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Mikhailov KG 2000 Catalogue of the spiders (Arachnida, Aranei) of the territories of the former Soviet Union. Addendum 3. Zoological Museum, State University, Moscow. 33 pp.
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Buchbesprechung

David Penney (Ed) 2013 Spider research in the 21st century – trends and perspectives

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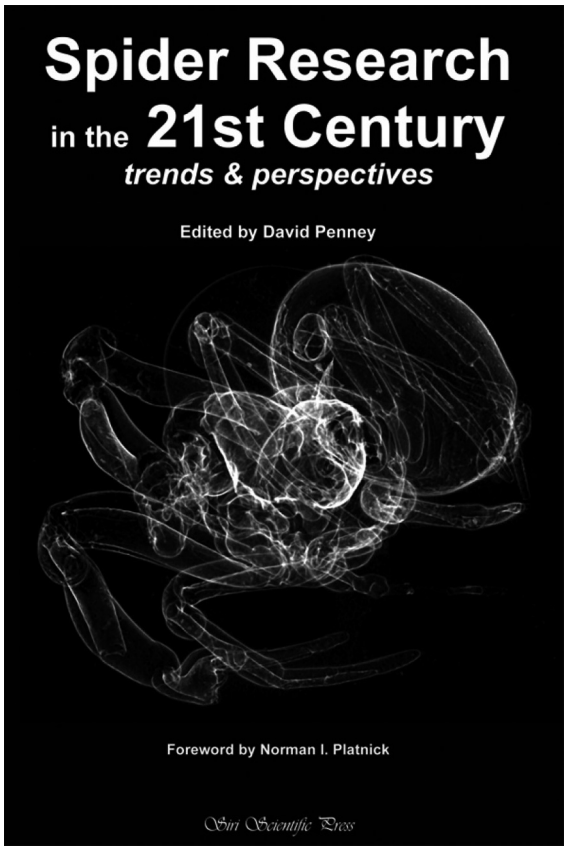

The latest arachnological publication from Siri Scientific Press is a substantial compendium of spider-related topics covering many aspects of these fascinating animals' biology. As the title suggests, the overarching theme running throughout this work are the advances which have been made in recent years – particularly through the application of novel methods and/or technologies – as well as productive directions for future research. Following an extensive foreword by Norman Platnick, which summarises the book's main conclusions rather well, the volume itself is divided into nine self-contained and fully referenced chapters. All have been written by acknowledged experts in their fields and all provide an excellent account of the modern literature.

Rudy Jocqué, Mark Alderweireldt and Ansie Dippenaar-Schoeman examine biodiversity, with particular focus on Africa where they have carried out much research. They begin by defining biodiversity, and the challenges of estimating it in any given habitat. On the plus side, spiders are moderately large and (at least males) are fairly easy to identify, but a downside is that numerous collecting methods may be required to sample the whole fauna and some species occur only at low densities and are easily missed. Tropical regions obviously host more species, but Africa has some unique geological aspects such as a lack of dividing mountain ranges and a south–north tilt to the continent. Rudy and colleagues thus argue that African biodiversity is influenced by the complexity of the vegetation, the range of altitudinal variation and the presence of former refugia. They also explore phenomena such as how large numbers of morphologically similar species can co-exist. Using the 'template' concept – roughly equivalent to the characters which traditionally define a genus – they critically discuss how male genital characters in particular are used both functionally by spiders to identify conspecifics (e.g. Rudy's 'mate check' hypothesis), and practically by taxonomists to recognise biodiversity. Does

a slight enlargement of a palpal sclerite justify a new genus?

This leads nicely into the next chapter on systematics and phylogeny by Ingi Agnarsson, Jon Coddington and Matjaž Kuntner. They define this field as comprising (a) inventories, (b) taxonomic description and (c) phylogeny. The latter is the most 'modern' approach and strongly associated with theoretical advances (particularly cladistics), the incorporation of data from web-building and spinneret structure, and of course molecular data. The authors caution that molecular phylogenies have not lived up to their initial promise, but that this may be rectified by new sampling techniques (see below). Ingi and colleagues remind us that spiders are not hard to discover, but that the rate of species discovery continues apace; from which a (cautious) estimate of at least 120,000 species in total is proposed. For phylogeny, the authors review a wealth of recent studies and highlight discrepancies between results based on morphology, molecules and or combined 'total evidence' approaches. Ingi and colleagues call for more standardized approaches towards documenting characters. Taking Jon Coddington's 2005 consensus phylogeny as a starting point they, highlight those cades which continue to be well-supported and those, particularly deeply-rooted, clades which remain in flux. A novel molecular phylogeny is also offered – which controversially groups haplogynes with mygalomorphs – along with a request for more coordinated efforts between different labs in future.

