

Table 1. BREEDING SYSTEMS AND COMPATIBILITY IN *Glyceria*

	<i>G. fluitans</i>								<i>G. plicata</i>							
	Selfed		Open pollinated*		Crosses within populations		Crosses between populations		Selfed		Open pollinated*		Crosses within populations*		Crosses between populations	
	Heavy†	Light‡	Heavy	Light	Heavy	Light	Heavy	Light	Heavy	Light	Heavy	Light	Heavy	Light	Heavy	Light
Mean seed set (per cent)	27	46	67	19	62	16	1.2	2.5	81	6	84	4	76	12	75	9
Range (per cent)	8-58	13-67	65-71	6-23	51-75	12-19	0-9	0-10	69-97	4-9	81-86	2-6	68-81	7-17	70-81	6-12
Mean seed viability (per cent) (Heavy + light)	54		88		54		1.7		92		83		95		86	
Range (per cent)	2-90		87-90		50-58		0-21		82-100		65-97		90-100		80-95	

* Data from two populations only. † Heavy seed: grains of full size. ‡ Light seed: grains less than two-thirds full size.

Tests were carried out to determine self- and cross-compatibility within and between populations. Hand emasculation followed by 'automatic pollination' was adopted in making crosses⁵. Compatibility was assessed on the basis of seed-set and viability.

A varying degree of self-incompatibility from plant to plant is characteristic of outbreeding grasses⁶. Comparing the results obtained from selfing with those from uncontrolled outcrossing (Table 1), it can be seen that *G. fluitans* plants are to various extents self-incompatible. This is shown by the low percentage of heavy seed obtained on selfing. Seed viability is related to degree of self-incompatibility, germination being poorest in the most self-sterile plants. *G. plicata* plants are by contrast highly self-compatible.

Observations were made of behaviour at anthesis. In *G. fluitans* the florets opened briefly and the large pendulous anthers were fully exerted on long filaments prior to dehiscence, which occurred before the stigmas were fully expanded. The florets of *G. plicata* stood open, and the small anthers were borne out on rather stiff filaments, dehiscing above the fully expanded stigmas. These facts strongly suggest that *G. fluitans* is a predominantly outbreeding species, and *G. plicata* generally inbreeding. In the latter species, though pollination is required for seed setting, apomixis may occur to some extent.

The results of controlled hybridization indicate that, in *G. plicata*, plants derived both from the same and different populations are highly cross-compatible. By contrast, in *G. fluitans* the results of intra- and inter-population crosses differ markedly.

Seed set in intra-population crosses (62 per cent heavy seed) about equalled that obtained on outcrossing (67 per cent heavy seed); there was, however, some reduction in viability, 54 per cent as against 88 per cent on outcrossing.

In inter-population crosses, few or no seeds were set (1.2 per cent heavy seed) and the viability of these was poor (1.7 per cent).

This suggests that a degree of incompatibility exists between parts of the *G. fluitans* species-population, sufficient to limit or prevent gene-exchange. In both species the local populations sampled were distinct morphologically and perhaps equally well isolated from the micro-evolutionary point of view. Incompatibility occurs in *G. fluitans*, but is apparently absent from *G. plicata*, and this is probably related to the breeding systems of these species⁷.

This work forms part of a biosystematic study of the British species of Sect. Euglyceria carried out

at the University College of Leicester, the results of which will be given in full elsewhere.

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Nov. 29.

¹ Clausen, J., "Stages in the Evolution of Plant Species" (New York, 1951).

² Gregor, J. W., *New Phyt.*, **35**, 327 (1936).

³ Church, G. L., *Amer. J. Bot.*, **36**, 155 (1949).

⁴ Fitzpatrick, J. M., *New Phyt.*, **45**, 137 (1946).

⁵ Jenkin, T. J., *Bull. Welsh Plant Breed. Stat.*, Ser. H., No. 2, 1 (1924).

⁶ Jenkin, T. J., *Bull. Welsh Plant Breed. Stat.*, Ser. H., No. 12, 100 (1931).

⁷ Baker, H. G., *Evolution*, **6**, 61 (1952).

Arginase in Elasmobranch Muscle

Hunter and Dauphinee¹ demonstrated the presence of arginase in the voluntary muscle of the dogfish (*Squalus sucklii*) and also possibly in the muscle of the herring. In the course of another investigation, it has now been observed that this is not true of other elasmobranchs, since no arginase activity was found in the skeletal muscle of the common skate (*Raja batis*), thornback skate (*R. clavata*) or cuckoo ray (*R. circularis*) using the conditions of determination of Van Slyke and Archibald² with the colorimetric procedure of Engel and Engel³. Activity was, however, observed in both the ordinary 'white' skeletal muscle (0.3 arginase units²/mgm. extract nitrogen) and 'red' lateral-band muscle (0.75 arginase units/mgm. extract nitrogen) of the lesser-spotted dogfish (*Scyliorhinus caniculus*) (cf. the observations of Matsuura *et al.*⁴ on several non-elasmobranch species of fish).

It seems that for the rays, at least, the extra-hepatic regulation of urea which appears to occur in elasmobranchs cannot take place in the muscle, even though this tissue is rich in urea.

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¹ Hunter, A., and Dauphinee, J. A., *Proc. Roy. Soc.*, B, **97**, 227 (1924).

² Van Slyke, D. D., and Archibald, R. M., *J. Biol. Chem.*, **165**, 293 (1946).

³ Engel, M. G., and Engel, F. L., *J. Biol. Chem.*, **167**, 535 (1946).

⁴ Matsuura, F., Baba, H. J., and Mori, T., *Bull. Jap. Soc. Sci. Fish.*, **19**, 893 (1953).