Supplement to Behavioral Ecology

ISBE International Society for Behavioral Ecology
Newsletter
web.unbc.ca/isbe/

Editor: Ken Otter
Ecosystem Science & Management Program
University of Northern BC
Prince George, BC, Canada V2N 4Z9
Phone - (250) 960 5019
Fax - (250) 960 5539
email - otterk@unbc.ca

Volume 16, Issue 1
Spring/Summer 2004

From the President

The 10th ISBE congress is rapidly approaching, and we can look forward to an exciting summer week in Jyväskylä. I warmly welcome Jack Bradbury to take over as president there, and the new members of the executive to take office. Paul Ward reports the result of the election on page 6.

Since the ISBE conference in Montreal 2002 there have been important changes in the editorial, submission and subscription systems of our journal Behavioral Ecology. Owing to excellent work by authors, reviewers, editors and editorial board as well as Oxford University Press, the journal has become the lead in its field. It is obviously highly attractive, the submission rate increases steadily, and the number of journal pages has been increased.

To keep the number of manuscripts handled by each editor within limits, we now have seven editors. At the successful switch to electronic submission, which is now in full timesaving swing since 2003, the need was felt for an editor-in-chief. David Westneat kindly agreed to take on this demanding task. He has done a great job as editor, not least by getting the new system going. After five years, he plans to hand over to his successor this summer. Gunilla Rosenqvist has also done a wonderful job, serving as an editor for over six years. Warmest thanks from the society to both of them, and a great welcome to Andrew Bourke who has agreed to succeed Dave as editor-in-chief, and to Göran Arnqvist and Mark Elgar for agreeing to be new editors. The quality and success of our journal depends on such first-rate scientists being willing to use their expertise in handling the manuscripts it receives.

Contents of this Issue

After the introduction of the web edition of the journal, there have been changes in the subscription system, not least for institutions. It is at present a bit difficult to predict how the economy for scientific journals will develop, given the rapid changes taking place through the expansion of web-based journal access. But OUP is keeping a keen eye on it to make sure that the economics of the journal will remain sound.

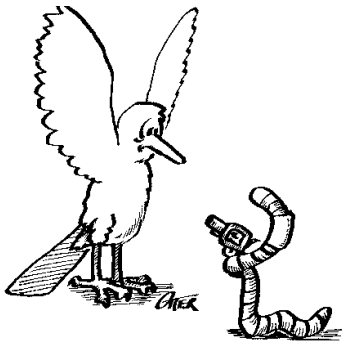
All these changes have involved negotiations, and it has been a pleasure to interact with everyone concerned – executive, editors and, not least, Cathy Kennedy at Oxford University Press. We have also negotiated a new contract between ISBE and OUP for the next five years of the journal. All negotiations have been held in a positive atmosphere, and everyone is enthusiastic about our journal and research field. The future therefore looks bright.

Unforeseen delays in building activities have made it difficult to hold the ISBE conference in 2006 at Cornell University as planned. Instead there will be a swap, the 2006 conference taking place in Tours, France, and the 2008 conference at Cornell University, when their new large-size auditorium is finished. Sandra Vehrencamp and Jack Bradbury at Cornell, and Marc Thery on the French side, have arranged this excellent solution. So we can still look forward to these two exciting venues for ISBE conferences, although in reverse order compared to the original plan.

But first of course, there will be the10th conference in Jyväskylä this summer, where Rauno Alatalo and his colleagues have set up a highly interesting program, in the beautiful and pleasant summer landscape of lake-rich central Finland. Do come if you have a chance, you would regret missing all the exciting recent research in behavioral ecology, being told long before publication, and at such a nice place!

Looking forward to meeting you all there,

Malte Andersson
ISBE President



SUDDEN ADVANCES IN ANTIPREDATOR STRATEGIES

CONTRIBUTIONS TO THE ISBE NEWSLETTER

The ISBE Newsletter publishes Book, Conference and Workshop Reviews of interest to the *International Society for Behavioral Ecology*.

Book Reviews: 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.

Workshop/Conference Reviews: Workshop and/or Conference reviews should be prepared in one of the following two formats. ***Brief synopses*** (max 1000 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 published.

Longer reports (max 2500 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 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 fall/winter newsletter will be Sept 15, 2004.

Current Executive

President
Malte Andersson
Animal Ecology
Department of Zoology
Göteborg University
Box 463, SE 405 30 Göteborg, Sweden
Tel: +46 31 773 3695
Fax: +46 31 416729
E-mail: malte.andersson@zool.gu.se

Past-President
Nick Davies
Department of Zoology
Cambridge University
Downing Street
Cambridge CB2 3EJ U.K.
Tel.: +44 (0)1223 334405
Fax: +44 (0)1223 336676
E-mail: n.b.davies@zoo.cam.ac.uk

President-elect
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

Secretary
Paul Ward
Zoologisches Museum der Universität Zürich
Winterthurerstrasse 190
CH 8057 Zürich, Switzerland
Tel: +41 1 635 4970
Fax: +41 1 635 6818
E-mail: pward@zoolmus.unizh.ch

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

Councillors
Marty Leonard
Department of Biology
Dalhousie University
Halifax, Nova Scotia, Canada B3H 4J1
Tel: +1 902 494 2158
Fax: +1 902 494 3736
E-mail: mleonard@is.dal.ca

Linda A. Whittingham
Dept. of Biological Sciences
University of Wisconsin-Milwaukee
Lapham Hall, P.O. Box 413
Milwaukee, WI 53201 U.S.A.
Tel: +1 414 229 2252
Fax: +1 414 229 3926
e-mail: whitting@csd.uwm.edu

Hanna Kokko
Department of Ecology and Systematics
Biocenter 3 PO Box 65 (Viikinkaari 1)
00014 University of Helsinki
Finland
Tel: +358 9 1915 7702
Fax : +358 9 1915 7694
E-mail : hanna.kokko@helsinki.fi

Nina Wedell
The School of Biology,
University of Leeds, L. C. Miall Building
Clarendon Way, Leeds, LS2 9JT, U.K.
Tel: +44 (0) 1133 433051
Fax: +44 (0) 1133 432835
E-mail: N.Wedell@leeds.ac.uk

In Memoriam

FRANK ALOIS PITELKA, 1916–2003

Frank Pitelka, in whose honor the ISBE's research award for the best student paper published in *Behavioral Ecology* was established, died of prostate cancer on 10 October 2003. Frank was born in Chicago, Illinois, on 27 March 1916. He earned his B.S. at the University of Illinois (1939) and his Ph.D. from the University of California, Berkeley (1946), where he remained for his entire academic career. He retired in 1985 but continued to come regularly to campus until 1999, when failing health forced him to move to his daughter's compound in southern California.

