Margaret Johnson (University of London) has now shown that, of the three kinds of fibre usually found in hamster muscle, type I shows least involvement by the dystrophic process while type II exhibits the greatest early atrophy but is also capable of the greatest hypertrophy in the later stages of the disease. One interesting speculation arising out of this work was that the level of glycolytic enzyme activity may influence the growth potential of a muscle fibre.

Dr D. G. F. Harriman (University of Leeds) showed some electron micrographs of intramuscular lipid droplets which had been revealed by freeze-etching. This study of lipid storage in normal and diseased muscle has become more relevant in the light of recent reports on the important role of lipids in the metabolic cycle of muscle. Dr A. J. McComas (University of Newcastle upon Tyne) outlined a new technique for estimating the number of functioning motor units within a human muscle. He showed that the weakness and wasting of old age could be largely accounted for by progressive denervation, and provided evidence that the surviving motor axons remain capable of sprouting and of effecting considerable re-innervation.

The failure to define the basic defect or even the cell structure that is primarily involved in dystrophy need not create complete pessimism about research, although Dr B. P. Hughes (University of London) and Perry suggested a reversion of certain enzyme patterns (lactic dehydrogenase, creatine-phospho-kinase and myosin adenine triphosphatase) in dystrophic muscle to that which occurs in foetal muscle (perhaps a secondary effect). The biochemical and structural investigation on the normal and in some instances abnormal fibre adds to the present knowledge of this tissue as a functional unit (a noteworthy contribution in itself) and provides a wider base from which to plan future research.

BRAIN

Glutamate and GABA

from a Correspondent

THE two amino-acids, glutamate and GABA (γ-amino-butyrate), are well known to have metabolic properties peculiar to brain, and both have been thought of as possible neurotransmitters in the central nervous system. These aspects of brain function were discussed at a Biochemical Society symposium on free amino-acids and central nervous function held at Leeds on January 13.

Dr C. Van den Berg (University of Groningen) talked chiefly about the metabolism of glutamate, glutamine and GABA, and provided evidence to support the idea that there are at least two separate tricarboxylic acid cycle pools in brain, one larger than the other. The smaller pool is believed to be associated particularly with the synthesis of glutamine rather than of glutamate and with the metabolism of precursors such as acetate and several amino-acids, for more labelled carbon from these precursors appears in glutamine than in glutamate. The larger pool is believed to be associated to a great extent with the metabolism of glucose and the synthesis of glutamate, for more glucose carbon appears in glutamate than in glutamine; it is probably also associated more with the production of energy. A simulation study using data from experiments with radioisotopes has led to the belief that the two pools are interconnected through glutamine and GABA. For example, α-oxoglutarate in the small pool would be converted (by way of glutamate of the small pool) to glutamine, which in turn would be converted to glutamate associated with the large pool. Imbalance between the pools would be avoided by the conversion of glutamate of the large pool to GABA which, after the loss of its amino group, would enter the tricarboxylic acid cycle of the small pool as succinate.

This fitted well with views expressed by Dr J. C. Watkins (MRC Neuropsychiatry Unit, Carshalton), who discussed the relationship between amino-acids and electrical activity in the central nervous system. He suggested that if, as some believe, glutamate is an excitatory and GABA an inhibitory neurotransmitter, each appropriate presynaptic type of nerve ending might contain a predominantly glutamate-producing or GABA-producing tricarboxylic acid cycle pool. He pointed out that the lack of a specific receptor-blocking, or inactivation-delaying, agent for either excitatory transmitter action (cholinergic and aminergic systems excluded) or the action of the excitant amino-acids prevented pharmacological differentiation of the two actions. A similar situation prevented pharmacological identification of GABA as an inhibitory transmitter. By contrast, the action of another amino-acid, glycine, which is neuroinhibitory and which has been proposed as a spinal inhibitory neurotransmitter, is blocked in both the spinal cord and the brain by strychnine, a substance also known to block the terminal action of the postsynaptic inhibitory system.

If glutamate and GABA are central neurotransmitters, it should be possible to show that they can be released in the brain by appropriate electrical stimuli. Dr K. D. Neame (University of Liverpool) reported that several workers had shown that this was so, but said that such evidence could only be used to support the neurotransmitter hypothesis if release in response to electrical stimuli were peculiar to these two amino-acids. This had not been definitely shown. In some cases so-called release could be interpreted in terms of altered metabolism of amino-acids associated with the tricarboxylic acid cycle. In others where it could be described in terms of movement as such out of the tissue, the evidence as to whether other amino-acids were or were not similarly released was far from conclusive.

Thus the speakers indicated that, although glutamate and GABA are certainly interesting metabolically, evidence in favour of a neurotransmitter action is still not compelling.

PROTEIN SYNTHESIS

Controlling Translation

from our Cell Biology Correspondent

THE molecular biology of bacteria and bacteriophages may be a dying industry, but there are still plenty of opportunities to make a quick killing. Positive control elements which regulate gene expression are the current market favourites. The discovery last year of sigma and rho factors, which determine the specificity of transcription of RNA off DNA templates, has of