ithaca NY 14850 USA
Tel: +1 607 254 2493
Fax: +1 607 254 2439
E-mail: jwb25@cornell.edu

President-elect

Patricia Monaghan

Division of Environmental & Evolutionary Biology
Graham Kerr Building University of Glasgow Glasgow
G12 8QQ Scotland, UK
Tel: +141 330 6640
Fax: +141 330 5971
Email: p.monaghan@bio.gla.ac.uk

Secretary

Robert Magrath

School of Botany and Zoology
Australian National University
Canberra 0200, Australia
Tel: +61 2 6125 3060
Fax: +61 2 6125 5573
Email: robert.magrath@anu.edu.au

Treasurer

Walt Koenig

Hastings Reservation
38601 E. Carmel Valley Rd.
Carmel Valley, CA 93924 U.S.A.
Tel: +1 831 659 5981
Fax: +1 831 659 0150
Email: wicker@uclink4.berkeley.edu

Councilors

Naomi Langmore

School of Botany and Zoology
Australian National University
Canberra ACT 0200, Australia
Tel: +61 2 6125 8436
Fax: +61 2 6125 5573
Email: Naomi.Langmore@anu.edu.au

Mats Olsson

School of Biological Sciences
University of Wollongong
New South Wales 2522
Australia
Tel: +61 2 4221 3957
Fax: +61 2 4221 4135
Email: molson@mirapoint.uow.edu.au

Rebecca Kilner

Zoology Department
University of Cambridge
Downing Street, Cambridge CB2 3EJ, UK
Tel: +44 (0) 1223 331 766
Fax: +44 (0) 1223 336 676
Email: rmk1002@hermes.cam.ac.uk

Michael Jennions

School of Botany & Zoology
The Australian National University
Canberra ACT 0200, Australia
Tel: +61 2 6125 3540
Fax: +61 2 6125 5573
Email: michael.jennions@anu.edu.au

Society News

Most Society News – workshops, conferences and job postings – is now publicized on our website (web.unbc.ca/isbe/newsletter). This allows ads and announcements to be posted shortly after receipt so that deadlines falling between newsletter distributions can be advertised. If you would like to advertise workshops, conferences or job postings of interest to the society, contact Mariella Herberstein (m.herberstein@bio.mq.edu.au) for posting.

MEMBERSHIP AND SUBSCRIPTION OPTIONS

Subscription to *Behavioral Ecology* is no longer required to be a member of the International Society for Behavioral Ecology. Everyone now has the option to join the society without taking a subscription to the journal. Such memberships will receive the Newsletter and announcements for the biennial conference. For those who wish to continue their subscription to *Behavioral Ecology* as well as be a member of the society, this option is also available. Information on this process is found on the society's (web.unbc.ca/isbe/ISBEmembership.htm) and Oxford University Press' *Behavioral Ecology* webpages (beheco.oupjournals.org).

DONATED SUBSCRIPTION PROGRAMME

Please help colleagues in need. Every donation will help increase scientific contacts across the world. In a time when nationalism is again raising its ugly head, this is more important than ever. For details, see the advertisement on the inside back cover of *Behavioral Ecology* volume 12(4).

ISBE 2008

The twelfth congress of the International Society for Behavioral Ecology will be held at Cornell University in Ithaca, New York, 9th-14th August 2008. Look for updates on the official website:

<http://isbe2008cornell.org/>

For more information contact
info@isbe2008cornell.org



INTERNATIONAL SOCIETY FOR BEHAVIORAL ECOLOGY
CORNELL UNIVERSITY • 2008

JOB AND STUDENTSHIP POSTINGS

Between the previous issue of the Newsletter (18(1)) and this issue, there have been **five faculty, three post-doc, and several PhD postings** on the Newsletter's website. However, since most of the application deadlines fall between physical copies of the Newsletter being published, or new ads are submitted after the Newsletter has gone to press, members should make sure they check out the website pages frequently:
<http://web.unbc.ca/isbe/newsletter>

- select "Ads and Positions" to see all currently available jobs

If you wish to post an advertisement for faculty, postdoc, graduate student, or field assistant positions in your lab or department, please send these to Mariella Herberstein (m.herberstein@bio.mq.edu.au).

WORKSHOPS AND MEETINGS

Conferences of other societies or workshops that may be of interest to the Society's members can be advertised on the Newsletter website (contact Mariella Herberstein for posting). Titles and dates of conferences are listed on page 27 and will be posted on the webpage.

ISBE Members Questionnaire and Feedback

In December 2006, I emailed all ISBE members for whom Oxford University Press (OUP) had email addresses. Of the 743 members current in 2006, only 497 had deposited their email addresses with OUP. Moreover, when I emailed those 497 members, only 422 emails actually arrived, the rest bounced. So while I aimed to target as many ISBE members as possible, I only made contact with around 57% and of those only 26% responded (15% of the entire ISBE population).

The questionnaire itself was very short, comprised of 3 questions:

1. Currently the ISBE newsletter contains: book reviews, commentaries, workshop/conference reviews, and cartoons. What other contributions would you like to see in the newsletter? (89 respondents, 21 skipped this question)
2. Do you regularly receive the ISBE newsletter, either by itself or together with the Journal? (110 respondents, 0 skipped this question)
3. Would you agree or object if the newsletter were to be distributed electronically in future? (110 respondents, 0 skipped this question)

The suggestions for new items in the newsletter were quite varied, but several themes emerged. Many respondents (33) were happy with the newsletter as it was or had no suggestions. The remaining respondents had one or more suggestion. The most numerous (19) request was for more **society news**: news of new members, features of members' research activities, member profiles, spotlighting a researcher and their lab, highlighting student research, obituaries, etc. The second most requested item for the newsletter (15) was a **list of related conferences**. A number of requests related to using the newsletter for more **scientific pursuit** such as highlighting new methods, discussions of new concepts, ideas or papers, and commentaries on exciting new results or controversies. There were some requests (7) to **post jobs and funding** in the newsletter and a couple of request to **publish the acceptance rates of Behavioral Ecology**.

Reassuringly, the vast majority of responding members regularly receive the ISBE newsletter (Fig. 1). The majority of responding members were also in favor of receiving the newsletter electronically.

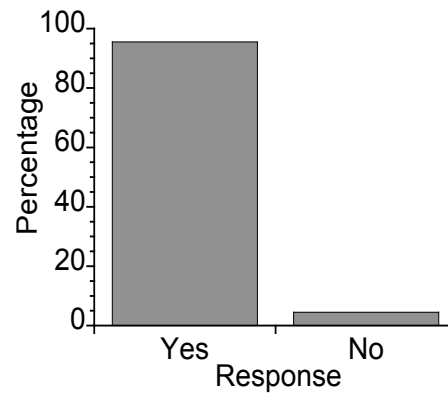


Fig. 1. Response to the question: Do you regularly receive the ISBE newsletter?

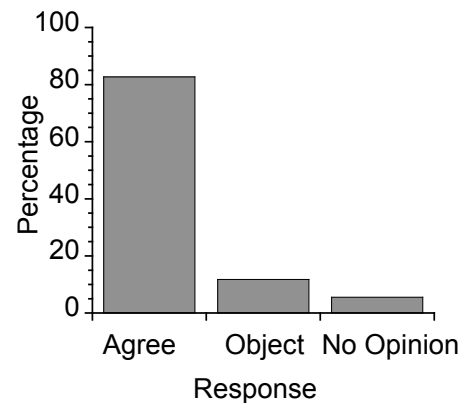


Fig. 2. Response to the question: Would you agree or object if the newsletter were to be distributed electronically?

The outcome of this questionnaire raises several issues that need to be addressed. The most obvious is that I was only able to obtain email addresses of 67% of members. Whether or not members respond to questionnaires or elections is up to each member, but not being able to reach a substantial proportion of members in the first place may be an issue that the society needs to deal with.

The low response rate to the questionnaire is also of some concern as this newsletter services all members of the society, not just the 15% that actually responded. Therefore, I would like to encourage all members that did not have the opportunity to respond to the questionnaire to email me directly.

The distribution of the printed newsletter via OUP seems

to work very well and respondents seem to be open to receiving the newsletter electronically. Electronic distribution would have several advantages but also disadvantages. An electronic newsletter could be produced faster and cheaper, we could have more issues per year (rather than just two) and the newsletters would be more up-to-date. However, we only have the emails of 67% of members and unless we can reach all members electronically, the newsletter should stay in its printed form.

The suggestions for new items in the newsletter were very helpful and I am happy to try to incorporate at least some of them. **Society news:** I am proposing a new item where recently finished PhD or Masters students are given the opportunity to introduce themselves and their research to the society (see also page 8 to find out how to nominate). This, I hope, will entice the new generation of behavioral ecologists to become members of and actively contribute to the society. Furthermore, a society newsletter should also always have room for obituaries of its members. Please send me any appropriate material.

List of related conferences: The ISBE newsletter has always published a short list of related conferences and workshops with more detailed information on the ISBE website. My plans are to continue this service to members. Please email me with any conferences or workshops you wish to advertise.

Scientific pursuits: Requests for using the newsletter for dynamic and controversial debate over theory or method are certainly exciting. But often such debates run out of steam very quickly, especially if the newsletter remains at 2 issues per year. The ISBE newsletter has had various

formats of scientific discussions, including a *Forum* on timely issues and *Commentaries*. The newsletter's probably most successful recent *Commentary* was Montgomerie and Birkhead's *A Beginners Guide to Scientific Misconduct* (May 2005), which has subsequently been reprinted in the newsletters of both the Ethological Society and the Association for the Study of Animal Behaviour (ASAB). I am certainly in favor of making the newsletter available for commentaries and discussion of controversial issues and would encourage all members to email me with proposals.