Frank's ornithological career spanned 50 years, beginning during the 1930s while he was growing up in suburban Chicago. Although he always dismissed his upbringing as distinctly non-academic, Frank began his professional ascent early on by joining the Chicago Ornithological Society, with which he took numerous field trips and began serious ornithological observations. During his college years Frank published eight notes in *The Auk* and a detailed account of the breeding biology of the Black-throated Green Warbler in the *Wilson Bull.* (52: 3-18, 1940).

After graduation, Frank spent the summer of 1939 at the University of Washington's Oceanographic Laboratories in Friday Harbor and then moved south to the University of California at Berkeley for graduate work under Alden Miller in the Museum of Vertebrate Zoology (MVZ). A venerable MVZ tradition during that era involved staff and students making extensive field collecting trips throughout western North America and Mexico. Frank eagerly joined several of these expeditions, and for his Ph.D. investigated variation and speciation in *Aphelocoma* jays (*Univ. Calif. Publ. Zool.* 50: 195-464, 1951). Presumably he chose this small genus, which currently is divided into five species, because of its taxonomic complexity. However, it turned out to be a fortuitous choice for another reason: several of these jays are extremely social, and behavioral observations Frank made during his collecting trips kindled an interest in the evolution of social behavior that was to form one of two major foci of his research career.

Frank's second major research focus was population regulation. This interest developed soon after he finished his Ph.D. and was hired as an Instructor in Zoology and Assistant Curator of Birds in the MVZ. Gradually his attention shifted from taxonomy to ecology, spurred along by his acceptance of an invitation to work at the recently established Arctic Research Laboratory (later the Naval Arctic Research Laboratory, or NARL) in Barrow, Alaska. Thus began an annual migration between Berkeley and Barrow that Frank undertook for 30 years as he and his students studied the legendary population cycles of lemmings and their avian predators (*Ecol. Monogr.* 25: 85-117, 1955), later expanding to studies of the behavior and ecology of other Arctic-breeding birds, particularly calidridine sandpipers (*Amer. Zool.* 14: 185-204, 1974).

Frank was a naturalist, proudly and unabashedly from an earlier generation of field biologists, for whom the collecting of specimens, distributional data, life histories, and behavioral observations were of paramount importance. He was especially in his element in the stark natural beauty of northern Alaska, where he enthusiastically trundled across the tundra to collect vagrants and observe the social and reproductive behavior of the avifauna. As described memorably by David W. Norton (in *Fifty years below zero: tributes and meditations for the Naval Arctic Research Laboratory's first half-century at Barrow, Alaska*, Univ. Alaska Press, 2001), over the many years of his work at NARL Frank became one of the station's most durable and colorful summer residents.

Frank's bibliography encompasses over 150 publications. His professional awards include the William Brewster Memorial Medal (1980) from the American Ornithologists' Union, the Mercer (1953) and Eminent Ecologist (1992) Awards from the Ecological Society of America, a distinguished teaching award (1984) and the Berkeley Citation (1986) from the University of California, Berkeley, and a Lifetime Alumni Achievement Award from the University of Illinois (1993). He was a Guggenheim Fellow, a visiting scholar in Charles Elton's laboratory at Oxford University in 1949-50, an elected Fellow of the Animal Behavior Society (1989), served on numerous federal committees and panels, and held editorial positions for various journals and organizations including *Ecology* (editor, 1962-64), *The Condor* (associate editor, 1946-62), and *Studies in Avian Biology* (editor, 1984-87). Because of Frank's Czech heritage, the honor that he treasured most was an honorary doctorate in biological sciences from Masaryk University in Brno, Czech Republic (1997).

These accomplishments only begin to touch upon Frank's

greatest impact on science, which was in the realm of nurturing students, their ideas and careers. The main tangible manifestations of this are the six M.S., 37 Ph.D, and 11 postdoctoral students whom Frank mentored. In terms of ideas, many of the roots and shoots of the American branch of the field of behavioral ecology were fertilized in Frank's lab during the 1970s. A list of Frank's doctoral students who were primarily involved in avian work was published as part of the academic family tree for Loye and Alden Miller (*Condor* 95: 1065-1067, 1993), and Frank's postdoctoral students are listed in an announcement of a celebration that his students and colleagues held in honor of his 80th birthday (*Condor* 98: 671-672, 1996).

Once Frank accepted a student, he typically became their life-long friend and ardent supporter, providing critical intellectual assistance and emotional support when needed, and gently but consistently nudging us to get out into the field and on with our research. Frank would look over his half-rim glasses with a twinkle in his eyes, raise his eyebrows and ask, "Well, doctor, what's going across your desk these days?" Always taking the big picture and keenly aware of developments in the field both current and past, Frank invariably was able to put whatever idea we were currently smitten with into its broader perspective and historical context, humbling and yet inspiring us to scurry excitedly back to work.

Frank's nurturing approach enabled him to transmit to students not only his appreciation for "old fashioned" natural history but also his enthusiasm for good science in general. He was particularly eager to foster scientific interchange between his students and the international scientific community. To that end, he hosted dozens of campus visitors and organized several small, focused meetings such as *The Great California Woodpecker and Acorn-storing Symposium* (*Condor* 76: 230-231, 1974) and an international symposium on shorebird behavior and ecology (*Studies Avian Biol.* 2: 1-261, 1979). Conversely, Frank exhibited a considerable disdain for anything that got in the way of doing good science, as well as political decisions based on emotion or public opinion rather than solid scientific evidence.

Beyond his influence through his own students, Frank's larger-than-life personality made him an important and respected influence on the careers of numerous young ornithologists, ecologists, and behavioral ecologists throughout the world. He was invariably a colorful and enthusiastic participant at meetings, asking penetrating questions, adding insightful comments, and always making it clear to everyone around him that getting to the heart of a research question was the key to having a good time.

In addition to his deep commitment to and involvement in science, Frank was intrigued by artistic beauty and achievement in a myriad of forms, from the ability to express himself in several languages (using appropriately colorful and amusing gestures and expressions) to his devotion to grand opera, which he and his wife Dorothy attended regularly in San Francisco and in Europe (they were particularly fond of Italy and Italian opera) until her death in 1994. Frank and Dorothy, who met as graduate students at Berkeley, are survived by their three children: Kazi, a professional violist in Altadena, California; Louis, an ecologist and director of the University of Maryland's Appalachian Laboratory in Frostburg; and Vince, a ceramicist and professor at the Appalachian Center for Craft in Cookeville, Tennessee.

One of Frank's most memorable characteristics was his love of good conversation over fine cuisine. He frequented many of Berkeley's chic restaurants regularly enough to be greeted by name upon arrival and then escorted to his favorite table. Frank also enjoyed fine wines, and in selecting these he brought to bear the same devotion and scrutiny he exercised in his scientific work. Frank may be the only person we've ever dined with who knew precisely how to squeeze a cork and sniff a vintage—and who didn't think twice about sending a bottle back if it failed to meet his expectations.

