DEFINING AND DEMONSTRATING POSTCOPULATORY FEMALE CHOICE—AGAIN

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My motivation for writing about the criteria for detecting one form of cryptic female choice, female sperm choice (Birkhead 1998) was twofold: to stimulate discussion (which has occurred) and to draw attention to the fact that novel ideas need to be subject to rigorous testing. There are many different styles of conducting science, one is that it is sufficient to generate novel ideas; at the other end of the continuum is the view, which coincides with my own, that unless an idea has been subject to rigorous testing, its value is limited. To some extent, my conviction that new hypotheses should be subject to testing arises from the impression that in the field of behavioral ecology there is an increasing trend for researchers to feel that it is sufficient to generate interesting ideas, to accept circumstantial evidence, or to report only that evidence which is consistent with a favorite hypothesis. In turn, this change in attitude may be partly a consequence of an increasingly competitive academic climate (e.g., Maddox 1993; Woodward and Goodstein 1996) in which there is little incentive and insufficient time to test ideas properly or replicate the experiments of others, particularly in fields with little impact on the quality of human life.

Cryptic female choice is a form of sexual selection and part of behavioral ecology (Krebs and Davies 1997). Behavioral ecology has been a particularly successful area of research and, as is typical of many young sciences, ideas often outstripped data, particularly in its early days. Although most of its practitioners would probably agree that behavioral ecology is now in a phase of more ‘‘normal science’’ (Kuhn 1970) much of the early enthusiasm still remains—especially for novel ideas, recent examples of which include: fluctuating asymmetry, immunocompetence, and cryptic female choice. I regard novel ideas as crucial starting points for progress, but they are not an end in themselves and to make genuine progress we need firm foundations on which to build. A combination of novel ideas, subsequently tested by the most rigorous methods available, including replication, provide the best recipe for success. Behavioral ecologists as a whole have not been especially good about this. A common excuse for the lack of replication for example, apart from the difficulty of obtaining funding for this purpose, is that biology is complex and replication is technically difficult, particularly with studies conducted in the field. However, cryptic female choice, because of its more mechanistic nature, lends itself to careful experimentation and replication more readily than other areas of behavioural ecology, once methods for identifying it have been agreed upon. As soon as we have some sound methodology in place, we will be in a position to fully assess the importance of cryptic female choice in evolution.

Here I respond to comments made by three sets of authors in response to my suggestions for how we might seek to identify one form of cryptic female choice: female sperm choice (Birkhead 1998).

RESPONSE TO EBERHARD

Eberhard (2000) makes four main points which I respond to in turn: (1) My terminology is inconsistent and my use of the term ‘‘sperm choice’’ is not synonymous with cryptic female choice, representing only one of many potential mechanisms. He further asserts that my focus on sperm choice is too narrow, and thus my criteria for demonstrating cryptic female choice as a whole are too restrictive. Eberhard (2000) is correct in identifying a statement in which I erroneously imply that sperm choice is synonymous with cryptic female choice: the statement that sperm choice is a ‘‘necessary component of cryptic female choice’’ was incorrect.

Notwithstanding, I feel that part of the difficulty Eberhard (2000) has with my comments stems from his definition of cryptic female choice. Eberhard’s (1996, p. 7 and below) definition of cryptic female choice is extremely broad, encompassing behavioral processes but also purely physiological processes in which females discriminate between males solely on differences between their ejaculates or sperm, that is, sperm choice. As Pitnick and Brown (2000) acknowledge (cf. Eberhard 2000), it is only this second type of relatively cryptic physiological process which is controversial, thus my focus on this aspect of postcopulatory female choice (Birkhead 1998). Sperm choice is controversial because, until recently at least (see Parker 1992), it was generally thought that sperm do not express their haploid genotype and therefore females could not distinguish between sperm on this basis. Although this remains contentious, there is convincing evidence that sperm both within and between males differ in ways that female tissue can recognize (e.g., Erickson 1990; Wedekind et al. 1995; Nayernia et al. 1996; Clark et al. 1999; Olsson et al. 1999). Because I focussed on sperm choice, it is not surprising that Eberhard (2000) considered my criteria to be too narrow to demonstrate all aspects of cryptic female choice.

(2) My criteria are mistaken. Eberhard suggests that differences between females are not necessary for female choice to occur. I agree that a situation could potentially exist in which all females make exactly the same choice of sperm and that under such circumstances one would be mistaken in concluding that no cryptic female choice was taking place.