Jobs and funding: In its current form (two issues per year) the newsletter is too infrequent for job postings and funding opportunities. Instead, the society website (<http://web.unbc.ca/isbe>) can be used. Please email me any relevant information.

Publish the acceptance rates of *Behavioral Ecology*: Every two years, the editor in chief provides a report to the society, which is published in the newsletter since 2000. Vital statistics, such as acceptance and rejection rates can be extracted from this report. The reports can also be viewed on the society website (under society news).

In summary, I imagine this questionnaire was only the beginning of more discussion on the scope and direction of the newsletter. I anticipate regular follow-up questionnaires to ensure this newsletter serves the society to its best capacity.

Mariella Herberstein
Newsletter Editor

Spotlight On.....

A newsletter item for advanced postgraduate students and recent post-docs.

Introduce yourself, your research and research interests to the society.

Nominate yourself for the autumn issue by emailing Mariella (m.herberstein@bio.mq.edu.au) by Sept. 1st.

ISBE membership is essential!

If multiple nominations are received, 3-4 entries will be selected randomly.

Book Reviews

Sperm Competition in Humans: Classic and Contemporary Readings

Todd K. Shackelford & Nicholas Pound (Eds.). Springer, 2006. 283 Pp.
ISBN: 978-0-387-28036-3

There is something immediately confronting about *Sperm Competition in Humans* - and I'm not talking about the subject matter (that, of course, goes without saying). No, what I'm referring to here is the book's cover design. I know that one should never judge a book by its cover, but it is difficult to be apathetic when confronted with a cover depicting (among other things) hundreds of tiny pink sperm set against a lascivious background of shocking magenta. Delving a bit deeper, one discovers that *Sperm Competition in Humans* is a book that - like its garish exterior - attempts something rather daring: it is a book that seeks to bring together, in a single volume, many of the most important papers published on the subject of human sperm competition. It is daring because, undoubtedly, there will be questions over what constitutes a paper 'worthy' of being included in the book (more on that a little later). And I suspect that many will also have difficulties buying a book that is, in essence, a compilation of (mostly) published papers (and an expensive compilation at that). But for anyone who can justify the asking price, this is a book that offers a tantalising overview of a highly fascinating field imbued with controversy and conflict, and brimming with research ideas.

For those unfamiliar with the subject matter, sperm competition is the term given to the competition that arises between the sperm of different males as they attempt to fertilize a female's eggs. *Sperm Competition in Humans* samples the growing body of evidence (some convincing, others less so) suggesting that, like many other species, sperm competition may have been an important selective force shaping anatomical, behavioral and physiological adaptations in humans.

Sperm Competition in Humans is a book arranged in three parts but before readers get to these they are first treated to a thought-provoking forward by Randy Thornhill. In the forward, Thornhill not only provides a succinct overview of the subject matter, but also posits some compelling arguments for the direction of future research. In particular, he suggests that studies should pay closer attention to women's 'dual sexuality', that is, differences in female sexuality expressed during the fertile and infertile phases of the menstrual cycle (which, apparently, is adapted to sperm competition.) According

to Thornhill, "[t]he future study of human sperm competition will benefit from more widely adopting this broader theoretical perspective on human sexuality" (page xv), something that has been largely overlooked by studies to date.

Part 1 of this book presents an excellent introduction to the subject. The first chapter by Nicholas Pound, Todd Shackelford and Aaron Goetz, offers a comprehensive, honest and insightful discussion of the state of research on human sperm competition in terms of both male and female responses. Importantly, this chapter places the others in the book within a broader research context, and highlights areas of contention and important avenues for future research. The remaining chapters go on to discuss more general issues, beginning with Geoff Parker's discussion (Chapter 2) of the role of sperm competition in explaining why sperm, relative to eggs, are smaller and more numerous, and how this competition, in turn, contributes to the stability of anisogamy. This theme is repeated in the excellent review by Nina Wedell, Matt Gage and Parker in Chapter 3 that discusses how the cost of sperm production can lead to male prudence, and the consequences this may have for members of the opposite sex.

Part 2 covers the 'classic' readings, including several key papers by the 'dynamic duo' of human sperm competition research, Robin Baker and Mark Bellis. It begins, however, with Robert Smith's (1984) original treatise on the subject. Smith's chapter (Chapter 4) provides compelling arguments for the role of sperm competition as a potent selective force shaping human evolution (it is little wonder that the original chapter has been so influential in shaping much of the current research on the subject). Smith's chapter is followed by a series of papers discussing adaptations to human sperm competition in both males and females. Chapters 5-7 reproduce three papers discussing the possible role that deformed (or 'kamikaze') sperm might play in affording males an advantage in competition over rivals. These papers illustrate (rather nicely, I might add) the differences in opinion and contradictory results that seem to have besieged certain aspects of this highly controversial area of research. Further adaptations to

sperm competition by males is discussed in Chapters 8 and 10. Those chapters (based, once again, on classic work by Baker and Bellis) suggest that the number of sperm inseminated is positively associated with the risk of females mating multiply; males ejaculate a greater number of sperm with increasing time that partners spend apart since their last copulation. Chapters 9 and 11 focus on female adaptations. In Chapter 9, Bellis and Baker provide evidence that human females promote sperm competition, with the authors finding a pre-ovulatory peak in extra pair copulations among their respondents. Chapter 11 discusses the role of different orgasm regimes in women as an adaptation to sperm competition. This chapter underscores an important conflict between the sexes: males appear to enjoy a competitive advantage by inseminating more sperm (because more will subsequently be retained in the female's reproductive tract) but females, too, may have strategies for manipulating the males' inseminate.

Contemporary readings in human sperm competition make up the final part of this book. I must admit that I had, perhaps, the greatest difficulties with this section of the book, mainly in terms of which papers were included (and which were not). That is not to say that discourse on subjects such as killer sperm (Chapter 12), psychological adaptations to human sperm competition (Chapter 13), semen displacement (Chapter 14), or human female orgasm and mate fluctuating symmetry (Chapter 15) is uninteresting. Far from it. In fact, all of these papers, in one way or another, build on themes explored in the classic readings (but then again, so do many others not reproduced in the book). It is worth emphasizing here that I fully appreciate the impossibility of being 'all-inclusive', and acknowledge that both the preface and the introduction do a stellar job discussing contemporary research. However, even if we were to accept Thornhill's claim that "if the important work itself is not in this book, it is discussed in some detail in it" (page vi), I still think

the editors could have done a better job articulating their reasons for including specific papers in this section (and why others, by default, might therefore have been omitted). Are these chapters in the book simply there because they are illustrative of recent research in human sperm competition, or is there something 'special' about these that set them apart from the rest? And will these contemporary readings, like some of the classics in Part 2, stand the test of time? Without a better justification, this part of the book seems a little arbitrary.

This is not a book without limitations. Still, I found the subject matter highly engaging and I genuinely had a hard time putting the book down (just ask any of the fellow commuters that share my train to and from work each day). Part of the appeal, at least for me, is that I was being introduced to the topic by reading many of the papers in the book for the very first time. No doubt, more established or learned colleagues, or those already working in the field, may already be familiar with many of the chapters and have them in their files. Nevertheless, because the topic itself has wide, popular appeal, I have no doubt that this book will find favor with a wide audience (assuming, of course, that either they, or their institutional libraries, are sufficiently cashed up to buy a copy). Ultimately, however, the true value of this book should hopefully be judged, not by its recommended retail price or the lascivious shade of magenta chosen for the cover design, but by how much discourse its content is likely to generate, and the future research it will inspire among those that are relatively new to the fascinating world of human sperm competition.

Bob B.M. Wong

*School of Biological Sciences
Monash University, Victoria, 3800
Australia*

Fish Cognition and Behaviour

Culum Brown, Kevin Laland and Jens Krause. Blackwell Publishing. 2006. Pp 352
ISBN 1-4051-3429-1

In September 2003, *Fish and Fisheries* published a special edition on the topic of fish learning and cognition. This collection of eight reviews covered a broad spectrum of topics in this field from social learning to orientation. As the editors point out, in the eleven years since the previous review (Kieffer and Colgan 1992) the number of references to draw on increased from around 70 to over 500 (Laland et al. 2003). So the field of fish cognition and behavior experienced a huge increase in research interest over this period. Therefore, it is important to ask whether this book is necessary, especially so soon after the previous review and given that the book contains contributions by a number of the same authors and many of the chapter titles are similar (or even identical). I am not going to count the number of references in this volume, but, as the editors of the book point out, this volume has expanded on the previous work by updating and expanding the existing reviews and by adding five new essays. These cover cooperation and cognition, Machiavellian intelligence, learning mate choice, modulating aggression through experience and the role of learning in aquaculture and fisheries. So, given that the book could be seen as a worthwhile addition considering the growing literature in this field, it is also useful to ask if this book is of interest to scientists outside fish research. The short answer is *yes*, fish are increasingly being recognized as possessing similar cognitive abilities to their better-studied tetrapod cousins, something this book makes abundantly clear. Therefore, the kinds of questions that can be asked using fish models are similar to those in other vertebrates. Furthermore, laboratory fish research is often easier to conduct as they can more easily be kept in semi-natural environments and in larger numbers than other vertebrates. So perhaps this volume will not only be a useful reference tool, it may even encourage some of you to switch to fish.