One of *Nature* magazine's favorite questions for scientists it profiles is "What persons, living or dead, would you most like to dine with?" Three choices come easily to our minds: Niko Tinbergen, David Lack, and Frank Pitelka, with our guess being that Frank would not only match his elder's insights and wit but most likely choose the best restaurant at which to dine. The passing of "Papa Frank" is truly the end of an era. He will be greatly missed by his family, students and the behavioral and ornithological communities.

NOTE: This is a modified version of a memorial statement that is forthcoming in *The Auk*.

Walt Koenig
Hastings Reservation
University of California, Berkeley
38601 E. Carmel Valley Rd.
Carmel Valley, CA 93924, USA

Paul Sherman
Department of Neurobiology and Behavior
Cornell University
Ithaca, NY 14853, USA

Society News

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).

SPOUSAL MEMBERSHIP

For $5 per year spouses of full members can become members of ISBE. Spousal members receive the newsletter and information concerning biannual meetings, but do not receive a subscription to the journal. Contact the Treasurer for more details.

ISBE 2004 CONFERENCE

The 10th Jubilee Congress of the ISBE will be held in Jyväskylä, Finland, 10-15 July 2004. Details can be found at www.isbe2004.com.

WORKSHOPS AND OTHER MEETINGS

XIXth (NEW) International Congress of Zoology will be held in 2004 in Beijing, China. Basic information, such as correspondence, first announcement, online registration and how to organize a symposium, is available on the web page **http://www.icz.ioz.ac.cn/.**
The research papers presented in the congress will be published in *Acta Zoologica Sinica*.

The 24th International Ornithological Congress will be held in Hamburg, Germany, 13-19 August 2006. The scientific program committee has been formed and a web page is in place:
http://www.i-o-c.org/
Susan Hannon (Chair, Scientific Program Committee)
Franz Bairlein (Secretary General)

GRANTS AND JOBS

Grants and Job postings are listed in detail on the newsletter's webpage: web.unbc.ca/isbe/newsletter/index.htm

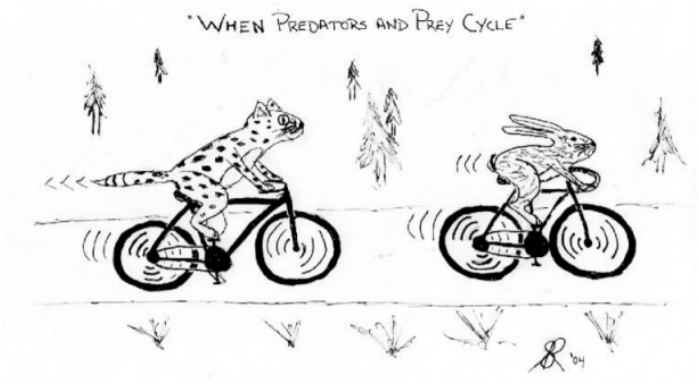
Results of the 2003/2004 Election of ISBE Officers

The results of the elections are as follows:

1) **President elect: Marlene Zuk**
2) **Treasurer: Walt Koenig**
3) **Councillors: Naomi Langmore and Mats Olsson.**

The elections were all close, except for the Treasurer, which Walt won by a landslide. There were no spoiled ballots but not everyone voted for all posts. Congratulations to the successful candidates. The ISBE is also grateful to the others for their willingness to participate in the process.

Paul Ward
ISBE Secretary



cartoon by Scott Ramsay

Book Reviews

Bumblebees. Their Behaviour and Ecology

Dave Goulson. Oxford University Press, 2003. 235 Pp.
ISBN 0-19-852606-7 (hardcover), ISBN 0-19-852607-5 (paperback)

Bumblebees (*Bombus spp*.) are familiar insects that have long been popular with the general public. As with some beetles and butterflies, part of the attraction lies in the bright coloration and the ease of watching them feeding on nectar and pollen of flowers. Bumblebees play a vital role in the pollination of wildflowers and some forage crops such as clover. Furthermore, bumblebees are widely used commercially as pollinators of glasshouse crops, such as tomatoes. In addition, the commercial use of the bumblebee species, *Bombus terrestris*, and the recent development of polymorphic microsatellite markers that can be used in parentage analyses have provided behavioral ecologists with an ideal model to study within-colony conflicts.

Thus, the popularity of bumblebees as subject of research has resulted in the publication of several major reference books on bumblebee biology (Alford, 1975). Dave Goulson's book represents the latest attempt to summarize the state of the art in bumblebee behavior and ecology. Having published numerous papers on pollination ecology, the author combines the results of his own studies on bumblebees with a thorough but concise overview of the literature.

The book, in its 235 pages, presents fifteen chapters and starts with some general information on classification, recent advances in phylogenetics and a summary of the life cycle. This fairly basic introduction is followed by a chapter on thermoregulation where the author reviews the mechanisms used by bumblebees to control their body temperature and regulate the temperature of the nest.

The next chapter deals with social organization and conflict. Traditionally, social insect societies were regarded as cooperative with the workers acting for the 'good of the colony'. However, it is now widely understood that the non-clonal kin structure of insect societies results in potential conflict among individuals or groups of individuals over reproduction. The author gives an excellent overview of the conflicts of interest over reproduction between queens and workers. He also outlines the most plausible hypotheses that explain why bumblebee sex ratios are often male biased and why sex ratios of cuckoo parasites (bumblebees of the subgenus *Psithyrus*) appear to be female biased.

In chapter four Goulson gives an interesting insight into mate location strategies, mating frequencies and explanations as to why copulation takes so long in bumblebees.

Chapter five gives a review of the diverse array of predators, commensals, parasites and parasitoids that are known to be associated with bumblebees, many of them relying entirely on these pollinators to complete their life cycle.

The next six chapters deal with foraging behavior. Goulson reviews the different hypotheses that try to explain the tendency of bumblebees to forage far from their nest. He also discusses the visual cues used by bumblebees to discriminate between rewarding and non-rewarding flowers of the same species without sampling the reward available. Communication during foraging is the subject of chapter eleven. It has been demonstrated that bumblebee foragers communicate and that recruitment of nestmates does occur but, in contrast to honeybees, bumblebees do not communicate with each other about good sources of forage. Goulson reviews the hypotheses that try to explain why bumblebees are unable to recruit nestmates to particular places. In addition, he describes the recent discovery of short-lived volatile scent marks (deposited during flower visits), which enable foragers to avoid flowers that have recently been emptied of rewards.

Which are the factors that allow a number of bumblebee species with similar biology to coexist? In chapter twelve, Goulson reviews the experimental evidence that suggests that variation in tongue length between species might lead to differences in floral preferences and resource partitioning. Goulson rightly emphasizes the importance of other factors (i.e. physiological and phenological differences), in determining niche overlap and community structure.

The following chapter focuses on the economic importance and commercial use of bumblebees as pollinators of crops. In particular the use of the bumblebee species *Bombus terrestris* as pollinators of glasshouse crops.

