Sexual selection and plants

Deborah Charlesworth

Mate Choice in Plants: Tactics, Mechanisms and Consequences.
By Mary F. Willson and Nancy Burley.
Princeton University Press: 1983. Pp.251. Hbk $45.50, £30.30; pbk $16.25, £10.90.

THIS book is not really about mate choice, but about the interesting and neglected problem of sexual selection in plants. Indeed, the sections on mate choice are in some respects the weakest part of the book, which is essentially a series of speculations that certain features of plant reproductive biology may have evolved due to sexual selection. Competition between individuals functioning as males for successful fertilization of ovules is discussed in various contexts, and the authors suggest that this may have played an important role in the evolution of delays in fertilization, cleavage polyembryony in gymnosperms, and double fertilization in angiosperms, as well as having the more obvious effect of determining pollen quantity and characteristics such as size and nutrient content. It is a pity that pollen competition is not well reviewed. Pollen production is mentioned on p.45, where it is wrongly stated that "a two-fold increase of pollen released by an individual results in only a 50% increase in the number of stigmas pollinated". Competition during pollination is mentioned extremely briefly; on p.55, four lines cover the evidence for competition between pollen grains of different genetic constitutions, with no reference to the classic *Oenothera* data.

Discrimination between genetically different pollen, during the female functions of reproduction, is assumed to exist, presumably on the grounds that there must be some evolutionary response to processes that have evolved as a result of male competition. But the case for differential abortion of zygotes based on any factor other than the degree of inbreeding of the progeny, is very weak. The statement (p.50) that "if outbreeding were of selective advantage per se, the fitness gains for male and female should be the same", is typical of the unclear arguments in this book, and is not even correct except in a totally outbreeding species. The statement (p.47) that "if selfing were strongly disadvantageous, we might expect higher levels of self-sterility than seem to be the case" is also unconvincing without further explanation. Perhaps this view that avoidance of inbreeding is not important in plants explains why self-incompatibility is scarcely mentioned, except indirectly as "pre-zygotic recognition of pollen types". There is no mention at all of the possible existence of self-incompatibility acting after fertilization. The discussion of simple polyembryony in gymnosperms would seem much more enlightening if viewed as a mechanism for preventing loss of an ovule (and the resources invested in it), due to inviability of the zygote it gives rise to, which would be most likely to occur because of inbreeding.

The weakness of the dismissal of inbreeding avoidance would be less serious if the book presented good evidence for other factors influencing chance of abortion of zygotes, but the authors seem simply to assume that these exist. They refer to "genetic complementarity", but do not explain what this is; apparently it can result in differences in survival of progeny of reciprocal crosses. Almost 10% of the book is devoted to a list of phenomena related to fertilization (in animals and plants) that could be the basis for differential chances of success of the fertilization products, but there is no case where female discrimination is known to occur. For these reasons, the parts of this book dealing with mate choice are unsatisfactory. There may well be no true opportunity for mate choice in plants, apart from the well known outbreeding systems such as self-incompatibility, but merely a range of adaptations by which plants have responded to this lack. □

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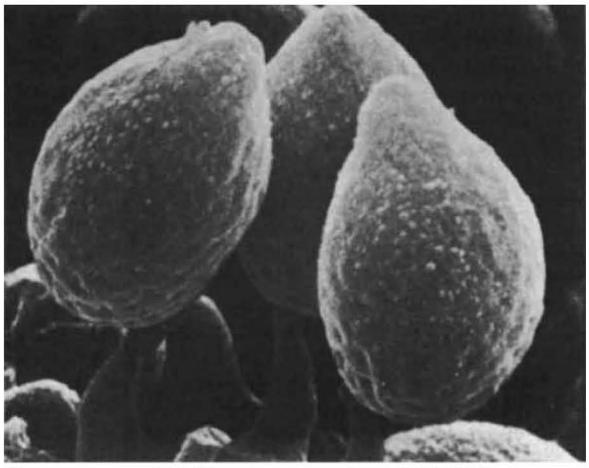

Close up on spores — a scanning electron micrograph of three submature basidiospores of *Ganoderma applanatum* (x8,000). The illustration is taken from *Atlas of Airborne Fungal Spores in Europe*, edited by Siwert Nilsson and recently published by Springer-Verlag. Price is DM 128, $55.20. This particular SEM was taken by J. Keller of the Université de Neuchâtel, Switzerland.

All about antlers

Malcolm Maden

Deer Antlers: Regeneration, Function and Evolution.
By Richard J. Goss.
Academic: 1983. Pp.316. $45, £32.

IF you want to know how the Lapps castrate reindeer, which is the only deer to possess a gall bladder, which deer is the national animal of Chile, which species only has two mammary glands, which is the world's handsomest deer, the deer with the lowest chromosome number of any mammal etc., then this book will answer your questions. In this way the author solves the problem he poses in the preface: how so narrow a subject as deer antlers could fill an entire volume, not to mention interest very many readers.

Goss has had a self-confessed 25-year love affair with deer and his book begins with a description of the characteristics of every species of deer and their global distribution. The following section on the evolution of deer and their antlers kept me amused thanks to the usual ingenuity of evolutionary biologists. Perhaps the most bizarre theory for antler evolution is that they evolved to function as thermal radiators releasing excess body heat. Presumably this must be why the Irish elk became extinct — they had such large antlers that they froze to death.

The central part of the book on the developmental anatomy of antlers and a review of regeneration in mammals was very enlightening, and is the only section of any real interest to developmental biologists such as myself. Antlers are a remarkable example of mammalian regeneration and their initial histogenesis shows many of the cellular characteristics of amphibian limb regeneration. What is more, they can grow at the very high rate of 1cm per day. The last part of the book deals with systemic and environmental controls of antler development.

Overall, the book was a pleasure to read and it stimulated my interest in the subject. However, scientifically, I was left with a feeling of dissatisfaction. This is not a reflection on the author but upon the current problems of antler research. For example, there is a great deal of anecdotal and contradictory evidence, conclusions are often based on observations of a single animal, many experiments are uncontrolled and one has to wait at least a year for the results. With problems like that I can see why this is a neglected field of investigation. Although, as Goss says, the antlers of deer are very valuable to the developmental biologist, for those who do not wish to take on these problems I suggest reading his book instead. □

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