The first chapter is the standard introduction to the book written by the editors. Often such introductions, whilst necessary, can be tedious for the reader. However, Brown, Laland and Krause provide a useful summary of the historical context of the book, and of course why it is justified given the close temporal proximity to the previous set of reviews. They also succinctly summarize the main themes of the rest of the book. I would encourage the reader to resist the urge to skip this introduction as it is interesting in its own right as well as

providing a useful summary.

In Chapter 2, Warburton introduces us to the importance of fish learning foraging skills. Warburton clearly shows that the complexity of fish behaviors with respect to foraging is equivalent to that of other vertebrates, a theme that continues throughout the book. This is extended to the role of learned defenses and counter-defenses in predator-prey interactions in Chapter 3. Kelly and Maguarran consider this in terms of the predation sequence and they then address the opportunities for learning of both predators and prey in each step of the sequence. They suggest that opportunities for learning are likely to be greater at the early stages of this sequence, although, according to the authors, there have been no empirical tests of this idea. Chapter 4 follows logically from Chapter 3 as Brown (G. E.) and Chivers explore the learning of chemical alarm cues in fish. Far from showing innate responses to the presence or absence of alarm cues, the authors show that fish are capable of flexible responses depending on the cue concentration. They are even capable of learning about predators about which they have no innate knowledge by pairing alarm and predator cues.

In Chapter 5 we are introduced to learning about mate choice, a review that did not appear in the 2003 collection. Witte summarizes the importance of learning in mate choice and particularly focuses on sexual imprinting, learning as adults, eavesdropping and mate choice copying. Perhaps it is appropriate to mention Chapter 10 next, "Social Learning in Fishes", as Chapter 5 places much emphasis on social transmission of information in mate choice. Brown (C) and Laland extend this to show that fish are capable of social learning in a number of different situations including, but not limited to, foraging, anti-predator behavior and migration and orientation. The last of these was particularly interesting, as fish have been shown to develop long-term traditions in their migration patterns. Whilst this chapter is largely an update of the previous review (Brown and Laland 2003); the authors have included a new section on how fish balance their reliance on social and asocial information. They suggest that cost-benefit analyses and not variation in intelligence may explain the differences in reliance on social learning between species.

Fish, like many animals, live in environments with spatial complexity and variation. Thus, as Odling-Smee, Simpson and Braithwaite explain in Chapter 7, it is advantageous to not only be able to learn about your environment but also to be flexible in your response to environmental changes. We learn from this chapter that fish are capable of spatial learning and that this learning is flexible allowing fish to adapt to particular ecological conditions. The nice thing about this chapter is that the authors do not take a “learning is everything” approach, rather they acknowledge that genetics and development are also important.

Chapters 8 and 9 consider the ability of fish to recognize and remember other individuals and how they coordinate their movements. Griffiths and Ward show that not only are fish able to recognize individuals, they prefer to associate with familiar individuals. However, research is currently biased towards easily studied species and the authors argue that technological advances are providing the tools to study familiarity in more difficult fish such as free-ranging marine species. In Chapter 9, Couzin and colleagues explore the literature on collective motion and social networks in fish. Whilst I found this chapter the most difficult to read, this is probably due to my ignorance of the subject and not a reflection on the content. Nevertheless, the authors make a good case, as do others, why fish can be good model species in behavioral research and how results from fish can be applied to other species.

In Chapter 11 we see that fish possess the cognitive capacities for cooperation in four categories: kin selection, reciprocity, byproduct mutualism and trait-group selection. The authors not only discuss examples of these behaviors, they also make a good case for using fish as model species to study these controversial areas of evolutionary biology. In what might be seen as an extension of the previous chapter, Bshary examines the social strategic behavior of fish. This is perhaps the chapter of the book that contains the least empirical data, but as a consequence it also suggests one of the more exciting areas for the future of fish cognition research. Indeed, Bshary argues that fish possess the preconditions for what he calls “Machiavellian-type intelligence”. He argues, however, that we have little knowledge the type and quality of information used by fish. This is a very interesting area of research as case studies, such as that of cleaner fish and their clients, suggest that fish show reconciliation, punishment and indirect reciprocity.

The idea that mammals are somehow more ‘evolved’ and thus possess greater cognitive capacity than fish is inconsistent with our understanding of evolution.

Nevertheless, this attitude seems to have prevailed in the research effort invested in studying the cognitive capacity of vertebrates. In Chapter 13, Rodríguez and colleagues challenge this notion by showing that fish possess similar cognitive capacities and neural structures to those of other vertebrates and they suggest that all vertebrates (yes, fish too) may have inherited these from their common ancestor.

Buried at the back of the book, as they often are, is the applied chapter (for some reason publishers must think most of us never get this far). But, it is well worth the journey to the end as Fernö and friends explain how fishing alters the environment of fish in both natural conditions and under aquaculture. They suggest that although these rapid changes may favor flexible strategies, such as learning, rapid advances in technology may not allow fish to adapt quickly enough. Furthermore, they argue that knowledge of how information is transferred between individuals could improve practical problems such as the low survivorship of hatchery released juveniles.

Brown, Laland and Krause have managed to put together contributions from a number of experts in the fields of fish learning and cognition and as a result they have produced a thought-provoking volume that not only summarizes existing knowledge but also suggests many opportunities for future research. The individual authors manage to convey their enthusiasm for their own fields of research and this makes for a book that is easy to read, but also challenges the reader to think about the outstanding questions in the whole field of animal cognition and behavior, not only that of fish. The one minor drawback to this book is the price. At US\$199.99 or £99.50 it is unlikely to “...find a home on the bookshelves of ... a broad set of practitioners and students...” (p. xvii). You’d be better off getting in touch with your librarian and spend your money on setting up an aquarium, or perhaps hold out for a soft cover version.

Matt Bruce
Behavioural Biology
Utrecht University
The Netherlands

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Chemical Ecology: From Gene to Ecosystem

Marcel Dicke & Willem Takken. Springer, 2006. 189 Pp.

ISBN 1-4020-4783-5 (Hardcover), ISBN-10 1-4020-4792-4 (paperback)

The astonishing ubiquity of chemical communication in almost all taxa and at all levels of biological organization should generate broad interest in the study of chemical ecology. Popular topics at recent ISBE meetings indicate that chemical cues and signals affect most, if not all, of the interactions of interest to behavioral ecologists: mate choice, foraging strategy, parasitism, anti-predator responses, cryptic female choice, sperm competition, kin-recognition, sociality, mimicry and so forth. *Chemical Ecology: From Gene to Ecosystem* is a welcome introduction to the field of chemical ecology and a useful summary of contemporary approaches. This book consists of peer reviewed papers from participants in the 'Frontis Workshop on Chemical Ecology' held in 2005 in Wageningen, The Netherlands, and more information plus the chapters as PDF downloads can be found at http://library.wur.nl/frontis/chemical_ecology/index.html. Contributors to the collection include established researchers and PhD students, and the chapters are either reviews of theoretical challenges in chemical ecology, or descriptions of current research programs. The combination of theoretical and experimental discussions and the broad range of study systems covered give this book applicability to a wide audience of community and population ecologists, behavioral ecologists, geneticists, and researchers in evo-devo, applied agriculture, integrated pest management, and natural product bio-prospecting.

The editors begin with a brief review of the major functions of chemical communication, and the exploitation of pheromones and cues by heterospecifics such as predators and parasites. The editors argue that since chemical communication is extremely common in the animal kingdom, all interactions are overlaid with 'information webs' of chemical signals. Therefore, it is critical to research chemical communication at several scales, from the genes regulating signal synthesis, to the behavior of individual animals, and also ecosystem level interactions in which there are multitrophic exchanges between several emitters and receivers and flexibility in signal emission and responses. This is well-illustrated by Ellen van Donk's examination of lake food-webs and phytoplankton's extremely plastic morphology, biochemistry, and behavior in response to chemical cues from predators and defense chemicals emitted by interspecific phytoplankton (Chapter 10). The value of studying chemical communication at various scales is

also promoted by the diverse study systems chosen for the book. There are chapters on community-level interactions, interspecific plant-insect interactions, a brief mention of pheromone communication in humans, and perhaps most interestingly, detailed analyses of communication systems within individual organisms such as *Drosophila* and *Caenorhabditis elegans*.

The value of integrative or cross-disciplinary research is reiterated in the case studies throughout the book, particularly so in André Kessler's description of current ecological, chemoecological, physiological and molecular research into chemical communication in wild tobacco *Nicotiana attenuata* (Chapter 3). This chapter explains how *Nicotiana attenuata* emit chemical defense compounds in response to mechanical damage and endogenous chemical signals caused by herbivory. The defense compounds attract predators to the herbivores, deter moths from ovipositing their herbivorous larvae, and reduce the palatability and digestibility of the plant tissue. Defense compounds released by plants vary according to the species of herbivore, and molecular analyses reveal that the genes that synthesize the anti-digestibility proteins have herbivore-specific responses. Physiological studies indicate that the emission of chemical defense compounds incurs significant costs, and behavioral and ecological observations reveal a complex antagonistic web of interactions between different herbivores and their predators that affect plant fitness. Furthermore, these ecological interactions are modified if mutant or modified plant varieties are used. The current use of such knowledge of plant defense compounds and insect behavior for pest management is examined by John A Pickett *et al.* (Chapter 11), with particular emphasis on using inducing agents to stimulate the plants' existing natural defense emissions. More discussion on the costs of producing these defense compounds, and chemical signals more generally would have been an interesting addition.

