tional method, are shown in Fig. 2. The measurements have been made on etiolated *Avena* and *Zea mays* coleoptiles in the dark. Contrary to previous results, the geoelectric voltage does not appear until 15 min. after tilting the plants into a horizontal position. This has been corroborated with *Avena*, *Pisum* and *Zea mays* by our extensive experiments with the conventional method using electrodes similar to the Clark type⁵. Further, the magnitude of the voltage is greater than that reported by the majority of previous authors. A more detailed description of the method and results with different plant materials will be published elsewhere.

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BIOCHEMISTRY

Screw Sense of the α -Helix in Poly- β -benzyl-L-aspartate

Blout and Karlson¹ have reported that the constant b_0 in Moffitt's equation for the dispersion of optical rotation² has values up to $+630^\circ$ for solutions of poly- β -benzyl-L-aspartate in chloroform; the usual value for solutions containing α -helices of polypeptides is about -600° , and corresponds to right-handed helices³. We have studied the dispersion of a number of copolymers of β -benzyl-L-aspartate with other amino-acids, and believe that the results demonstrate that the positive b_0 found for poly- β -benzyl-L-aspartate is due to a left-handed helix and not to an optical anomaly.

If we plot b_0 against composition for a series of random copolymers of β -benzyl-L-aspartate and γ -benzyl-L-glutamate, we find that although the values of b_0 for the two simple polymers are almost equal (though of opposite sign) the curve is very far from symmetrical. Eight mole per cent of L-glutamate is sufficient to reduce b_0 to zero⁴, and more than 85 per cent of the total change in b_0 is produced by the addition of 15 mole per cent of L-glutamate; the effect of L-alanine residues is similar. These results are best explained by the hypothesis that the two simple polymers form α -helices of opposite screw senses, and that the preference of the L-aspartate residues for a left-hand helix is much less marked than that of the L-glutamate residues for a right-hand helix, so that comparatively few of the latter can dictate the sense. To explain these results on the basis of an optical anomaly we would have to postulate that this anomaly depends on long unbroken sequences of L-aspartate residues. However, other experiments show that the sequences of L-aspartate residues may

be interrupted by either D-glutamate or D-aspartate residues with very little effect on b_0 .

These conclusions are confirmed by measurements on a number of other copolymers, both random and block, and by building molecular models. A full account of this work will be published elsewhere.

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Isolation and Probable Functions of Betaine Esters in Brain Metabolism

In previous work, Hosein¹ reported that γ -butyrobetaine was found in extracts made from brain tissue of rats in convulsions which had been induced by intraperitoneal injections of cerebral convulsants. We have now found that fractionation of the gold precipitate formed from eluates of the chromatograms made from these extracts by the procedure of Linneweh² enables the identification of two other betaines. The melting points of the gold derivatives of the betaines obtained in this investigation are shown in Table 1 and compared with those obtained by Linneweh for synthetic betaines.

Table 1. MELTING POINTS OF GOLD DERIVATIVES OF VARIOUS BETAINES

Substance	Melting point (with decomposition) in deg. C Linneweh	Betaine isolated
γ -Butyrobetaine	180-184	177-181
Crotonbetaine	212-214	209-211
Carnitine	150-153	149-153

From these results we conclude that the brain extracts from animals treated with cerebral convulsants contained free γ -butyrobetaine, crotonbetaine and carnitine.

Other work by Hosein³ has shown that in normal brain extracts these betaines in the free form could not be detected. It was shown that the 'free' or immediately extractable acetylcholine from aqueous brain extracts (supernatant A) contained acetylcholine and propionylcholine, while the 'bound' fraction, released after chloroform treatment (supernatant B), contained, in addition to these choline esters, a mixture of the coenzyme A ester derivatives of the betaines mentioned above. These betaine esters were contained in a band of the chromatogram developed in the butanol/water system with an R_F between 0.45 and 0.56. The chromatogram pattern obtained from the 'bound' acetylcholine fraction in brain was similar to that obtained by Bannister *et al.*⁴, who used ox spleen. We have synthesized enzymatically γ -butyrobetaine-coenzyme A, and this substance has an R_F of 0.55 in the butanol/water system. This thiol ester was found to possess acetylcholine-like properties similar to those obtained with eluates of the 0.45-0.56 band obtained from brain extracts. In both cases their physiological effects are abolished by atropine. Accordingly, it appeared from these