Committee on Analgesia for Labour and is widely used in combination with nitrous oxide or, better, trichloroethylene. The dithienylbutenylamines are more active than pethidine but inferior to morphine. Methadone is in the morphine class as an analgesic, but is less effective in reducing anxiety and promoting sleep.

Potent analgesics are potential drugs of addiction and are, like morphine, carefully controlled by law. Tolerance and dependence may develop even with pethidine, and the need for a reliable analgesic which is not addiction-producing has still to be met. As a laboratory-worker Prof. Macdonald was fortunate in having, to follow him, Dr. P. O. Wolff, of the World Health Organization, Geneva, to discuss some of the problems of addiction, and Mr. J. Pennybacker, of Oxford, to deal with some of the contributions of neurosurgery to the relief of pain.

RECENT STUDIES IN THE PSYCHOLOGY OF THINKING

THERE is a growing sense among psychologists that the psychology of thinking is not only one of the most important areas of psychology both theoretically and practically, but also that it is an area that can be profitably investigated by scientific methods. Thinking is a complex activity rendered possible only as the result of a long period of evolutionary and individual development, and it depends on the co-operation of favourable organic and environmental conditions. The three major aims of the psychologist are: first, to study in detail the development of thinking from its simplest forms to the most highly developed logical and mathematical thinking; secondly, to study the conditions upon which thinking depends; and thirdly, to throw some light upon the general nature of the processes involved in thinking. The purpose of the presidential address by Prof. L. S. Hearnshaw to Section J (Psychology) is to present a sort of interim report on some of the more recent work and speculations of psychologists in the field of normal psychology.

Among this recent work a very high place must be given to the developmental studies of children's thinking carried out by Piaget in Switzerland. Piaget's recent work is not as yet well known in Great Britain. The importance of Piaget's studies is not merely that they constitute by far the most detailed account of children's thinking from the hour of birth to adolescence that has yet been made; it has much more in the comprehensiveness of their scope and their systematic theoretical organization which links the two poles of biology and logic. His studies of the genesis of mathematical and scientific thinking should be of great interest to scientists.

The work of experimental psychologists, though much more fragmentary than that of Piaget, has thrown some light on the subtlety of the personal, emotional and environmental factors that may influence thinking. Though the results of experiments in this field are still meagre in quantity, they indicate the practicability of an experimental approach which may in the course of time place our intuitive art of thought upon firmer foundations.

The tendency of contemporary psychologists is to regard thinking as a high-level skill, derived and built up, therefore, not, as in older views, from special cognitive elements, but compacted, as all skills must be, of both sensory and motor components. Skills are essentially activities, and skills are learned. The gestalt psychologists rightly emphasized organization as an essential feature of all skills, including thinking; but their further contention that this organization is immediate, unlearned, and unanalysable is much less acceptable. In a series of important experiments with monkeys, Harlow has traced the development of apparently immediate insightful behaviour through the establishment of what he terms "learning sets". Insightful behaviour is an end product, the result of a mature skill gradually acquired by experience, and marked increasingly by flexibility, transfer and generalization.

No theory of thinking as yet comes near comprehending the full range of the phenomena we know as thinking. Thinking cannot be equated with problem solving. An adequate theory must embrace every kind of thinking, normal and pathological. Recent studies suggest, however, that the psychology of thinking is no longer an esoteric study, but a branch of psychology which can be objectively studied, and which joins hands not only with better settled areas of psychology, but also with subjects like biology and logic, which lie beyond its own frontiers.

PLANT GROWTH AND PRODUCTION

IN his presidential address to Section K (Botany), Prof. W. H. Pearsall points out that botanists are faced to-day with many developments arising from new and exciting techniques. These have suggested to many that botany is liable to split up into a great number of highly specialized lines of inquiry. On the contrary, these new methods of inquiry should, from various directions, throw new light on the fundamental botanical problems which centre around the organization and growth of plant cells and tissues. Just as growth is the integration of the plant's activities, so the study of growth will serve to integrate inquiries on different aspects of botany.

If the botanist is thus interested in plant growth as a fundamental process, *per se*, the general public is interested in it because it is the means of producing food and raw materials, of which the world is in danger of being starved. It may be useful, therefore, to look on this latter subject somewhat systematically.

Methods of growth analysis devised by F. G. Gregory and his colleagues show that most plants appear to have similar values for their photosynthetical efficiency in growth. The efficiency of a crop thus depends generally more on climatic variations and on the extent and duration of plant-cover than on the nature of the individual plant. This can be illustrated in various ways, particularly by reference to J. D. Ovington's figures for the annual production of dry matter by various types of planted tree. In natural vegetation, too, dry-weight production seems to fall between similar quantitatively definable limits which bear little relation to the type of plant involved, or to some of the obvious ecological factors. Thus, in terms of annual dry-weight yield, waterlogged swamp-soils may be as productive as drained or normal ones.

It appears that very considerable increases in the production of food or raw materials are possible with more continuous crop-cover and improved methods of land-use; but methods of food collection also merit more attention. The use of animals to con-