The editors' second major aim is to describe contemporary techniques and procedure that have allowed fine-detail research into chemical ecology, e.g. analytical chemistry with Gas Chromatography-Mass Spectrometry, and molecular analyses of the genes regulating scent emission. The chapter on *Drosophila* odor coding by Marien De Bruyne describes the application of several new techniques: genetic

manipulations, fluorescent visualization of olfactory receptor neurons, and electrophysiological measurement of neuronal response to olfactory stimuli (electroantennography). The reference list for De Bruyne's chapter provides some good sources for further information and clarification of the complex techniques mentioned only briefly here.

Ecologists and behaviorists curious about the potential of chemical ecology but unfamiliar with the techniques may appreciate the early inclusion of Dustin J. Penn's chapter, "Chemical communication: five major challenges in the post-genomic age" (Chapter 2). Penn provides a brief strategic plan for advancement via specific research topics and the application of new techniques. Penn briefly reviews some current major research areas such as the information encoded in chemical signals, the mechanisms of chemical communication, and the evolution of reliable signaling. The chapter is most interesting when it highlights some less well-known areas for future research, such as endocrine-disrupting pollutants that negatively affect chemical communication between cells and organisms. Researchers seeking new collaborators with particular expertise should find Penn's summary of new research disciplines a useful guide.

Fortunately for behavioral ecologists, throughout the book there is strong emphasis on the necessity of behavioral and/or physiological bioassays to determine the biological relevance of data produced with fine-scale techniques such as GC-MS. Chapter 6, on the chemosensory system of the nematode *Caenorhabditis elegans* (Damien M. O'Halloran *et al.*) provides a particularly interesting case study indicating the benefits of combining behavioral, physiological, and molecular research.

The final chapter, by editor Marcel Dicke, continues to promote studying chemical communication at the community-level, and, mercifully, the use of 'infochemical' rather than the unwieldy 'semiochemical'

to describe chemical signals/cues conferring information and stimulating receiver responses. Dicke acknowledges the extreme complexity of multi-level and multi-disciplinary investigations, particularly in terms of the number of genes potentially responsible for signal production, and the potential number of compounds in the mixed bouquet of a chemical signal. To tackle this, Dicke suggests linking technology-driven, typically lab-based approaches with the more conceptual and broad field of community ecology. This would mean a manipulative approach involving specific genetic and phenotypic information plus field experiments to study how individual traits relate to ecosystem interactions. Examples would be to test a synthetic pheromone on an entire natural community rather than just an individual target species, or to expose mutant or modified plants to natural herbivore populations rather than monocultures of herbivores in the lab. Such a broad scope would undoubtedly allow observation of previously unknown interactions and generate some fascinating experimental strategies to elucidate the small-scale connections involved.

Overall, the main aims of the book are achieved and the chapters are well-organized so that the reader is introduced to the more complex ideas in good time with sufficient preparation. The figures are generally good, but some would benefit from color rather than black and white printing, particularly one figure in which the legend refers to color coding not actually provided in the drawing. There are a few grammatical errors, and occasionally, regrettable overuse of acronyms, but these are minor problems in a largely well-written and practical collection.

Anne Gaskett

*Department of Biological Sciences
Macquarie University
NSW, 2109, Australia*

Neural networks and animal behavior

Magnus Enquist & Stefano Ghirlanda. Monographs in behavior and ecology, Princeton University Press, 2005. 253 pages.

ISBN: 0-691-09632-5 (hardcover), 0-691-09633-9 (paperback).

Simulation with neural networks, or artificial neuron nets, is perhaps the most common type of learning in computers. During the learning process the networks can be trained by a genetic algorithm. This can be seen as self-learning in machines - a popular science fiction topic, such as in the movies *Terminator* or *Matrix*. More seriously, computation intelligence methods (cellular automata, genetic algorithms and neural networks) are becoming popular in ethology and behavioral ecology. Still they are not yet common, and few biologists have formal training in these methods. Thus Enquist and Ghirlanda's book on neural networks and their applications in animal behavioral models comes in very handy. The book contains a subject-oriented introduction to neural networks. It is easy to follow, well structured, and I believe that it will appeal to a wide variety of behavioral scientists. It focuses on networks as a means to understand animal behavior, rather than black-box simulators of behavior. The introduction to neural networks aims to give an understanding of what they actually do, rather than an account of all technical details that a beginner might need to look up before making his/her own networks.

The book contains six chapters. It starts with introductions to the two topics of the book; neural networks and animal behavior. Enquist and Ghirlanda present numerous examples where neural networks have been used to investigate animal behavior. In many of the examples, the networks are designed to mimic the actual neural machinery. This is normally only possible for relatively *simple* behavior, for example behavior that would be labeled neuroethology. As the authors point out, there are fewer examples of cognitive processes in animals with complex brains. At the end of each chapter there is a summary and a list of references.

In chapter 1, the authors discuss "Tinbergian" levels on which animal behavior can be explained. They continue with various approaches to behavioral modeling, such as operational models, black box models and physiological models. The chapter ends with a historical overview of the development of neural networks. The authors introduce the *behavior map* to describe the motivational processing that changes incoming signals into behavior.

The next chapter, (chapter 2) is a technical and theoretical explanation of neural networks. It starts very

basically and goes through topics of increasing complexity. The authors suggest that many readers should skip this chapter but I found it pedagogic and relatively easy to follow, compared with more technical books on the subject (e.g., Haykin 1999). This chapter explains the common *perceptrons* (the oldest and best known neural network) and feed forward networks as well as recurrent networks that can simulate time delay. Furthermore, learning rules, i.e. different methods to update weights, are explained here. The chapter ends with examples of how C code can be used to implement networks in the computer.

Chapter 3 starts with a description of some mechanisms of behavior and then goes on with an account of how neural network models can be constructed. The chapter treats processes such as stimuli perception, motor control, simple decision making and motivation.

The following chapter (chapter 4) treats learning from two view points: in real animals and in neural networks. Learning and developmental phenomena such as imprinting, ontogeny and conditioning are discussed together with neural networks terms such as Hebbian learning, reinforcement and back propagation. The authors also discuss neural networks in the context of various learning processes and animal learning theory.

Chapter 5 discusses neural networks and evolution. Some parts of this chapter are a bit tentative, but it also contains interesting parts. Neural networks are compared to more common theoretical approaches to adaptive behavior, such as optimization theory and game theory. The authors point out some evolutionary questions that are especially well suited for neural network analyses. These include the evolution of camouflage and mimicry, adoption of unrelated young (requires opposite solutions to very similar stimuli), coevolution between signal senders and receivers and evolution of signals. The book concludes with chapter 6 which contains a summary of the book and some suggestions for future work.

What is then my general impression of the book? The authors make an admirable effort in explaining how neural networks work, both mathematically and as "behavioral simulators". To describe what goes on in a neural network mathematically is almost impossible for large networks that are designed to solve complex

problems. This makes the book pedagogical but by necessity also focused on networks that fit problems within classic ethology rather than behavior ecology; examples from neuroethology and learning psychology dominate. A citation from chapter 5 illustrates this ‘The advantages that neural networks enjoy over similar or even formally equivalent models stem from their interpretation as models of nervous systems rather than black-box models of abstract cognitive process’. Another citation may also serve to illustrate the emphasis: ‘The understanding of motor control in terms of neural networks is perhaps the best developed field of neural network research’. Motor control is a suitable topic for neural network modeling but it is probably of more interest to neuroethologists than to behavioral ecologists.

For an evolutionary trained ecologist (such as most readers of the ISBE newsletter) the ethological approach may give novel insights, which, in my view, makes the book interesting. Experienced behavioral scientists may also learn new things, or rediscover facts they had forgotten. However, I am not sure that I always agree with the authors about the explanatory power neural networks will have for real nervous processes. For example, they suggest that the use of neural networks makes it possible to give internal factors that govern learning a concrete interpretation. To me this is fine, as long as one is aware that neural networks are just simulators of processes that may be very different in real brains. In neural networks memory is located in connection weights, and the learning process depends on changes of these weights. The fact that it is easier to define memory and learning in neural networks than in real animals does not mean that they may offer a realistic interpretation of memory and learning, only that they can be used to model these entities.

There are a number of details on the construction and training of neural networks that are either not included or not treated in depth. This does not mean that the authors have missed to include these. Rather, the book is intended to give an understanding of how neural networks can be used for behavioral modeling, not as a dictionary for network building. Thus the book can be a goldmine for behavioral scientist that already have some knowledge of neural nets, but newcomers to this field will probably need to look up details before they can build their own networks. For example, biases are not mentioned in the book. Biases are net inputs to a layer that will increase the capacity of many networks. Inexperienced network builders may also ask questions about transfer functions, the number of neurons, training method (batch or sequential), etc. The learning rule that

probably will appeal most strongly to behavioral ecologists, inserting the weights in a genetic algorithm, is not really treated in depth. More details on genetic algorithms in neural networks can be found for example in Kamo et al. (1998) and Brodin and Haas (2006).