The last two chapters are to me the highlight of the book and deal with conservation issues and the impact of introduced bumblebees on native ecosystems. The author gives an excellent overview of the possible causes for the

widespread decline in bumblebee numbers. He also highlights the knock-on effects of the demise of bumblebee fauna on other wildlife.

In summary, Dave Goulson is to be congratulated for producing this book that synthesizes behavioral and ecological information that can be used to manage bumblebees for pollination and/or conservation purposes. Furthermore, Goulson highlights how little we know about the ecology and behavior of bumblebees other than the economically important *Bombus terrestris* and makes many constructive suggestions as to where bumblebee research needs to be heading.

Finally, I have no doubt that this book will be an important shelf reference for many years to come for anyone working on bumblebees. Therefore, I highly recommend this book to beekeepers, conservation biologists, pollination ecologists and other biologists who want to gain greater knowledge on the behavior and ecology of bumblebees.

Carlos Lopez-Vaamonde
Institute of Zoology, Zoological Society of London
Regent's Park NW1 4RY, London, UK

References

Alford DV, 1975. Bumblebees. London: Davis-Poynter.

Niko's Nature: A Life of Niko Tinbergen and His Science of Animal Behaviour

Hans Kruuk. Oxford University Press, 2003. 388pp
ISBN 0-19-851558-8 (hardcover)

One of three founding fathers of the science of ethology, Niko Tinbergen was a skilled communicator. Yet, if your browse through the popular science section of any bookshop today you'll be lucky to come across any of his books. During the 1930s and 40s the pioneering studies of Tinbergen, Konard Lorenz and Karl von Frisch helped to create the field of animal behavior and in 1973 their combined efforts were recognized by the award of a Nobel prize. All three died in the 1980s, but Lorenz is the best remembered, justly famous for his popular books like *King Solomon's Ring* (1949) and *Man Meets Dog* (1950) which are still in print. Von Frisch, who discovered the dance language of bees, is now an almost forgotten figure in the public eye. Niko Tinbergen lies somewhere in between, and even if he does not feature very prominently in the collective public memory, of the three Nobel laureates it is his scientific legacy that lives on today. Tinbergen provided the framework for understanding the function or adaptive significance of behavior that began in the mid-1970s and continues to inspire successive generations of naturalists.

Hans Kruuk has written a compelling account of what turns out to be a rather fragile man. Knowing that Kruuk was one of Tinbergen's assistants and later his research student, one might be forgiven for expecting something sycophantic. Instead, Kruuk has employed the same dispassionate objectivity that well-trained ethologists use to scrutinize their animal subjects. The result is remarkable, and provides a critical and fascinating insight into Tinbergen's world.

It is easy to imagine that someone who has won a Nobel prize for their monumental contribution to science would also be a monumental and robust personality. In Tinbergen's case nothing could be further from the truth: he was a shy and self-effacing individual and a complete contrast to the loud, arrogant and self-seeking Lorenz. It says much about Tinbergen that despite their personality differences and despite being held hostage by the Germans during WWII, and knowing that in Austria Lorenz had joined the Nazi party, Tinbergen remained a loyal and life-long friend to Lorenz. Given Tinbergen's success it is surprising but also reassuring in a way, to discover that his approach to animal behavior also elicited criticism, some of it 'so penetrating and so devastating it would have felled a lesser man'. The critic was Danny Lerhman, who in 1953 pointed out all that was wrong with the Tinbergen-Lorenz approach to instinct. Tinbergen's response – characteristically - was to invite Lerhman to Oxford, where the two of them hit off immediately, both benefiting in the long run from a friendly rather than adversarial exchange of views.

Tinbergen had a passionate interest in the natural world. He was obsessed by his work - family came second - and he drove himself relentlessly, often with catastrophic consequences. Nevertheless, despite his human failings, Tinbergen was an inspiration to his students. They called him 'the Maestro' and with good

reason. He was a startling original thinker and tested his ideas with experiments of beguiling elegance. His main contribution was the notion that one could do meaningful experiments with animals in their natural environment. Tinbergen also encouraged modesty, clear thinking and straightforward writing in his students. *The Study of Instinct* (1951) was a landmark in animal behavior. *The Herring Gull's World*, published two years later was popular science writing at its best and led eventually to an award-winning film *Signals for Survival*. Tinbergen was also a superb speaker – his Nobel speech in Oxford (despite its controversial content) was one of the most inspiring performances I have ever heard.

Tinbergen came to Oxford from Leiden in 1949 as a result of David Lack persuading the then head of the zoology department, Sir Alistair Hardy, that they should get him. Employed initially as an assistant (he was 42!), Tinbergen quickly moved up through the ranks with a rapidly expanding and successful research group. Hardy retired in 1961 and was replaced by John Pringle. One of the most shocking aspects of this biography is Kruuk's revelation of how shabbily Oxford, and Pringle in particular, treated Tinbergen – epitomized by their lukewarm response to the Nobel prize.

Great scientists are either part of an intellectual dynasty or they start one. Tinbergen started one, and Kruuk's book culminates with an intriguing overview of Tinbergen's intellectual offspring, including Gerard Baerends, Mike Cullen, Desmond Morris, Robert Hinde, Richard Dawkins and others, all of whose names are familiar to most behavioral ecologists. This book is a landmark in the history of our subject; beautifully illustrated with numerous photographs and Tinbergen's vivid sketches of animals behaving in their natural environment.

Tim Birkhead
Department of Animal & Plant Sciences,
The University of Sheffield,
Sheffield S10 2TN, UK

A Red Bird in a Brown Bag: The Function and Evolution of Colorful Plumage in the House Finch

Geoffrey E. Hill, Oxford University Press, 2002. 318 Pp.
ISBN 0-19-514848-7 (hardcover).

I should begin with a statement of my prejudices. I am a huge fan of long-term studies, and I have always enjoyed reading synthetic accounts of such research. Even with these general biases, I think Geoff Hill's book deserves to be viewed as a classic in the genre. Hill's study of house finches will be well known to most students of behavioral ecology. He and his colleagues have exploited three attractive features of their biology – massive variation in the extent of ornamental plumage, a well-documented population expansion, and a massive epidemic at the crest of the population boom. These characteristics have led to a highly suitable model for the study of the expression of ornaments and sexual selection (Hill, 1991). The research has not only clarified many pre-existing issues through careful observations and experiment, but has stimulated two of the current enthusiasms (some might unkindly say fads) of empiricists – the importance of carotenoid-derived pigments as signals, and the possibility that dominance and attractiveness are completely unrelated.

All the house finch research is clearly explained in this well-written and nicely organized book. It is an admirable introduction for students unfamiliar with the large body of research that has emerged since Hill decided to study house finches in 1987. However, even for those of us who have studied the original papers, the book has additional value as an account of how good research evolves, not just from clever experiments, but also from serendipity, chance conversations, and work that at first blush seems to have gone terribly wrong. His repeated accounts of how graduate (and undergraduate students) made their own contributions to the body of work are engaging and illuminating.