Jordi Moya-Laraño and colleagues follow up with a contribution on evolutionary ecology. Certain spiders (e.g. *Nephila*) show extreme sexual size dimorphism: females weighing 100 times as much as males. A possibly explanation is a 'gravity hypothesis' – mature males need to be lighter to roam the vegetation in search of more sedentary females – although further avenues for research in this area are discussed. Next up is mimicry. For Müllerian mimicry, the authors note that relatively few spiders (e.g. *Gasteracantha*) display warning colours. More widespread are Batesian mimics, whereby ant mimicry is most prevalent among corinnids, gnaphosids and especially salticids. Trade-offs towards being an accurate or more generalist mimic are discussed. Colonial spiders (ca. 32 species) and truly social spiders (ca. 25 species) are considered in detail, weighing the advantages of cooperative hunting against the disadvantages of inbreeding; which may bias the sex ratio towards one male for eight females. Finally, the general ecological role of spiders can now be extrapolated from 'individual-based models' (IBMs) which explore how different parameters in the environment may influence spider ecology. Molecular tools are also becoming increasingly important for identifying exactly which prey items spiders have fed on based on DNA in the food remains.

Rosie Gillespie's theme is biogeography, where she argues that a major revolution in the 1970s was the realisation that land areas can split up (vicarience) and that this – and not just dispersion – can explain today's observed distribution patterns. Rosie offers examples of spiders with, for example, a 'Gondwanan' (i.e. southern hemisphere) distribution and shows how both the fossil record and knowledge of major geological events can contribute towards our understanding of which spiders live where today. From her own studies there is a particular focus on island biogeography; both the source of new colonists and the way in which they can then undergo adaptive radiation, such as in Hawaiian *Tetragnatha* species. Rosie suggests that in future biogeography may become a predictive science, able to model the effects of phenomena such as climate change or the arrival of invasive species.

Sara Goodacre takes on the complex subject of genetics and genomics; a field where technological advances are particularly important (and rapid). For example, the famous polymerase chain reaction (PCR) – which traditionally multiplied sufficient DNA for subsequent analysis – has now been largely superseded by the more efficient and cost-effective 'next generation sequencing' (NGS) which yields massive amounts of DNA without the PCR step. Sara also highlights the significance of RNA silencing, by which genes can effectively be 'switched off' in order to study their role during development. Molecular biology is now an integral part of much spider research, and Sara's chapter reviews how genetic data can help resolve phylogenetic relationships, act as genetic markers (microsatellites), and discusses the analysis of transcriptomes in social spiders, meaning those genes which are likely to be actively expressed. Also noteworthy is the possibility of creating artificial silk (see below). Sara concludes that in future it should be possible to recover increasingly large amounts of DNA, perhaps even from historical museum specimens, and that we may be able to barcode organisms from their whole genome; and

not just through the mitochondrial COI gene as has been done so far.

Klaus Birkhofer, Martin Entling and Yael Lubin remind us that spiders are key predators in many terrestrial ecosystems, and outline here their potential use in agroecology; particularly for biological control. They demonstrate that agricultural land use, such as pesticides, mowing, grazing, etc., generally has a negative impact on spider abundances. They reintroduce Jadwiga Luczak's term 'agrobiont' for those spiders which are regularly present in agricultural ecosystems. Thirty-one such species are recognised for Central Europe, characterised by – among other things – life cycles synchronized with agricultural usage; meaning that their vulnerable life stages occur at times when they are not affected by habitat disturbance. The spatial distribution and prey spectrum of argrobionts are further discussed and Klaus and his colleagues conclude that spiders can and do contribute to pest control as generalist predators; albeit with the caveat that spiders are also cannibalistic and/or attack other predators acting as potential pest control agents in argroecosystems. A few examples where spiders are thought to play a key role in biological control are critically reviewed.

Spider behaviour is the topic of Marie Herberstein and Eileen Hebets, who ask if (and why) spiders make good model organisms. They begin with a useful discussion of what a good model should be, before reviewing to what extent spiders have actually been utilised in the behavioural ecology literature. There has clearly been a tendency to focus on particular behaviours in particular taxa, such as signalling and courtship in the wolf spider *Schizocosa*, Friederich Barth's working group on neurobiology in the wandering spider *Cupiennius*, or sexual cannibalism and genital damage in the widow spiders (*Latrodectus*) and cross spiders (*Argiope*). Evidently spiders can and do learn and some may even have sacrificed their general body design to accommodate a proportionally large central nervous system. Their use of webs as 'extended phenotypes' (sensu Dawkins) also allows us to study how these animals are able to adapt their web-building to their immediate circumstances. Marie and Eileen conclude that observations of spider behaviour have moved on from being 'curiosities' to more rigorous studies placed in an evolutionary and/or ecological framework and that spiders now have great potential to contribute towards understanding wider theoretical questions in animal behaviour.

Spiders are largely defined by their unique ability to produce a diverse range of silks; a subject addressed by Jessica Garb. She begins with a comprehensive review of the probable origins, production mechanisms and mechanical properties of the various spider silks (up to seven in some species). A particular focus is the possibility of generating artificial silk; whereby the 'holy grail' is determining how spiders transform liquid silk proteins into solid fibres. Jessica also demonstrates how silk glands evolved up through the phylogenetic tree, e.g. major ampullate glands characterise araneomorph spiders, flagelliform glands define the araneoids, etc. The chapter continues with a molecular perspective on silk production and in particular spidroins: i.e. the structural proteins underlying silk fibres. Sequencing these long and repetitive proteins has proved a difficult technical challenge and previous attempts are comprehensively reviewed. New genetic techniques (see above) should make this easier in future and allow us to test hypotheses about silk evolution at a molecular level too. Jessica concludes with some possible applications in bioengineering – from medical ligaments to bullet-proof vests – noting that the length of the spidroins has made them difficult to clone when transplanted into transgenic hosts: from bacteria, to silk worms, to goats!