In conclusion I find this book very useful for behavioral scientists that want to model animal behavior, but beginners will probably need additional technical advice on the encoding of the networks, which is available on numerous websites or in some software that has neural network toolboxes. The authors mention Matlab, which I think has a very pedagogic explanation of neural networks fundamentals. For readers that have access to this software I recommend typing the command `nnd4db` at the prompt to see how easy it can be to understand a neural network.

Anders Brodin
Theoretical Ecology
Lund University

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WARNING COLOURS

Richard Dawkins: How a Scientist Changed the Way We Think

Edited by Alan Grafen & Mark Ridley. Oxford University Press, 2006, 283 Pp.
ISBN 0-19-929116-0 (hardcover)

Richard Dawkins' media profile has recently surged thanks to the controversy surrounding his latest book, *The God Delusion* (Dawkins, 2006a), at the time of this writing, number 10 after 22 weeks on the New York Times list of bestsellers. In spite of all this current attention, (whether he likes it or not) most scientists probably know Dawkins for his first book, *The Selfish Gene*. In his introduction for the 30th anniversary edition of *The Selfish Gene*, Dawkins (2006b) grumbles that over the years, as he has toured to promote his subsequent books, "[a]udiences respond to the new book, whichever one it is, applaud politely, and ask intelligent questions. They then line up to buy, and have me sign . . . *The Selfish Gene*." To further emphasize the huge impact of *The Selfish Gene* and its author, thirty years after its publication Oxford University Press has released a collection of essays discussing Dawkins' influence on science, philosophy, and human culture.

Richard Dawkins: How a Scientist Changed the Way We Think, edited by Alan Grafen and Mark Ridley, features 25 essays contributed by renowned scientists, philosophers, writers, and intellectuals. The essays are organized into seven themes: Biology (how Dawkins' contributions have influenced prominent biologists); *The Selfish Gene* (how Dawkins' first book in particular has contributed to biological advances); Logic (the philosophical implications and extensions of *The Selfish Gene*); Antiphonal Voices (dissenting views to some of Dawkins' scientific opinions); Humans (the extension of Dawkins' arguments to human behavior); Controversy (Dawkins' views on religion, politics, and philosophy); and Writing (Dawkins' contributions to literature). For the sake of brevity and to avoid spoiling the sense of discovery that comes from reading the essays in sequence, rather than list them all I will focus on a few that I hope will give the flavor of diverse content represented.

In the first section, several contributors comment on how Dawkins has affected the science of biology. For example, Helena Cronin's essay, "The Battle of the Sexes Revisited", provides a delightfully crafted summary of how sexual selection in general and sexual conflict specifically have been advanced by a "genes' eye perspective". Cronin's presentation of sexual conflict cuts to the heart of some of the thorniest questions in the field, and serves as a useful reminder that the fundamental questions that are in current fashion owe

much to Dawkins. More notably, Cronin's writing rephrases these questions and controversies artfully and economically, arguing for example that some cited examples of conflict, such as the dead female dung fly drowned by eager males, are not in fact examples of sexual conflict at all, but "civilian casualties caught in [the] crossfire" of intrasexual competition between males. Cronin's essay is a fitting tribute to Dawkins, as she shares his gift for clarifying scientific principles while popularizing them.

In the section on *The Selfish Gene*, David Haig's essay, "The Gene Meme," is a wonderful exercise in mental gymnastics that will leave your mind limber and strengthened or cramped and sore. Haig discusses the concept of the gene as a unit of information, and explores its use in scientific language as a case study in memetics. His attention to detail in defining the jargon words of our science demonstrates how a careful consideration of information theory affects our perception of the selective replication that is central to evolutionary theory.

Some readers will appreciate the relatively more technical contributions, for example "*The Selfish Gene* as a philosophical essay" by Daniel Dennett, who praises *The Selfish Gene* as "philosophy at its best", and "mind candy of the highest quality". Dennett's essay, along with those by Seth Bullock and Kim Sterelny on algorithmic biology and the roots of irrational human behavior, respectively, could provide a platform for interested readers to explore other sciences adjacent to evolution.

My favorite part of the book was the collection of five essays grouped in the section entitled Controversy. Marek Kohn's piece examines the perceptions (and misperceptions) about Dawkins' politics, and the naturalistic fallacy (that what is natural is good) which many critics (incorrectly) accuse him of committing. This will be especially illuminating for young readers and those who grew up outside Thatcher's Britain, who may not appreciate the political environment in which Dawkins and his critics were operating in the years following the publication of *The Selfish Gene*. David Barash's essay on existentialism and the human search for meaning draws on many literary references, most notably a passage from *A Hitchhiker's Guide to the Galaxy* (Adams 1979), and left me thinking deep

thoughts long after I had closed the book to consider life, the universe, and everything. Both Barash and A. C. Grayling compare Dawkins' efforts in promoting science to the task of Sisyphus, mythical king of Ephyra, who was condemned to push a rock uphill for eternity. Grayling, like Dawkins a persistently strong critic of religious belief, produces a typically piercing summary of how Dawkins' writings "meet and contest, repeatedly and with equivocal success, the weight of the majority outlook in this world, which as regards the relative merits of science and religion is stubbornly ignorant, superstitious, impermeable to rational argument, lazy, narrow, shallow, and prejudiced."

This cynicism regarding the thanklessness of promoting reason underlines my chief complaint about *How a Scientist Changed the Way We Think*. Perhaps a book about a generally acclaimed author (particularly one edited by his former graduate students) strays inevitably towards hagiography, but even understanding this I found too little in this book reflecting the often-virulent opposition that Dawkins encounters. Michael Ruse (on whether there is such a thing as progress over evolutionary time) and Patrick Bateson (on the most appropriate unit of selection) present friendly dissenting views on some of the details in Dawkins' reasoning, but neither debate captures the intensity of controversy surrounding Dawkins' most hotly contested opinions. For his part, Richard Harries, the Bishop of Oxford, prefers to comment on where he and Dawkins concur (they are both humanists) rather than discussing their fundamental disagreements concerning religion. This makes for

eminently reasonable discourse and is doubtless preferable to irrational quarrelling, but nevertheless I found myself hungry for a passionate and strongly argued opposition that was never even attempted.

In spite of this complaint, I enjoyed the book for the very variety of its perspectives. No doubt the essays that I preferred will not necessarily be the favorites for others, but every reader is likely to find something he or she likes. Some of the essays would make for great discussion in seminar courses that touch on the philosophy of biology. I also recommend this book for anyone who enjoys grappling with the wide-ranging implications of evolutionary thinking, and for anyone who, like me, has a hard time imagining what biology was like before *The Selfish Gene*. Perhaps *The God Delusion* will prompt many readers to visit or revisit *The Selfish Gene*, and this will be a very good thing. For those who need extra encouragement, *How a Scientist Changed the Way We Think* fits the bill.

Luc F. Bussière

*Zoologisches Museum der Universität Zürich
Zürich, Switzerland*

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Top Predators in Marine Ecosystems: Their Role in Monitoring and Management

Edited by Ian Boyd, Sarah Wanless & C.J. Camphuysen. Cambridge University Press, 2006. 378 Pp.

ISBN 0-521-61256-X (paperback)

This book grew out of a 2004 symposium and a collaboration between the editors, who work on two major programs of research: one involving Southern Ocean (Antarctica; Boyd) predators and one on North Sea predators (Wanless and Camphuysen). As such, this text is a collection of 24 separate chapters, each written in scientific paper format. The goal of the book itself is to examine the links among top marine predators, their prey, and the marine climate, to determine whether such information can be useful for ecosystem-based fisheries management. Unfortunately, the title over-reaches the extent of the book. Rather than examining all marine ecosystems, as the title suggests, the authors primarily focus on cold water systems, limited prey (sandeels, krill, capelin, and pinnipeds), and certain marine top predators (marine mammals and sea birds). Temperate areas are largely overlooked, tropical systems are completely absent, piscine top predators (including sharks) are ignored, and consideration of alternative prey items are largely omitted. The editors admit to the slanted focus of their book in the introduction, explaining the need to utilize accessible predators (such as marine species with terrestrial breeding seasons) and areas with appropriate communities of predators available for study (largely confined to temperate and subpolar regions). The editors aim to develop an extensive description of one particular system, rather than provide a comprehensive survey.

A major strength of the book is that most of the chapters involve comprehensive overviews of long-term (10 to 20-year-long) studies performed by the authors. Only a few of the chapters are overarching reviews summarizing other researchers' work. Such long-term data sets are critical repositories of information that are often lacking, especially in marine systems. The authors do an excellent job of defining terms, utilizing boxes to further explain certain sampling techniques or phenomena that might not be familiar to outsiders, and use clear, informative graphs and figures. Almost all of the authors provide the reader with the take-home message within the introduction, which facilitates information-gathering for a reader who is interested in skimming for an overall, superficial understanding of the findings. The extensive list of references affiliated with each chapter usually includes both cutting-edge articles and historical papers. Therefore these lists are valuable resources for anyone interested in this field. Unfortunately, the writing style is

akin to reading a collection of scientific papers in a journal. Although it is a nice collection, it is easy to lose sight of the big picture as there is no attempt to synthesize across individual papers. There is much more emphasis placed on the potential for top marine predators to serve as monitors of ecosystem health than there is an attempt at providing information as to how these studies could translate to management practices.