There is lots of advice, that ranges from the useful – the easiest way to interact with the university administration about research on campus is to start the research first and answer any questions later, through to personal obsessions – strong advocacy of the brown bag technique for restraining birds that features in the title. However, for me the greatest revelation was Hill's

obvious concerns about the runaway success of some of his ideas – his caution about some of the claims currently being made for carotenoids should be compulsory reading.

I have no reservations in recommending this book wholeheartedly. There are points of disagreement – such as whether there are likely to be indirect effects from good genes when the evidence of direct effects are overwhelming. Nonetheless, the book is admirable for its balanced presentation of the weaknesses as well as the strengths of the research so far. The final issue that interested me was the question of when is the right time to publish a synthesis of this sort – Hill's work on house finches is a highly active ongoing concern. I remember Steve Albon once complaining to me that the famous monograph on red deer he had written with Tim Clutton-Brock and Fiona Guinness had led people to ignore some of their later papers. Hill uses his own book to map a path of future research – much of which is probably already underway. I hope this book will draw readers into the completed work, and whet their appetite for the research that is still to come.

Andrew Cockburn
School of Botany and Zoology
Australian National University
Canberra ACT 0200 Australia

References

Hill GE, 1991. Plumage coloration is a sexually selected indicator of male quality. Nature 350:337-339.

Animal Behavior and Wildlife Conservation

Marco Festa-Bianchet and Marco Apollonio (eds.) Island Press, 2003. 379 Pp.
ISBN 1-55963-958-X (cloth), ISNB 1-55963-959-8 (paperback)

Almost 10 years ago, Behavioral Ecology experienced another renaissance, brought on by the collective imagination and conscience of several mainstream practitioners. In quick succession, they appreciated the myriad ways that the theory and methods of Behavioral Ecology could address pressing problems in Conservation Biology. Bill Sutherland (1996) began by identifying the population consequences of ideal free distributions, interference competition, and depletion. Ulfstrand (1996), Clemmons and Buchholz (1997), Caro (1998), Helfman (1999), and Gosling and Sutherland (2000) organized symposia and published edited collections, each one attesting to the wealth of information and expertise Behavioral Ecology was already contributing to this new crisis discipline. At least two dozen reviews of specific topics have been published in the primary literature (for an up-to-date list, see the website of the Animal Behavior Society's Conservation Committee at [http://www.animalbehavior.org/ABS/Conservation/]).

Many of these targeted specific taxonomic, disciplinary, or conservation contexts and did so with impressive breadth and innovation. And so, you might wonder, what need is there of another book on this topic and what new things does it offer?

Animal Behaviour and Wildlife Conservation is, indeed, a little different. A subtle departure is suggested in its name by the containment of the word 'wildlife,' which was traditionally restricted to moving organisms people like to eat, or at least photograph. In the opening chapter, Festa-Bianchet and Apollonio dispel this tradition, using the term 'wildlife' to imply any animal species, and further suggesting that the former disciplines of wildlife management and wildlife conservation are coalescing into a single entity. In so doing, they acknowledge a truism: conservation – whether of species at risk of extinction, or of species that produce superabundant pests – always involves human behavior. In fact, they state, human behavior generally plays a greater role than animal behavior in management and conservation. I would agree.

The book is structured around invited workshop presentations that took place in November 2000 in the infamous Ettore Majorana Center for Scientific Culture, in Erice, Sicily. How fitting that talk of how to conserve other species, whose fates are inextricably tied to human activities, should take place in this ancient former monastery. In addition to an opening and concluding chapter by the editors, the book contains 15 chapters, loosely grouped in four sections which address (1) the reasons animal behavior is important for conservation, (2) resource-use strategies in space and time, (3) wildlife management, and (4) genetic diversity and individual differences.

In the first section, Morris Gosling extends Festa-Bianchet and Apollonio's introductory chapter by describing the fundamental relationship between the adaptive behavior of individuals and population

viability. I believe it's the ability to make this critical link – to see the population consequences of individual behavior – that makes it possible to behaviorists to contribute helpfully to conservation problems. The link is not an easy one for us for two reasons. First, the relationship is often difficult to extrapolate and sometimes counterintuitive. Second, we are steeped from the time we are baby biologists in the heresy of perceiving individual behavior as being for the good of the group, a.k.a. population! But if we do not take this step, I believe our efforts are largely academic and our contributions needlessly stunted. The remainder of the book provides specific case studies and tools for linking genetic differences to individual behavior to differential reproductive success to, finally, population persistence.

In the second section, Rosie Woodroofe provides a primer on the relationships between dispersal behavior and metapopulation persistence and explores the behavioral and habitat attributes that tend to limit or facilitate dispersal movement. Paolo Luschi fleshes out both the importance of and challenges to long-distance movement with a nice case study of sea turtle migration and conservation. André Desrochers takes a boldly comprehensive approach for forest-dwelling birds by scaling up from behaviorally-mediated details of individual movement to derive rules of territory establishment, which ultimately produce patterns of distribution in fragmented forest. Isabelle Côté explores the population consequences of reproductive behavior, habitat loss, and exploitation, with a focus on fish. Although the specifics are novel, many of these topics are also addressed in some of the earlier books, especially those edited by Caro (1998) and Gosling and Sutherland (2000). Norman Owen-Smith rounds out the section with an assessment of foraging behavior, with pertinence to habitat suitability and translocation success in the context of large mammalian herbivores. As he points out, this topic was not as explicitly addressed in the previous books, perhaps ironically so given the pivotal role of foraging behavior in the development of Behavioral Ecology as a discipline.

For me, it's the third section that really highlights the novelty of this collection through its focus on wildlife management. Jean-Michel Gaillard and others emphasize how the behavior of harvestable ungulates can influence census methods and, hence, population models and management. Joel Burger *et al*. explain how both losing, and later regaining, carnivores drives predator-prey dynamics and, ultimately, the biodiversity of many North American ecosystems. Marco Apollonio and co-authors review some behavioral aspects of conservation for European mammals to show how inadequate appreciation of animal behavior has limited management efficacy. In so doing, they set the stage for a pair of chapters by Jon Swenson and Marco Festa-Bianchet, which show how sex- and age-biased hunting can increase rates of sexually-selected infanticide (carnivores) or artificially select for precocious development and smaller horns or antlers (ungulates).

The forth section scales back down to individuals and genes. A first chapter by Steve Dobson and Bertram Zinner shows how social groups and mating systems can affect genetic structure and a second chapter by Claus Wedekind shows how selection for pathogen-resistance interacts with genetic variability in small populations. Both demonstrate how historic natural selection can thwart conservation efforts of small populations. A second pair of chapters, the first by Brian Steele and John Hogg, and the second by Peter Arcese, assesses how variation among individuals contributes to environmental suitability and conservation. The former provides a great introduction to generalized linear mixed models, which are relevant to many instances in which one would like to extrapolate the successive behaviors of individuals (e.g., movement) to populations.