Finally the editor, David Penney, rounds off the book with a chapter on palaeontology. Advances here include online databases with regular updates: a project which author of this review is involved in. Amber fossils in particular have benefited immensely from new imaging techniques, such as combining stacks of images in different focal planes or the use of computed tomography or synchrotron radiation to produce detailed, three-dimensional reconstructions. These allow fossils to be placed using largely the same morphological characters as living spiders, and enable palaeontological data to be integrated smoothly into studies on their living relatives. David highlights a number of key fossils (and fossil localities) discovered in recent years, and some of the ways in which the fossil data can be used to enhance topics from earlier chapters of this book; e.g. calibrating molecular phylogenies or reconstructing biogeographic scenarios. Future work should involve redescribing a number of problematic historical records and exploring the position (and validity?) of the extinct spider families. Particularly exciting is the possibility of recovering fossil DNA from copal; a very young fossil resin.

Taking the book as a whole, "Spider research in the 21st century" has been produced to a very high standard, with numerous colour images, all printed on good quality paper. The editing is tight and as far as I can tell, error-free. In fairness, this is not really a book for the beginner – Foelix's "Biology of spiders" remains preeminent here as a general overview – since the individual chapters can and do get rather technical in nature. Yet herein lies, I think, the strength of this work as a unique summary of the current state of play. Penney's volume is thus an excellent guide to the surprising diversity of research which is possible with spiders today; thanks largely to impressive theoretical and technological advances across a range of biological sciences. The one area which is perhaps not covered in so much detail is physiology, but for this Wolfgang Nentwig's 2013 revised edition of "Spider ecophysiology" would offer a complementary source of reference. In conclusion, for those of you actively working in arachnology (or their students), "Spider research in the 21st century" has to be very highly recommended. Yet even for readers whose interest in spiders is more casual, there is plenty to discover here out at the cutting-edge of our subject.

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Tagungsbericht

Bericht zum 19. Internationalen Kongress für Arachnologie, Kenting/Taiwan 2013
Report on the 19th International Congress of Arachnology, Kenting/Taiwan 2013

Organizing committee: Dr. I-Min Tso (Tunghai University), Kuo Yun Fang, Hsiao-Yu Tang, Dr. En-Cheng Yang, Dr. Sean J. Blamires, Dr. Pao-Shen Huang, Chen-Pan Liao, I-Ching Cheng, Ling-Fei Chen, Jo-Fan Wang, Ren-Chung Cheng, Yong-Chao Su, Po Peng, Hui-Yun Tseng.
Kongresswebseite mit zahlreichen Fotos: https://www.flickr.com/photos/98394366@N05/sets

Vom 23. bis 28. Juni 2013 fand der 19. Internationale Arachnologiekongress statt, zum ersten Mal in Asien, im subtropischen Süden Taiwans. Im luxuriösen Howard Beach Resort Hotelkomplex am Kenting Beach im Kenting Nationalpark am südlichsten Zipfel Taiwans trafen sich 248 ArachnologInnen aus 40 Ländern. 133 Vorträge und 69 Posterpräsentationen wurden gezeigt. Morgens wurden jeweils zwei 45-minütige Hauptvorträge vor dem versammelten Publikum gehalten, danach wurden Präsentationen parallel in 4 Vortragssälen gezeigt, wobei in jedem Saal ein anderes Themengebiet/Symposium behandelt wurde. Zwischen und nach den Vorträgen konnten die ArachnologInnen am Strand oder im riesigen Hotelpool bei 35°C das schöne Wetter geniessen und ihre Gedanken austauschen. Viele nutzten die Gelegenheit, um mit Keschern, Exhaustoren und Fanggläsern bewaffnet in der umgebenden Natur


Pekka T. Lehtinen und Shuqiang Li (Foto: Kongresswebseite)

auf Spinnentierjagd zu gehen. Zu erwähnen wäre der Nachtmarkt im Städtchen, wo unzählige kulinarische Delikatessen, wie z.B. Stinktofu (Nationalgericht, wird wirklich so genannt), fermentierte Eier, aber auch frittierte Oreo Kekse, angeboten wurden.

Am Sonntagabend, nachdem die meisten Gäste eingetroffen und registriert waren, gab es eine opulente Willkommensparty, nach der einzelne Gruppen von Gästen noch bis in die Nacht weiterfeierten. Der Montag begann mit einer Eröffnungszeremonie und einer Ansprache vom Organisator I-Min Tso. Der erste Vortrag wurde von Hirotsugu Ono gehalten, der die Geschichte der Spinnentaxonomie in Asien illustrierte. Shuqiang Li präsentierte die Fortschritte in der Erfor-