Chapters that most likely will interest behavioral ecologists include chapter 6 (a multi-species survey of seabirds and marine mammals in the North Sea examining the behavioral mechanisms underlying species-specific population responses to prey stocks), chapter 7 (examining the spatial and temporal variation in the diets of polar bears in the Canadian Arctic), chapter 9 (describing the use of data loggers to determine predatory behavior of fur seals and penguins and reveal the patchiness of krill), and chapter 12 (examining the impacts of oceanography on the foraging dynamics of three seabirds with different foraging strategies that depend on sandeels to varied extents).

Unfortunately, the 24 chapters in this book are not organized into any thematic sections, explicitly or implicitly. For instance, chapter 9 (on Antarctic fur seals and macaroni penguins eating krill) is followed by a chapter on the range expansion of North Atlantic fulmars (birds), and then a chapter on the Antarctic fur seal, gentoo penguins macaroni penguins, and albatross foraging on krill. Chapters 14 (*How many fish should we leave in the sea for seabirds and marine mammals?*) and 15 (*Does the prohibition of industrial fishing for sandeels have any impact on local gadoid populations?*) seem to signal a shift in topic to human impacts and suggestions for fisheries managers, but then chapters 16 to 20 are throwbacks to earlier chapters. It is not until chapters 21-24 that management goals and marine reserves are again covered. Even in these final chapters, few specific ideas are provided that would be helpful to fisheries managers, although some issues affiliated with marine reserve design are discussed. This lack of organization is unfortunate, because it leaves many potential links among papers and studies unclear. At least two of the chapters emphasized that to use top marine predators to determine ocean-climate change impacts, it may be necessary to study predators at the

limits of their physical and behavioral tolerances (at the edge of their oceanographic domains). Such important overarching points become easily lost in the lack of structure among the chapters.

The chapters could have easily been organized into appropriate sections. For example, sections could have focused on the various dominant prey (many papers dealt with sandeels, krill, or bottom fish), the dominant predators (birds versus marine mammals), ocean characteristics and environmental changes, or techniques and equipment (data loggers, quantitative fatty acid signature analysis, mathematical models, old-fashioned field observations). Such section organization would have reduced unnecessary repetitiveness. For instance, many chapter introductions pointed out that (1) upper-trophic level predators should respond to environmental variability (including prey resource levels), but this potential often has not been widely investigated; (2) ecosystems are complex (involving interactions at multiple time and spatial scales), and (3) sustainable use of marine ecosystems will depend on a better understanding of these systems. Most papers ended by concluding something akin to “While our understanding of the role of top predators as ecosystem monitors is increasing, more studies are needed to provide enough background knowledge to correctly interpret the data.” The editors should have attempted to reduce this restating, and organizing chapters in thematic sections with an overarching introduction and conclusion for each section would have helped achieve this end.

There is no overall summary or conclusion chapter to indicate the current status of this area of research or future directions. Such an omission is disappointing, especially given that many of the systems produce conflicting results: in some systems, the top predators seem to provide a good indication of climatic change and

reflect what is occurring at lower trophic levels. Here, using studies of these top predators as surrogates for more complicated multi-species, multi-trophic level analyses seem an attractive option. However, in other cases (Chapter 5’s grey seals in eastern Canada, or Chapter 6’s multi-species study that discovered that different species of seabirds varied in the sensitivity of their responses) the populations of top predators do not seem to vary in response to prey availability and therefore do not seem to be viable methods of monitoring ecosystem health.

The entire book is of extreme interest to a very limited audience: mainly scientists working on marine top predators in the Southern Ocean or North Sea. Some of the chapters will have broader appeal, depending on the interests of the reader. However, it is unlikely that most readers associated peripherally with the field, even those who study marine predator-prey interactions in non-avian, non-polar systems, will be interested in reading the entire book carefully. If the editors’ goal had been to produce a volume of individual scientific papers that reflect in-depth some of the major findings of twenty years of research in these polar marine areas, they would have succeeded. However, they state that their goal is “an effort to synthesize across a range of studies that have examined the ecology of predators within the context of ecosystem approaches to management” (p. xiv). I would say they are largely lacking the synthetic and management aspects.

Erika V. Iyengar
Department of Biology
Muhlenberg College
Allentown, PA 18104, USA

Ptilochronology: Feather Time and the Biology of Birds.

Thomas C. Grubb, Jr. Oxford University Press, 2006. 176 Pp.

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Growth rings reflect environmental conditions in which a tree grew: narrow rings are indicative of years of poor growth, whereas wide rings, years of relatively good growth. Inspired by dendrochronology, Thomas C. Grubb, Jr. has shown that daily growth patterns of feathers, marked by alternating light and dark bars on primaries and rectrices, can reflect nutritional condition of birds. The author comments that alternatives, including body fat and muscle mass measures, are not always representative of a bird's true nutritional condition. Birds in better nutritional condition putatively have more resources to allocate to feather growth. Thus, wide growth bars, which indicate more growth per day, suggest an individual is in better condition than a conspecific of comparable size with relatively narrow bars. Measurements appear extremely simple and require little training or equipment. Grubb, who introduced ptilochronology 18 years ago, provides a synthesis of research involving the use of feather growth as an index of nutritional status.

The book is divided into two parts consisting of eleven chapters. In the first of three chapters (part one of the book), the author presents a first-hand account of how he developed the hypothesis that feather growth bars can be used as an index of nutritional condition. An introduction to general aspects of nutritional condition and feather growth follows. Grubb uses the last section of this chapter to respond to an early critique of ptilochronology (Murphy and King 1991). The following two chapters and other studies described in the next part of the book support many of the assumptions of ptilochronology and resolve some of Murphy and King's (1991) criticisms. In chapters two and three, Grubb presents four studies (one descriptive and three experimental) that test the primary assumption of ptilochronology: that feather growth is positively related to nutrition. He also explores other factors germane to variation in feather growth. The second part of the book consists of seven chapters in which the author summarizes research that has used ptilochronology to study nutritional condition. Studies are assembled in chapters on habitat quality, caching, social behavior, individual quality, reproductive effort, nestling condition and prolonged brood-care. In the final chapter, the author comments on applications of ptilochronology, and how the method needs to be refined.

Throughout the text, Grubb clearly presents limitations

of ptilochronology as an index of nutritional condition. For example, growth bars, which are easily detected on most plain feathers, may be difficult to discern on feathers that are pied or have dark pigmentation. Moreover, although ptilochronology has been used in many passerine and non-passerines, four species (Laysan and black-footed albatross, Leach's storm-petrels and common terns) had atypical feather growth bar patterns, meaning nutritional condition could not be determined with confidence by this method. Future determination of species-specific guidelines for ptilochronology will be helpful for researchers. The author stresses the need to measure growth in induced feathers, which are those grown during a known time interval after pulling out original feathers, unless the investigator is sure where and when original feathers were grown. In species that are difficult to trap or re-trap, collection of induced feathers may not be possible. Therefore, this technique will be most useful for species with high site-fidelity that can be easily attracted and captured or in situations in which timing of feather growth is known (*e.g.* in fledglings with known hatch dates).

Excellent experiments were presented; however, most supporting evidence is correlative. Grubb poses interesting questions about published studies and suggests directions for future research. While for us, reminders throughout the book regarding interpretation of correlative data, random assignment of control and treatment groups, and importance of independent samples seemed repetitive and unnecessary, less experienced readers are likely to benefit from them. Grubb provides readers with fair warning that he is "not a disinterested observer" (P. 35); however, this may be responsible for an unintentional bias in presentation of some material. In some cases, non-significant results that might have represented unwanted complications such as temperature effects on feather growth, were disregarded as "supporting the view that temperature and wind do not affect the rate of feather growth independent of their possible effect on nutritional status" (P. 32). This conclusion seems to warrant a power analysis or further analysis. In other cases, relationships that "deserve to be true" are stated without statistical evidence (*e.g.* "feather-growth rates were positively related to return rates from one winter to the next" when referring to Brown *et al.* 2002; P. 42-43). Moreover, relationships that failed to reach statistical significance were argued without power analysis (*e.g.* "No statistically significant

relationship was found between dominance rank difference and difference in growth bar width, but this lack of significance is likely due to the difference that was present being too small to be detected statistically"; P. 87). However, these slight and seemingly innocent biases were not common and did little to conclusions drawn.

The introductory remarks in chapter 8 incorrectly suggest that "reproductive effort", the subject of the chapter, is synonymous with "parental effort". In fact, the definition provided for "parental effort" describes "parental investment". Such a slip might serve to confuse students without firm background in parental and mating investment theory. This chapter would have been better entitled "Parental Effort", since reproductive effort includes mating effort, a topic that was primarily considered in another chapter.

Some editorial missteps were apparent. Three colour plates are duplicated elsewhere in black and white. In two figures "Styan's grasshopper warbler" is mis-named "Styan's grasshopper sparrow". These and other more minor editorial slips take little away from the overall presentation.

In sum, we were satisfied with the amount of information and manner in which it was presented. The book brings together many diverse studies that examine or use ptilochronology and will be a valuable research tool for field ornithologists. Grubb wrote for an educated audience of ornithologists; however, care has been taken to define important terms and concepts so that readers with less background in ornithology will not drown in

jargon. *Ptilochronology* will be of most interest to those who can use such time-sensitive measures of nutritional condition in their research. Readers that have already explored ptilochronology may find few sections contribute information that is not already known from primary literature. Nonetheless, this book brings together many published resources and we recommend it. Ptilochronology is a relatively new technique that appears to have great potential to generate useful data relatively cheaply and easily. More research is needed to further establish the approach and this book should generate the interest necessary to encourage pursuit of questions related to effective use and applications of ptilochronology.