Although many of these topics have been treated before in the burgeoning literature on conservation behavior, this collection has strength in its integration, flow, and management foci. If I were to name a limitation of this book, it would be the same one I'd levy for the earlier collections; population implications of individual behavior remain nebulous and too variable to generalize. Most authors offer ideas that are as yet untested about how their particular behavioral emphasis would, should, or could affect population persistence. But, on the other hand, this interface is young and the ideas contained here provide rich seams of behavioral ore to be mined by current and future conservation behaviorists.

I will end with an assessment of the fit and finish of this new book. As might be expected of workers from several continents, conservation cultures, and first languages, the writing style is interestingly variable. But the chapters are structured with uniform attention to objectives and summaries and carefully chosen, positioned, and perhaps edited to increase their complementarity. I like the variability and think it attests to the universal nature of human solutions for conservation problems. The book is well-suited to upper division undergraduate or graduate student discussion courses and certainly is a must for anyone with serious interest in conservation behavior. The book has a final

advantage. Published by the not-for-profit Island Press, it practices the responsible environmental ethic it preaches by offering an affordable US$35 paperback version printed on acid-free, recycled paper. Now that's conservation behavior!

Colleen Cassady St. Clair
Department of Biological Sciences
University of Alberta,
Edmonton, Alberta, Canada T6G 2E9

References

Caro T, (ed). 1998. Behavioral ecology and conservation biology. New York: Oxford University Press

Clemmons JR, Buchholz R (eds), 1997. Behavioral approaches to conservation in the wild. New York: Cambridge University Press

Gosling LM, Sutherland WJ (eds.), 2000. Behaviour and conservation. New York: Cambridge University Press

Sutherland WJ, 1996. From individual behaviour to population ecology. Oxford Series in Ecology and Evolution. New York: Oxford University Press.

Pheromones and Animal Behaviour. Communication by Smell and Taste.

Tristram D. Wyatt. Cambridge University Press, 2003, 391 pp.
ISBN 0-521-48068 X (hardcover), ISBN 0-521-48526-6 (paperback)

The importance of olfaction in animal communication and behavior was noted early, notably by French naturalist Jean-Henri Fabré. The first published accounts appear to be by Bethe (1932), who proposed the term "ektohormone". Numerous scientists studied behavioral effects of 'scents', e.g., the late Bertil Kullenberg, who was professor at Uppsala University when I studied entomology, studied interactions between bee orchids and their pollinators in the 1940's-1950's, and had hypothesized the presence of "para hormones", as he then referred to them (pers. comm.). However, it was when biologists, chemists, and electrophysiologists joined forces that the study of olfactory stimulants really took off. Groundbreaking work by Nobel laureate Adolf Butenandt and co-workers (Butenandt et al. 1959) lead to the identification of the pheromone **bombykol** of the silk moth, *Bombyx mori.* Butenandt spent more than 20 years, and used extracts from ½ million female silk moths to accomplish the feat. The term **pheromone** was first introduced at the same time (Karlson and Butenandt 1959, Karlson and Lüscher 1959).

The discipline of chemical ecology emerged as a result of continued fruitful collaborations between biologists and chemists, leading to a deluge of information in this field in the last 40 years or so, particularly for insects. The development of the electroantennogram detector (EAD) by Schneider (1956) had been crucial for the identification of bombykol, and technology (including the EAD) continues to play an important role today. In the last few decades, in large part as a result of the availability of increasingly sensitive analytical techniques, chemical ecology has indeed become a very prominent discipline.

In this book, Tristram Wyatt attempts to synthesize research on chemical ecology from a number of animal taxa. The intent of the book is to provide an easy starting point for experts and lay people alike to the current state of knowledge of chemical communication. In large part, I believe that Dr. Wyatt has succeeded. The author's style is crisp and easy to read, and he inserts personal thoughts and anecdotes throughout while maintaining a solid evolutionary context to the topic. Technical terms are well explained, making the text accessible to lay people or students, and the author strikes a good balance between introductory and more advanced information, making the book useful even for more experienced readers. While much of the entomologically-relevant material was of less value to me (as one would expect given my background in insect chemical ecology) I found much of the information on taxa other than insects very useful.

The book is very well organized. Thirteen chapters of text are allocated 301 pages, supported by three appendices (8 pages), references (48 pages), credits (11 pages!), and an index (20 pages). Each chapter is concise, supported with selected tables, and well illustrated with line drawings and photographs. The author's approach to the topic at hand is outlined at the start of each chapter, and it ends with a brief conclusion reiterating the main points, and a section providing key references to further readings on the subject. Fact boxes provide more detailed insight on specific issues or research illustrating important aspects of the topic. The three appendices at the end of the book provide extremely brief introductions to pheromone chemistry, perhaps too brief in places. The reference section is not intended to be exhaustive, so many classical references

are missing (for example some listed below). However, this does not detract from the value of the book.

The majority of the book focuses on intraspecific communication, i.e., the role of pheromones. Chapter 1, "Animals in a chemical world", sets the stage for the book, discussing basic concepts such as "What is communication?", and "What are pheromones?" Chapter 2 provides some historical background, and discusses current techniques for pheromone-based research (primarily identification, etc.). Chapters 3-8 discuss various behavioral effects of pheromones in the context of functional classifications and adaptive benefits of these behaviors. Chapter 9 provides a fairly extensive discussion of the neurophysiological basis for detection of chemicals in animals. Chapter 10 discusses orientation mechanisms in response to pheromones. Chapter 11 is the only chapter that deals interspecific communication with semiochemicals (primarily kairomones), including the fascinating subject of symbiosis. Chapter 12 discusses how pheromones are applied by humans to manipulate animal behavior, including for pest management and animal husbandry. I found the final chapter, "On the scent of human attraction: human pheromones" extremely interesting, and it provided a really strong ending to the book.

I found very few typographical errors, and not surprisingly those I picked up related mostly to entomology. For example in Table 7.1 the ant subfamily Ponerinae ended up as Ponennae. The only real error I found was that in Fig. 4.2 and section 4.2.5, the mountain pine beetle (one of my pet insects), was given the Latin name *Dendroctonus montanus* instead of its proper name *D. ponderosae*. The fact boxes, while useful and interesting, were difficult to read due to a 9 pt. font (rather than 13 pt. as in the rest of the book) on a grey background. I also felt that some key references should have been provided, e.g., Hummel and Miller (1984), which still contains a lot of useful information on pheromone research. Finally, it would have been useful to provide information on journals specializing in this field, e.g., Journal of Chemical Ecology and Chemoecology, as well as contact information for organizations like the International Society of Chemical Ecology.

In the final analysis, I would definitely consider this book as a basic text in an upper undergraduate course or graduate course on chemical ecology. I would also recommend it for anyone wishing a broad overview of pheromone biology, or for someone (like myself) wishing to broaden their knowledge of research in this area. The list price of US$45.00 is quite reasonable, making it well worth purchasing.

