Formation of Creatinine in the Animal Body

H. Borsook and J. W. Dubnoff[1] have discovered that phosphocreatine is changed into creatinine in water solution at 38° and *p*H 7, by splitting off phosphate, and they consider that this spontaneous reaction is the way in which creatinine is formed in the animal body. In connexion with this important discovery, I want to direct attention to similar results which I published in 1940, and which for obvious reasons did not reach any abstracting journal published abroad.

I found[2] that in minced muscle (38° C.) in the presence of fluoride, iodacetate or hydrogen cyanide, the formation of creatinine was greatly accelerated, and I tried to explain that fact by a non-hydrolytic dephosphorylation of phosphocreatine. The idea that creatinine is formed not by splitting off water from creatine but by the splitting of phosphate from phosphocreatine is now made fully evident by Borsook and Dubnoff's experimental work.

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[1] Borsook and Dubnoff, "Annual Review of Biochemistry", **12**, 187 (1943).

[2] Rosengart, V., *Bull. Med. Coll., Dnepropetrovsk, U.S.S.R.*, **2**, 87 (1940) (in Russian).

Prolongation of the Effect of Narcotics by Combination with Mucic Acid

A SEARCH for improved methods of prolonging the effect of the injection of morphine and other narcotics resulted in the observation that, for a given dose of morphine, the period of narcosis can be considerably extended if the base is administered in the form of mucate instead of the usual salts such as tartrate, sulphate, etc. This prolongation of effect is also obtained with the mucic acid compounds of other physiologically active bases such as adrenaline and ergometrine.

Some of these compounds are now undergoing systematic pharmacological and clinical test, the results of which will be published elsewhere in due course. In the meantime, other compounds of mucic acid, its homologues, analogues and their derivatives are being prepared and examined to ascertain if this particular property is exhibited by them all to a greater or lesser extent.

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Inheritance of the 'Bolter' Condition in the Potato

'BOLTERS' occur[1,2] in many potato varieties and are distinguished from the normal plants of the variety by the following characteristics: the haulms are more vigorous, taller and with longer internodes, the tubers are coarser and the crop heavier at maturity, maturity is much later, and flowering is much freer. The 'bolter' condition is perpetuated by the tubers, and Davidson[1] states that bolters obtained in 1917 from the variety Snowdrop have always produced bolters.

This group of characters by which the 'bolter' differs from the normal plant of the variety might be due to the pleiotropic effects of a single gene, but a more attractive hypothesis is that it is due to the loss or gain of a whole chromosome. Root-tip counts of 'bolter' plants of the varieties Gladstone and Ulster Chieftain showed, however, that the chromosome number was $2n = 48$ and was identical with that of the normal plants of the varieties (these counts were made by Mr. N. W. Simmonds and checked by one of us, H. W. H.).

'Bolters' also differ from normal plants in having 'wilder' underground parts, that is, the stolons are more numerous, longer and more persistent. The root system also appears to be more strongly developed. These differences have been utilized in comparing the two crosses, Gladstone female × Flourball and Gladstone 'bolter' female × Flourball. A third family from the cross U.S.D.A. seedling 41956 female × Flourball is also available for comparison.

The crosses were made in 1942 (the 'bolter' Gladstone having been collected in 1941 from a field of Gladstone in Northern Ireland) and the seedlings were raised in pots in 1943 in an insect-proof glasshouse. In 1944 two tubers from each seedling were planted out in the field for scoring and the results are shown in the accompanying table.

Family	Cross	No. of distinct seedlings	Percentage of plants with underground parts			
			cultivated	somewhat wild	wild	very wild
50/43	Gladstone 'bolter' × Flourball	25	20	44	24	12
49/43	Gladstone × Flourball	52	58	25	17	0
47/43	U.S.D.A. 41956 × Flourball	133	62	20	17	1½

Families 49/43 and 47/43 have similar percentages of plants in the four groupings of underground parts, but family 50/43 from the 'bolter' Gladstone cross differs in having many fewer plants with the cultivated type and more plants with the somewhat wild, wild and very wild underground parts. Thus there seems no doubt that 'bolter' Gladstone differs in being genetically 'wilder' than normal Gladstone. On August 10 families 49/43 and 50/43 were scored for flowering; 38 per cent of the plants in family 49/43 had flowered as compared with 57 per cent in family 50/43.

Mr. John Clarke (the well-known Northern Ireland potato breeder) of Broughgammon, Ballycastle, Co. Antrim, has told us in conversation this year that he obtained similar results when comparing the cross Epicure 'bolter' × Herald with the cross Epicure × Herald. More than 50 per cent of the plants in the family from the 'bolter' cross were 'wild' types as compared with a small percentage from the cross Epicure × Herald.

Since a series of intermediates between the normal and bolter type occur and since it is known that maturity, flowering and stolon development are influenced strongly by the length of day, it is possible that the 'bolter' condition arises through the mutation of the gene or genes governing the photoperiodic reaction.

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[1] "Potato Growing for Seed Purposes" (Dublin, 1937).

[2] "The Maintenance of Pure and Vigorous Stocks of Varieties of the Potato", Revised ed. (Edinburgh, 1944).

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