chains, even at high concentrations of salt, when the native protein gives rise to the ball structure. There is no obvious explanation of this behaviour. The polymerization is performed at *p*H 4, and in these conditions the carbohydrate remains attached. At *p*H 1·8 it is detached by hydrolysis, and the product will then still aggregate, but only to the chain form. If there is, as the authors have done their best to prove, no covalent change when chains are formed, this behaviour would seem to involve a hysteresis of unprecedented prominence.

In the accompanying paper (Barclay *et al.*, *Biochem. J.*, **111**, 353), the same workers examine the biological activity of the two polymeric forms. The protein can function in three ways—it may inhibit agglutination of red cells by sensitive (though not by certain resistant) strains of virus; it will inhibit the propagation of the virus; and it will itself, in appropriate conditions, agglutinate the virus particles. The chain polymer was active in all three respects, the ball form in none. Polymers, from which the carbohydrate had been removed, were also inactive, although they appeared only in the chain form. At this stage it is not obvious whether the ball has any biological significance.

NEUROCHEMISTRY

The Developing Brain

from a Correspondent

BRITISH scientists are making considerable advances in developmental neurochemistry and some of their work was discussed on February 20 at a meeting organized by the Neurochemical Group of the Biochemical Society.

Professor A. N. Davison reviewed the biochemistry of myelinogenesis. He presented new evidence to suggest that there may be an intermediate stage in myelin synthesis. Thus, crude myelin isolated from homogenates of the developing brain can be separated into two fractions—one comparable to mature myelin and another with a lipid composition similar to that of plasma and other cell membranes. Apart from its lipid complement, this fraction resembles myelin in its protein and enzyme composition. It was suggested that the myelin-like membrane fraction was in part glial plasma membranes, for myelin is thought to be derived from the oligodendroglial cell wall. The process of myelination seems to be a "once and for all" event and once deposited around the axon most of the myelin seems to be metabolically rather stable. Myelination may therefore be regarded as a vulnerable period of development, for even mild undernutrition or amino-acid or hormonal imbalance can permanently reduce myelin deposition in the brain. For example, hypothyroidism during early life only can result in cretinism. In the brain of thyroidectomized rats (as Professor J. T. Eayrs reported) neuronal perikarya are smaller but packing density of neurones is increased. There are also reductions in the dendritic fields and their interconnexions and in the amount of myelin found in the hypothyroid brain. Apart from these anatomical changes, it was concluded that additional factors may also be related to the reduced intellectual performance of the cretin. Professor Eayrs thought that it was here that current biochemical studies on the brain were of special value.

R. Balazs reported that measurement of DNA and labelling of nucleic acids in the brains of thyroidectomized rats supported anatomical work. Two important biochemical systems were also studied in the hypothyroid brain of developing rats—the conversion of glucose to amino-acids and the compartmentalization of glutamate. Both these age dependent processes were found to be retarded. In addition, deficiencies were observed in the development of synaptic endings at least as judged by reduced glutamic acid decarboxylase and synaptosomal succinic dehydrogenase activities. Much work is currently aimed at relating different protein species to the function of identifiable brain structures. M. K. Gaitonde drew attention to the complex and changing protein composition of the developing brain. With the introduction of quantitation of proteins separated by gel electrophoresis, it should become possible to extend considerably our knowledge of the role of proteins in the brain.

The demonstration of permanent effects on the developing brain as a result of conditions such as undernutrition, hypothyroidism or hyperphenylalanaemia is of considerable clinical significance. The vulnerability of the brain during postnatal life indicates that the proper nutrition of the newborn child should have priority in underprivileged countries. There is also the exciting possibility that further neurochemical work will provide a link between the biochemistry of the brain and the process of intellectual development.

NEUROPHYSIOLOGY

Mechanoreceptor Function

from our Neurophysiology Correspondent

ALL sensory receptors eventually code their input into a neural pulse frequency, so it is important to know the extent to which their transducer properties are inherent in the form of their accessory structures and not in the neural membrane itself. In some cases much of the answer is obvious, but the correct assignment of the apparently simple properties of many mechanoreceptors is still in doubt. Nakajima and Onodera (*J. Physiol.*, **200**, 161 and 187; 1969) have now published the full results of their experiments with crayfish stretch receptors. These are neurones with their dendrites attached to muscle fibres so that they are stretched in parallel with the muscle. There are two morphologically and physiologically distinct types: the fast and slowly adapting receptors.

The experiments were in two principal categories: stimulation by intracellular or extracellular microelectrodes, and physiological stimulation in conditions of constant stretch or constant tension. In both types of receptor the current–voltage relation (the displacements in membrane potential produced by intracellularly injected currents) was similar. Both showed delayed rectification due to an increased permeability to K^+ on depolarization, although with large (> 50 mV) depolarization of slow receptors, potassium inactivation set in. This meant that a sudden repolarization of the membrane produced no measurable under-shoot of the membrane potential, although the membrane resistance was still lower than when at rest. In slowly adapting neurones, sustained discharges of action potentials were produced as long as a supra-threshold depolarizing