B. Staffan Lindgren
Ecosystem Science and Management
University of Northern BC
Prince George, BC, Canada V2N 4Z9

References.

Bethe A, 1932. Neglected hormones. Naturwissenschaften 20:177

Butenandt A, Beckmann R, Stamm D, Hecker E, 1959. Über den Sexuallockstoff den Seidenspinners *Bombyx mori*. Reindarstellung und Konstitution. Z Naturforsch 14b:283-284.

Hummel HE, Miller TA (eds), 1984. Techniques in Pheromone Research. Springer Verlag,

Karlson P, Butenandt A, 1959. Pheromones (ectohormones) in insects. Annu Rev Entomol 4:49-58.

Karlson P, Lüscher M, 1959. Pheromones: A new term for a class of biologically active substances. Nature 183:55-56.

Schneider D, 1957. Elektrophysiologische Untersuchungen von Chemo- und Mechanorezeptoren der Antenne des Seidenspinners *Bombyx mori.* Z vergl Physiol 40:8-41.

Parents out of control: a review of '*Sex wars: genes, bacteria, and biased sex ratios*'

Michael E.N. Majerus, Princeton University Press, 2003. xix + 250 pp.
ISBN: 0-691-00981-3 (hardcover)

I have long had an interest in the evolution of sex ratios, and in biased sex ratios in particular. My starting point was Hamilton's (1967) theory of local mate competition (LMC), which is essentially a game-theoretic explanation for the female biased sex ratios observed in many, mainly invertebrate, species. One might, somewhat crudely, label this as 'the behavioral ecologist's approach' because it is assumed that mothers are in control of sex allocation and the sex ratios of their progeny thus reflect maternal optima in terms of maximizing fitness (often quantified as the number of grand-offspring produced). The behavioral ecology of sex ratios is now quite refined, with many interesting modifications to basic LMC theory (summarized in *e.g.*

Godfray 1994, Hardy *et al.* 1998) and consideration of further scenarios in which parental control is an initial assumption (*e.g.* Hardy 2002). Hamilton's (1967) landmark paper, however, did much more than seed a powerful set of optimality models and empirical tests, it also focused attention towards a number of genetic considerations such as constraints and opportunities deriving from various mechanisms of sex determination, sex ratio distorters and conflicts within the genome, and further linked sex ratio studies to ongoing debate surrounding the adaptive function of sex. One might label this as 'the geneticist's approach' to studying sex ratios.

Majerus's book clearly adopts the genetic approach, focusing on genetic battles and parents who are *not* in control of the sex of their offspring. In Part I of the book ('The sexes, sex determination, and sex ratios') he begins, sensibly, with a background discussion of what sexual reproduction is (or might be) for, and links this with such issues as sexual conflict, sexual selection, sperm competition and cryptic female choice, noting (p23) that there is 'a truly extraordinary array of variations on the theme of sexual reproduction. Almost every conceivable way of having sex (and many that, until they were observed, were probably beyond conception) occurs in some species or other'. Then comes a short and, from a behavioral ecologist's perspective, inadequate chapter on the sex ratio itself. For a book with 'biased sex ratios' in the sub-title, less than six pages covering, collectively, Local Mate Competition, Local Resource Competition and the Trivers-Willard hypothesis is simply not enough. The book then swings into better stride with a nice chapter on sex determination mechanisms (though with scant coverage of Environmental Sex Determination and only one sentence on Pseudoarrhenotoky [Paternal Genome Loss]!). I particularly liked the emphasis that male heterogamety (*e.g.* the XX/XY system) and female heterogamety (ZZ/ZW) are importantly different. For a start, there is no homology between the ZW chromosome of birds and the XY chromosomes of mammals, thus the sex chromosomes of these groups evolved independently. Majerus makes interesting comments about the consequences of female heterogamety for the evolution of sexual dimorphism (p62) and cytoplasmic sex ratio distortion (p104). Unfortunately, it seems that ZZ/ZW systems are rather poorly understood (but a recent hint is provided by the observation of a ZZW female bird, Arlt *et al*. 2004).

Part I finishes with a chapter on genes that are not inherited 'fairly' and the resulting conflicts within the genome. Here we meet meiotic drive and selfish supernumerary B-chromosomes that can affect the sex ratios of their hosts. A well-known example is the paternally inherited B-chromosome that turns fertilized, diploid and - from the maternal point of view - intentionally female, parasitic wasp offspring into haploid males. Aside from the B-chromosome itself, it is the father's genes that are excluded to achieve haploidy and so by the following generation neither of the initial parents has any grandchildren, while the caddish B-chromosome marches on through the generations. It is also in this chapter that the role of *Wolbacia*, a principal character in the remainder of the book, starts to occupy the spotlight. *Wolbacia* are bacteria that infect many invertebrates and affect their reproduction, including their sex and their sex ratios, in various and interesting ways. Part II of the book concentrates further on such 'ultra-selfish symbionts'. There are chapters on microbe induced sex change (feminization), male-killers (those symbionts that are not passed on through males do best if they kill their male hosts in order to reallocate resources to female hosts containing their microbial kin, or in order to promote horizontal transfer), parthenogenesis inducers, and their evolutionary consequences. The final chapter then loops back to the evolution of sex itself and how an appreciation of the importance of ultra-selfish elements has had a profound, and recently exponential, influence on the understanding of many areas of reproductive biology. Majerus concludes with six speculative, yet informed, predictions about invertebrate sex ratios and related issues.

From a stylistic point of view this book is patchy: most of it is written like a typical Princeton Monograph and thus appears to be aimed at an academic audience. It, however, contains a smattering of literary and mythological allusions and a smidgeon of travelogue with which an author might seek to retain the interest of a more general reader (*e.g.* a 'divine explanation' of sex ratio equality is considered on p37) yet, unless your Uncle Bob happens to be Bob Trivers or Bob Luck, this book is not suitable as a stocking-filler. There are also typos and other mistakes, my favorite being that, in a book concerned with genes and infections causing sex change, Majerus himself has bestowed male gender on French *Wolbachia* researcher Marie-Jeanne Perrot-Minnot (p103)!

In summary, there is certainly much of interest in this book: there are lots of interesting facts and plenty of intriguing evolutionary scenarios. It is not the 'Complete Book of Sex Ratios' because it is biased towards Majerus' own area of genetics, and is consequently weak

on behavioral ecology *sensu stricto*. This is exactly why those who take 'the behavioral ecologist's approach', and wish to expand their understanding, should read it. You don't have to know about genetics to do behavioral ecology, but it certainly helps.

