

# Sexual conflict in a mutually fertilising hermaphrodite: manipulation after sperm exchange?

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## SEXUAL CONFLICT

Slugs of the genus *Deroceras* are simultaneous hermaphrodites. Many species are able to self-fertilise. Moreover, they have organs to store foreign sperm as well as to digest it. Sexual conflicts can thus arise because

- they need not use received sperm, but can use their own or another partner's instead.
- they may try not to donate sperm (because the partner might not use donated sperm; it may be better to invest in eggs).

Copulation begins suddenly, and sperm is exchanged fast, simultaneously, and as single packages. *Deroceras* seems thus to have little chance to stop donating sperm once copulation has started, even if it realises that the partner does not donate sperm. This is different from many other hermaphrodites, where individuals can adjust their behaviour to the behaviour of the partner (e.g. repeated alternation of male and female roles or slow sperm exchange with adjustable amounts of sperm).

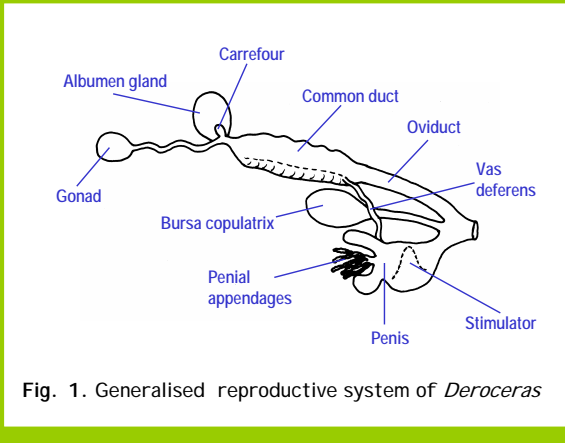


Fig. 1. Generalised reproductive system of *Deroceras*

Several behavioural patterns during mating might be interpreted in the context of SEXUAL CONFLICT between the partners:

1. The long and elaborate COURTSHIP might serve to manipulate the partner by transferring secretions (the stimulator contains many glands).

In this case the aim of the manipulation would be to change the behaviour of the partner either during copulation (to ensure that it will donate and/or accept sperm) or after sperm exchange (to ensure that donated sperm is used for fertilisation). This latter sort of manipulation has been demonstrated as the role of dart shooting in the snail *Cantareus aspersus* (Koene & Chase, 1998).

However, the courtship may also have other functions:

- Physiological synchronisation to assure simultaneous sperm exchange.
- Information gathering about the partner (e.g. about its willingness to donate sperm or fertility as a female).

2. The spread of the PENIAL APPENDAGES on the partner's body surface takes place only after sperm transfer. This timing rules out synchronisation and information gathering, making the most likely function manipulation to ensure that the donated sperm is used for fertilisation.

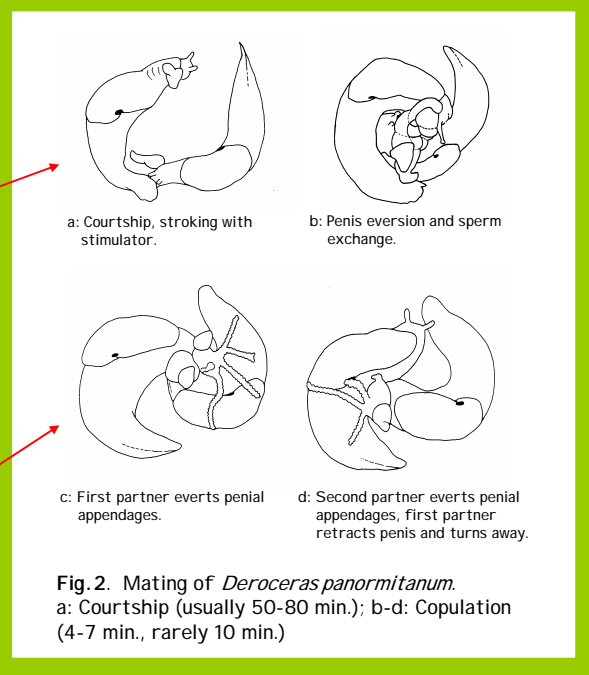


Fig. 2. Mating of *Deroceras panormitanum*. a: Courtship (usually 50-80 min.); b-d: Copulation (4-7 min., rarely 10 min.)

## Diversity of penis morphs in *Deroceras*

The more than 100 species of the genus *Deroceras* show a remarkable diversity of penis morphs. Not only does the overall shape of the penis vary, but also the shape of the stimulator and the number, shape and size of the appendages. If the stimulator and penial appendages indeed serve to manipulate the partner and/or gather information about it, their morphological diversity might be the product of an evolutionary arms race driven by sexual conflict between mating partners.

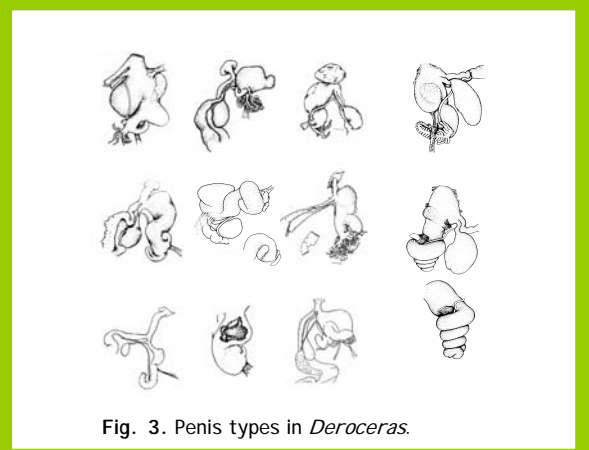


Fig. 3. Penis types in *Deroceras*.

## REFERENCES

Koene, J. & Chase, R. (1998): Changes in the reproductive system of the snail *Helix aspersa* caused by mucus from the love dart. *J. Exp. Biol.* 201: 2313-2319.