Annika Samuelsen & Jim Quinn

*McMaster University
Hamilton, Ontario*

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Sexual segregation in Vertebrates – Ecology of the two sexes

Kathreen E. Ruckstuhl & Peter Neuhaus, Editors. Cambridge University Press, 2005, 488

Pp.

ISBN 0-521-83522-4

‘According to Greek mythology, Amazons were female warriors who lived on an island. They occasionally met with men of another people to mate, keeping female offspring and sending male offspring back to their fathers... This book aims at synthesizing our current understanding of the evolution of sexual segregation in different vertebrates, focusing on taxa in which there is sufficient evidence to investigate causes of sexual segregation’. This introduction by Ruckstuhl and Clutton-Brock (Chapter 1), sets the scene for this editorial volume with 20 chapters, spanning sexual segregation in time and space, and seeking proximate and ultimate causes to this phenomenon across bony fish, sharks, reptiles, marsupials, albatrosses, petrels, other birds (from a conservation perspective), large herbivores (three chapters), seals, bats, odontocetes (tooth whales), non-human primates and humans. The editors have allocated these chapters into topical sub-sections where a particular taxon serves best to illustrate particular phenomena. Following the introductory ‘Overviews’ and ‘Concepts and Methodology’ chapters, ‘Foraging ecology’ is aptly exemplified with large herbivore biology, the taxonomic group (ungulates) that inspired much of the seminal work in this discipline (e.g., Clutton-Brock et al. 1982, 1987). ‘Predator avoidance and reproductive strategies’ builds on fish biology, with examples from teleosts (Croft, Krause and James) and elasmobranchs (Sims) and ungulate biology (Main and Toit). ‘Sex-related activities and social factors’ is conceptually introduced with a chapter on activity synchrony of the two sexes by the editors themselves, followed by examples from ungulates (Bon, Denoubourg, Gerard, Michelena) and humans (Pellegrini, Long, Mizerek). ‘Sexual differences in ecology: comparisons within different taxa’ is richly illustrated with examples from reptiles (Shine, Wall), marsupials (MacFarlane, Coulson), bats (Altringham, Senior), tooth whales (Michaud) and non-human primates (Watts). The last section, ‘Implications for conservation’ is illustrated with examples from birds and, primarily, big-horn sheep (Rubin, Bleich).

I find this a rich source of information where natural history is allowed to dominate the scene. As an evolutionary ecologist, it is fun and entertaining to learn about how differences in beak morphology between male and female birds allocate them to different foraging patches, how dominance relationships force one sex

(often females) more than the other into poor quality habitats, how thermal biology may drive spatial separation of male whales and their gravid females, and how prey availability may drive the divergence in phenotypes of male and female carpet pythons, where mouse-eating males reach a body size of 0.3 kg and wallaby-eating females average 3.9 kg. Conceptually, the authors and editors also do a good job at streamlining current terminology and separating old and new lines of thoughts into coherent hypotheses. For example, the ‘forage selection hypothesis’ used to be the ‘sexual dimorphism’ hypothesis, examples of the ‘reproductive strategy hypothesis’ is now collated under the ‘predation risk’ hypothesis, while the ‘activity budget hypothesis’ has components from previously fairly disparate ideas, such as social segregation and habitat specialization. Such culling and cleaning of terminology is important, especially in a relatively young research area, and too often left to ‘self-cleansing’ in the primary literature at the cost of prolonged unnecessary debate and confusion. The editors serve their field especially well here. In the process, old ideas, such as the ‘competition avoidance hypothesis’ are critically re-examined (Geist and Petocz 1977). This hypothesis suggests that males leave the best areas for foraging to females and their offspring to maximize their own reproductive success, for which there apparently is no evidence (Neehaas et al. p. 398).

What is my overall impression and what would I have wanted more as a reader? The authors are given considerable freedom to expand on their favorite and specialist taxon. This is excellent when examples on sexual segregation within a given taxon are plentiful. On that note, I marveled at the virtual catalogue of sexual segregation examples in Shine’s reptile chapter (*yes* – I sometimes work with Rick, *no* – he did not pay me to say this), and not only because I am a herpetologist at heart. I also found the bird chapter on conservation exciting and illuminating. I have to admit I never thought of sexual segregation in terms of conservation before, i.e., that some taxa can be so segregated that habitat-destruction can be sex—specific. However, in chapters where you have to wade through pages of natural history for a probable example of sexual segregation, I think the editors’ red pens could have been put to more use. This also applies to a somewhat repetitive re-introduction of the same alternative hypotheses in many of the chapters. I also miss invited theoretical work. I would, for

example have loved to have seen a quantitative genetics chapter where constraints on the evolution of sexual segregation are examined using theory developed for the evolution of sexual dimorphism, since it forms such an obvious corner stone in sexual segregation biology of many taxa. Furthermore, although mentioned by several authors in passing throughout the book, I would have wished for more focus on, and calls for, stringent hypothesis testing, how to design experiments and field studies in order to test, explicitly, between the alternative (or non-exclusive) hypotheses or their components, and suggestions for what invertebrates and smaller vertebrates that would be ideal for this purpose (although I take my hat off for the editors' suggestion, p. 178, to use sticklebacks in such an attempt).

That said, I would like to end this review on a very positive note. There is much to gain from reading this book for anyone interested in the evolution of sexual divergence and segregation from a number of perspectives, ranging from morphology to behavior. In their final summary of this volume, the editors identify a number of outcomes, which I agree with. In my freely

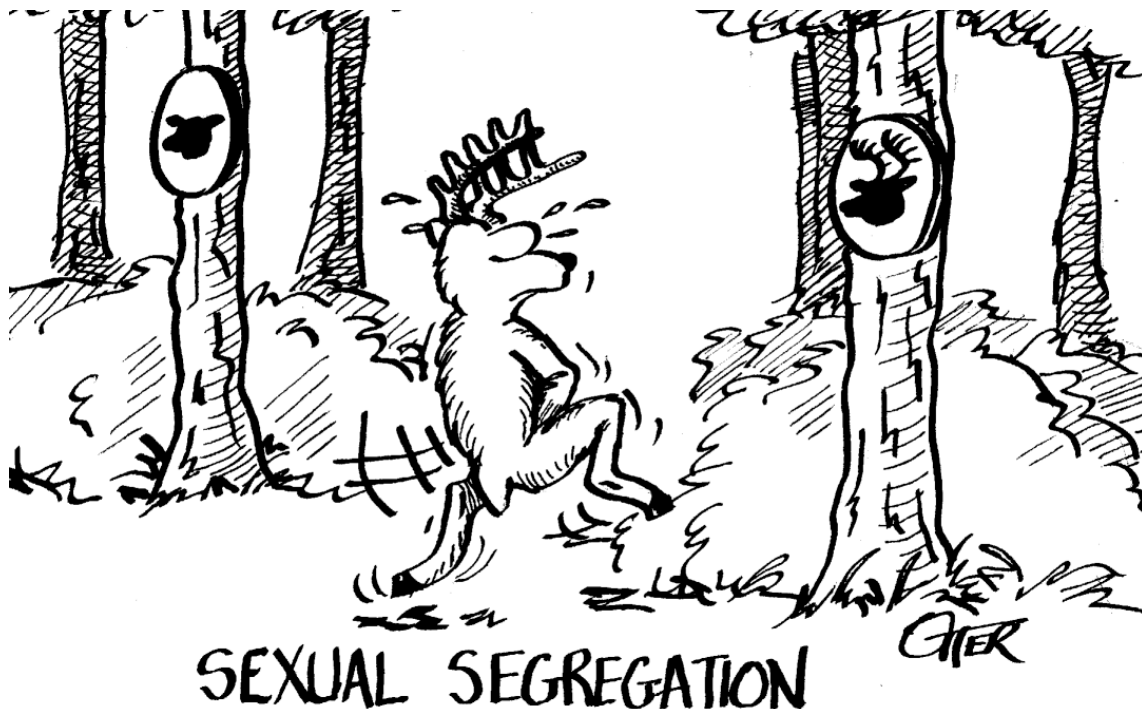
condensed summary of their conclusions, this review shows that 'sexual segregation occurs in a wider variety of species and ecological conditions than previously appreciated, that social and habitat segregation are independent phenomena, that sexual segregation has a multi-factorial explanation, and can have fundamental importance for conservation and management issues'. Nice piece of work!

Mats Olsson

*The University of Wollongong
School of Biological Sciences
Australia*

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Evolutionary Ecology: The Trinidadian Guppy

Anne. E. Magurran. Oxford University Press, 2005. 206 Pp.
ISBN 0-19-852785-3 (hardcover), ISBN 0-19-852786-1 (paperback)

It is hard to imagine a species that has had a greater impact on the field of behavioral ecology than the Trinidadian guppy, *Poecilia reticulata*. This little livebearing fish has become an irresistible model system for evolutionary biologists thanks to a number of factors fortuitously converging in Trinidad to form what Caryl Haskins, a pioneering guppy ecologist, called a ‘natural laboratory’. Foremost among these factors is that several rivers in different drainage basins in the island’s Northern Ranges each have waterfalls along their course that form natural barriers. This simple feature has had a profound effect on the evolution of guppy life history and behavior for one simple reason (well, actually there are many reasons but these are minor compared with...): it causes the level of predation risk on guppies to vary within the same river. Typically, localities above waterfalls have reduced risk while those below have dramatically increased rates of predation-induced mortality. So, in effect, nature has provided biologists with an experimental treatment (predator present vs. absent) and a series of replicate populations with which to test a large body of evolutionary theory.