Ian C.W. Hardy
School of Biosciences
University of Nottingham
Sutton Bonington Campus
Leics LE12 5RD UK

References

Arlt D, Bensch S, Hansson B, Hasselquist D, Westerdahl H, 2004. Observation of a ZZW female in a natural population: implications for avian sex determination. Proc R Soc Lond B (Suppl.) DOI 10.1098/rsbl.2003.0155

Godfray HCJ, 1994. Parasitoids: behavioral and evolutionary ecology. Princeton: Princeton University Press

Hamilton WD, 1967. Extraordinary sex ratios. Science 156:477-88

Hardy ICW, (ed) 2002. Sex ratios: concepts and research methods. Cambridge: Cambridge University Press

Hardy ICW, Dijkstra LJ, Gillis JEM & Luft PA, 1998. Patterns of sex ratio, virginity and developmental mortality in gregarious parasitoids. Biol J Linn Soc 64:239-270

Workshop & Conference Reviews

Course on Basic Methods in Evolutionary and Functional Ecology

The second edition of the course on Basic Methods in Evolutionary and Functional Ecology was held in Rodalquilar (Almería, Spain) 20 to 24 October 2003. The course, organized by the Estación Experimental de Zonas Áridas (EEZA, Consejo Superior de Investigaciones Científicas, CSIC), was intended to teach basic methods in evolutionary ecology to young researchers and pre-doctoral students. To meet this aim eleven Spanish researchers working at different Universities and research institutes of the CSIC were invited to lecture on their field of study and share their expertise. Researchers and topics were chosen to cover as many areas of study as possible so that everybody could get an overall view of the methods available, even though some of them may not have been of immediate interest to all participants in the course.

The course opened with an introductory review of Evolutionary and Functional Ecology (Dr. F. Valera) that stressed the importance of applying an evolutionary perspective to our study interests. Thereafter, several thematic groups could be distinguished. The first set included general techniques, like statistics (Dr. J. Soler), comparative method (Dr. J. Cuervo), molecular ecology (Dr. J.G. Martinez) and ecological modeling (Dr. M.A. Rodriguez-Gironés). While some of these topics were likely to have been studied at University, both our experience and audience comments showed that most young Spanish researchers wanted a greater knowledge in these areas.

A second group of talks could be classified as Vegetal Ecology. This consisted of topics such as the importance of physical factors producing stress in the Mediterranean area and its importance in the evolution of communities (Dr. F. Pugnaire), methods to estimate phenotypic plasticity and variability (Dr. F. Valladares), and the design of experimental models of ecological restoration in Mediterranean ecosystems (Dr. P. Rey).

Finally, talks concerning topics on Animal Ecology were offered by Dr. A. Barbosa (application of ecomorphological studies to behavioral ecology), Dr. S. Merino (methods to study immune response and parasitism) and Dr. J.J. Sanz (methods to estimate metabolism and energetic costs).

Twenty-eight students attended the course, which attained international status thanks to the presence of a Moroccan and three Portuguese researchers. Most students were already committed to research, but there were also other interests, like conservation and management or improving on one's knowledge to increase the quality of teaching ecological subjects. Students gave short talks about their interest and work and interactions among the students and with the speakers were enhanced at every moment.

A first sign that evolutionary and ecological sciences in Spain are changing rapidly comes from the analysis of the interests of the students. Ten years ago, most participants in similar courses were mainly interested in "animals" and animal ecology, and the borders between different disciplines (e.g. animal ecology, vegetal ecology) were sharply delineated. In contrast, nearly half of the students that took this course were as interested in plants as they were in animals, and it soon became evident that the boundaries between the closely related topics of animal

and vegetal ecology are becoming increasingly fuzzy. It is also noteworthy that female students reached simple majority (half the forum plus one), which shows that Spanish science today makes no gender distinctions. Yet, the students themselves pointed out the fact that there were no female researchers among the guest speakers; this probably reflects the state of science and society in Spain in former times.

Another issue that became apparent throughout the course is that students are more deeply embedded in evolutionary thinking than years ago. Not many years ago, the intellectual thinking of young Spanish researchers was closer to natural history than to evolution. The study of evolution has traditionally lost weight in the Spanish educational system. Recent work (Cordero 2003, Web Ecology 4:14-21) shows that Spanish textbooks devote virtually no pages to evolutionary concepts and that there is not a single university department that includes ecology and evolution in its name. Cordero (2003) suggests that historical factors may account for the special case of Spain, where pioneers working on oceanography, limnology and geography may have influenced the current view and working method of ecologists. To our satisfaction, many students boasted a solid knowledge of evolutionary concepts and were eager to work within an evolutionary framework and find methods to test their deeply rooted evolutionary hypotheses.

Behavioral studies in Spain have evolved to the point where the target is no longer merely the description of a behavior, but the analysis of why a behavior occurs based on Evolutionary Theory. We also verified that young Spanish behavioral ecologists are quite aware of the latest research and their interests cover a wide variety of topics, from sexual selection to foraging ecology, host-parasite relationships and applied ethology. In line with the traditional lack of resources for research in Spain, most students were aware of a range of methods applicable to evolutionary studies, particularly to behavioral ecology studies, but not many have ready access to them. This course has hopefully changed this.

We found strong motivation in all students. They know that a scientific career in Spain is hard and that not all subjects are equally competitive. Behavioral ecologists still have to face some opposition from researchers working on “more ecological” subjects. Meeting together and sharing experiences on this topic contributed to exorcise inequities.

Behavioral Ecology in Spain has grown rapidly in recent years, as can be seen from the continuous and successful participation in the biannual organization of the Spanish and Iberian-American Conference. The next conference will be held in Almería, organized by the EEZA (http://www.eeza.csic.es/etologia2004/). However, young researchers have limited access to proper training in our country. Currently, there are two courses specifically aimed at encouraging students and young researchers in the research of evolutionary ecology, the one described here and the one held in El Ventorrillo (Madrid) organized by the Museo Nacional de Ciencias Naturales (MNCN, CSIC). The former focuses mainly on methods, the second on strengthening the concepts of evolution. Although these courses are not solely on behavioral ecology but on evolutionary ecology, it is obvious that both disciplines are closely related and therefore the advantage for students taking these courses will be to foster the development of behavioral ecology in Spain in the near future. The course at El Ventorrillo rests on a solid tradition, and the one organized in Almería, which we hope will become consolidated in the future, has completed its second summit. The next meeting will be held in autumn 2005. Although the "official language" will most likely be Spanish, we aim to broaden the scope of the course by inviting foreign researchers. We encourage interested participants who have some knowledge of Spanish to contact us or get additional information about next meeting of the course at the following web-address:

http://www.csic.es/postgrado/cursos/cursos_2004.html#area_3_especializacion

All in all, we forecast a promising future for behavioral ecology in Spain.

This EEZA course was kindly funded by the CSIC through the Department of Postgraduate and Specialization, the Spanish Ministry of Science and Technology (BOS2002-10944-E), the Consejería de Educación de la Junta de Andalucía, the Asociación Española de Ecología Terrestre (AEET) and the Sociedad Española de Etología (SEE).

Francisco Valera & Andres Barbosa
Estación Experimental de Zonas Áridas (CSIC)
C/ General Segura 1 04001 Almeria, Spain