

BRIEF COMMUNICATIONS

DIFFERENTIAL ANTHOR EATING BY SNAILS IN THE HETEROSTYLOUS PLANT SPECIES, *PRIMULA ELATIOR* (L.) HILL.

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SUMMARY

Anthor eating by snails in natural plant populations is reported for the first time. The snail species, *Trichia hispida* (L.) was discovered to eat anthers from the flowers of *Primula elatior*, but only those from the thrum type. 3–5% of the thrum flowers of two natural populations were emasculated.

In a study of the floral biology of Danish heterostylous plant species anther eating by snails was discovered in populations of *Primula elatior* (L.) Hill. Reports of observations of snails specifically eating anthers and no other floral parts have only been published once before (NEIJZING & ZEVEN 1976). They found that one snail species and one slug species ate anthers of *Streptocarpus* cultivars in greenhouses, but in natural plant and snail populations this very specialized food foraging behaviour has never been reported.

The observations and collections of flowers and snails were performed at two localities: Boserup Forest, Zealand (4–11 May, 1975) and Frijsenvold Forest, Jutland (spring 1976), Denmark. Both are luxurious growing forests on a heavy mould. The Boserup locality is a mixed oak and ash forest with an understory of *Cerasus padus*, *Corylus avellana*, *Crataegus monogyna*, *Lonicera xylosteum*, *Malus silvestris*, *Prunus spinosa*, and *Sambucus nigra* and many herbs, e.g., *Allium oleraceum*, *Anemone nemorosa*, *Corydalis cava*, *C. fabacea*, *C. pumila*, *Gagea lutea*, *Heracleum sphondylium*, *Paris quadrifolia*, and *Polygonatum multiflorum*. Frijsenvold is a mixed forest of beech and oak with an understory of *Corylus avellana*; characteristic herbs are *Anemone hepatica*, *A. nemorosa*, *Chrysosplenium alternifolium*, *Corydalis fabacea*, *Ficaria verna*, *Gagea lutea*, *G. spathacea*, *Ranunculus auricomus*, and *Lathraea squamaria*.

Flowers of *Primula elatior* have their styles and anthers arranged heterostylously, i.e., approximately half of the individuals of a natural population has flowers with a long style and anthers situated deep in the corollar tube, these are the pin flowers; the other half of the individuals has flowers with a short style and anthers protruding in the opening of the corollar tube, these are the thrum flowers (DARWIN 1862). The ratio between their number is generally 1:1, except in species with an additional reproductive system. A 100% intermorph flow of pollen would theoretically result in this ratio, since the system for the inheritance of the two morphs is a 1-locus system in which pin is homozygous recessive and

Table 1. Data of floral material and of herbivorous pressure by snails and slugs on two Danish populations of *Primula elatior* (1975-76).

locality	Boserup Forest, Zealand			Frijsensvold Forest, Jutland		
	Total	Thrum (%)	Pin (%)	Total	Thrum (%)	Pin (%)
1. No. of inflorescences	113	54 (47.8%)	59 (52.2%)	117	68 (58.1%)	49 (41.9%)
2. No. of flowers	928	439 (47.2%)	489 (52.8%)	503	292 (58.1%)	211 (41.9%)
3. No. of flowers per inflorescence	8.2	8.1	8.3	4.3	4.3	4.3
4. No. of <i>Trichia hispida</i> in flowers observed during in day hours	2	2	0	3	3	0
5. No. of flowers totally emasculated (in % of 2.)	22 (2.4%)	22 (5.0%)	0 (0.0%)	9 (1.8%)	9 (3.1%)	0 (0.0%)
6. No. of flowers partly emasculated (in % of 2.)	2 (0.2%)	2 (0.5%)	0 (0.0%)	1 (0.2%)	1 (0.4%)	0 (0.0%)
7. No. of flowers totally eaten by slugs (in % of 2.)	3 (0.3%)	3 (0.7%)	0 (0.0%)	5 (1.0%)	3 (1.0%)	2 (1.0%)
8. No. of flowers partly eaten by slugs (in % of 2.)	48 (5.2%)	20 (4.6%)	28 (5.7%)	13 (2.5%)	8 (2.7%)	5 (2.4%)

thrum is heterozygous; but in no study of the pollination in heterostylous species this ideal has been realized. In LEVIN (1968), ORNDUFF (1970a, 1970b, 1971, 1975, and 1976), GANDERS (1974) and OLESEN (1979) the intramorph flow of pollen has been demonstrated to be the dominating one.

The results of the present study at the two widely separated localities are summarized in *table 1*. The data indicate that individuals of the very common forest snail species, *Trichia hispida* L. (Helicidae) reduce the intermorph pollinating potential of the thrum morph by eating 3–5% of its anthers. They have not been observed in pin flowers.

In addition a portion of the flowers were eaten (*table 1*), but here no difference was found between the two morphs. These ingestions seemed to be performed by slugs. In Boserup an *Arion circumscriptus* Johnston (Arionidae) was observed eating flowers.

It is not known whether *T. hispida* does visit pin flowers, but even if it does, any instances of malacophily may be regarded as accidental and unimportant.

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