And test it we have. The guppy system has produced a voluminous literature in behavioral and evolutionary ecology. To take on the synthesis of this enormous body of work, I am sure we can all agree, is no light task. Anne Magurran does just this, and does it very well, in *Evolutionary Ecology: The Trinidadian Guppy*.

This engaging book is a concise discussion of the findings from decades of research on guppies. The monograph is abundantly illustrated with data-rich figures and opens with a very thorough introduction to guppy biology, segueing to the ecology of the guppy in Trinidad and progressing to the meat of the book – predator avoidance, reproduction, life-history patterns, and the evolution of reproductive isolation. These are areas in which Magurran is an active researcher and her personal experience gives an autobiographical feel to the volume.

All the chapters are packed with insight and detailed analysis and, as such, certainly deserve one’s attention. However, the penultimate chapter is a *must-read* for guppy biologists as it deals with guppy conservation and the preservation of the ‘natural laboratory’. As Magurran rightly argues, guppies are in no danger of becoming extinct – in addition to being found in most Trinidadian

rivers and nearly every pet shop on the planet, they can also be found in such exotic locations as Malaysia, Australia, Hong Kong, Papua New Guinea, and the Philippines – however, they are increasingly facing many of the same conservation problems (e.g. pollution and competition from introduced exotic fishes) as other species around the world. I found the most startling revelation to be that scientists themselves could “unwittingly be compromising the rich variety of populations that attract guppy biologists to Trinidad in the first place” (pg. 141). The author points out that several decades of artificial introductions, transplants within and among populations and, to a lesser extent, over-harvesting may be taking their toll on the genetic and phenotypic mosaic currently found among guppy populations.

Since interest in studying guppies is unlikely to abate in the foreseeable future, the author solicits scientists to become “proactive in safeguarding the system that is so rewarding to study” (pg. 148). Magurran, a member of the Royal Society Working Party on Biodiversity Measurement, offers a landmark solution. She proposes that a centralized and uniform web-based recording repository be established in which data such as sample location, description of habitat, date, number, sex of individuals collected and so on be entered. In addition to assisting conservation efforts of the guppy in Trinidad, such a system would have the added advantage of serving as an exemplar for other intensively studied species.

Evolutionary Ecology: The Trinidadian Guppy compliments Houde’s (1997) volume on sexual selection and mate choice in guppies. In fact, Magurran’s book is a timely and welcome synthesis given the explosion of published research on guppies in the past dozen years – by Magurran’s estimation 50% of all papers on guppies have been published since 1996. A terrific side-benefit of the author’s scientometric analysis of guppy publications (spanning the years 1859, the first species description, to 2004) is the comprehensive bibliography – a handy resource, particularly for very early papers, for the novice researcher or even the experienced guppiologist.

Research on ‘the millions fish’, the colloquial name for guppies in Trinidad, has a long and remarkable history and this is something that Magurran acknowledges by weaving historical fact and anecdote throughout the text.

One historical tidbit of which I was unaware was that the first empirical work on sperm competition was conducted on guppies at the Carlsberg Laboratory in Copenhagen by Schmidt (1920) in 1917-1918. But I digress. My point is that given the long history of guppy research one would think that all there is to know about guppies must surely be known; particularly after a quick perusal of the hundreds of papers, books and book chapters on guppy evolution and ecology. This is one of the pleasant discoveries of *Evolutionary Ecology: The Trinidadian Guppy*: there are still gaps in the literature the size of an Alberta sunset. What's more, Magurran not only highlights these gaps throughout the book but she generously dedicates the final chapter to identifying important and profitable avenues of research. Consequently, one finishes the book with the thought that the most exciting and influential research on guppies is yet to come.

Of the myriad investigative possibilities highlighted by Magurran in the final chapter, unraveling the functional genomics of *Poecilia reticulata* will likely pack the biggest punch in terms of driving novel research and ultimately getting under evolution's hood to see how it all works. Fish provide some of the best model organisms in genomics research with the zebrafish (*Danio rerio*), medaka (*Oryzias latipes*) and pufferfish (*Fugu rubripes*) leading the way. However, unlike the guppy, we know very little about the natural history and behavioral ecology of the aforementioned species. By applying the candidate gene approach (Fitzpatrick et al. 2005), for example, behavioral ecologists will be able to acquire previously unimagined insight into the factors driving guppy behavioral and morphological adaptation. This line of investigation is not the stuff of fantasy, but is happening right now. For example, Hoffmann et al. (2007) are exploring the coevolution of visual perception and male ornamentation by identifying the genes influencing the expression of male color patterns and female perception of those patterns. This methodology will not only eventually lead to a better understanding of phenotypic differences among guppy populations but inevitably to our understanding differences among poeciliid species.

I have few serious criticisms of this book. There are some editorial errors in the text and index but these do not detract much from the overall presentation. My only real complaint is that some of the empirical research is not set in a hypothetico-deductive framework; I think readers would benefit from seeing how well the empirical research findings on guppies support theoretical predictions. However, these are minor quibbles, really, and I recommend this book certainly for those with interests in guppies but, even more generally, for anybody with an interest in fish behavioral ecology or in the evolutionary effects of predation risk on animal behavior and morphology.

Clint D. Kelly

*School of Botany & Zoology
Australian National University
Canberra, ACT 0200 Australia*

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Workshops and Meetings 2007

Evolution Annual Meeting
6 to 21 June, 2007, Christchurch, New Zealand
www.evolutionsociety.org/meetings.htm

5th Meeting Australasian Evolution Society
13-15 June 2007, Sydney, Australia
<http://aes.eriophora.com.au>

21st Meeting Society for Conservation Biology
1st to 5th July 2007, Prot Elizabeth, South Africa
<http://www.conbio.org/2007>

Animal Behavior Society
21-26 July, 2007. Burlington, Vermont, USA.
<http://www.animalbehavior.org/ABS/Program/>

XVII International Congress of Arachnology
5-11 August 2007, São Pedro, Brazil
<http://www.arachnology.org/>

11th ESEB Conference
20-25 August 2007, Upsala, Sweden
www.eseb.org

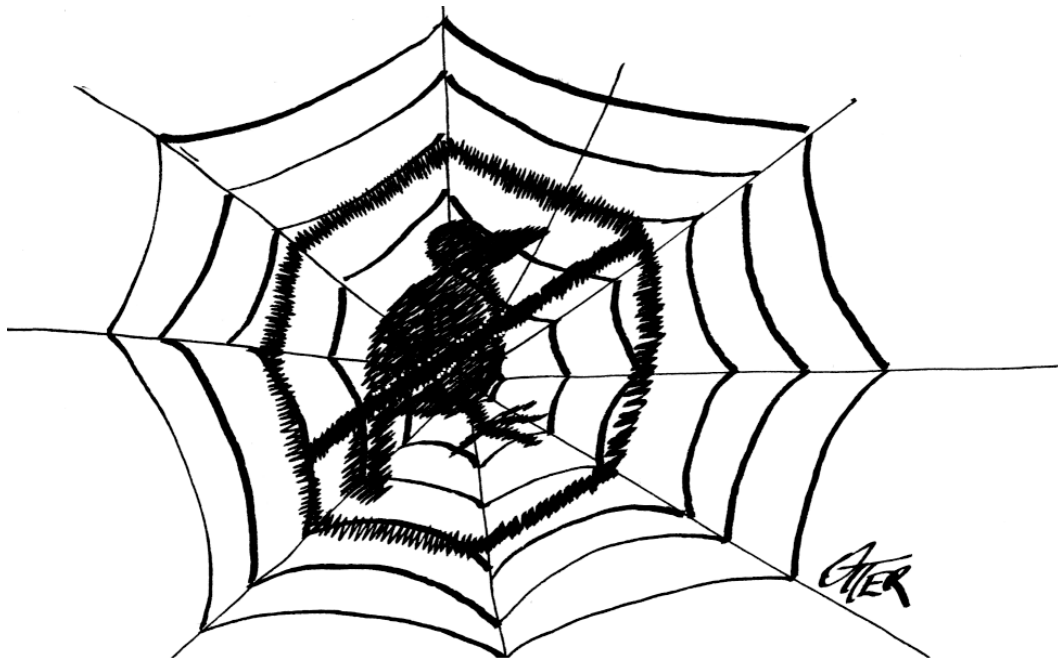
International Ethological Conference 2007
15 to 23 August, 2007, Halifax, Canada
<http://iec2007.psychology.dal.ca/iec2007>

ASAB Summer Meeting
5-7 September 2007, Newcastle-upon-Tyne, UK
<http://asab.nottingham.ac.uk/meetings/asab.php>

XII European Congress of Ichthyology
9-13 September 2007 Cavtat (Dubrovnik), Croatia
<http://www.biol.pmf.hr/~ecixii/>

17th Conference Biology of Marine Mammals
29 Nov- 3 Dec 2007 Cape Town, South Africa
<http://www.marinemammalogy.org>

4th Biennial Australasian Ornithological Conference,
December 3-5, 2007 Perth, Australia
www.birdswa.com.au/aoc2007



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ORNAMENTS REMAINS HOTLY DEBATED**