250,000 tons of ethylene and that future plants may have a capacity of 500,000 tons. A logical consequence of developments of this magnitude must be cooperation between producers, at least for the production of cheap starting materials, and the concentration of facilities in large chemical complexes. Although the construction of large petrochemical plants offers new opportunities for advanced control concepts—increased use of computers for process control, for example—increase in size also gives rise to problems of plant safety and pollution control.

Enzyme controlling Birth?

from our Medical Biochemistry Correspondent

THE journey from the uterus to the outside world has been said to be the most hazardous undertaken by any individual in his lifetime. In spite of the dangers to both mother and child during labour, obstetrics remains largely a manual and surgical speciality. Very little is known about the physiological control of normal labour, and even less about what happens when labour does not proceed smoothly.

The polypeptide hormone oxytocin, produced by the neurohypophysis, makes uterine muscle contract, and is used to induce labour and shorten the later stages of labour. Oxytocin is, however, present in the blood during pregnancy and its concentration does not seem to increase greatly at term. The serum of pregnant women contains an enzyme, oxytocinase, which hydrolyses oxytocin, but again no changes in the amount of oxytocinase have been demonstrated just before birth. In a letter to the *British Medical Journal* (**3**, 122; 1968) A. Boulton Hewitt suggests that changes in the *p*H of the amniotic fluid may change the activity of oxytocinase so that more oxytocin reaches the uterine muscle and causes it to contract. The optimum *p*H of oxytocinase is about *p*H 7·3, and for most of pregnancy the amniotic fluid—like the blood—has a *p*H around this figure. Hewitt has shown that in normal pregnancy the *p*H of the amniotic fluid drops to *p*H 7 or less at 39 weeks gestation, presumably because of the increasing activity and size of the foetus. This *p*H change (which would also occur when the foetus dies) would decrease the activity of oxytocinase, so that the concentration of oxytocin in the amniotic fluid would rise until it could pass through and affect the uterine muscle.

In the same issue of the *British Medical Journal* (**3**, 96; 1968) V. S. Mathur and J. M. Walker report estimations of oxytocinase in the plasma and placenta in normal and prolonged labour. In the nine cases of prolonged labour, the cervix had dilated fully but the second stage of labour was proceeding so slowly that there was concern for the condition of the baby. Previous workers have reported increased oxytocinase activity in the blood of women whose labour was prolonged, and Mathur and Walker found significant differences in the oxytocinase concentrations in both the plasma and the placenta of women in normal and prolonged labour, and the difference in the ratio of placental to plasma activity was highly significant. In the ten normal cases the plasma activity was $0{\cdot}8 \pm 0{\cdot}09$ with a placental activity of $6{\cdot}0 \pm 0{\cdot}61$. In the nine women with prolonged labour, the activity in the plasma was increased to $1{\cdot}3 \pm 0{\cdot}11$, with a corresponding decrease in the placental activity to $4{\cdot}0 \pm 0{\cdot}37$. This suggests that the increase in oxytocinase in the plasma comes from the placenta, and the authors believe that this is because the prolongation of labour causes greater detachment of small pieces of placental tissues into the maternal blood stream. It seems equally reasonable to suggest that the leakage of oxytocinase from the placenta into the blood stream may be one cause of prolonged labour.

DNA Synthesis during Meiosis

from our Cytogenetics Correspondent

THE processes which take place in the nucleus and lead to chromosome pairing and chiasma formation during meiosis are still a mystery, but now that microscopic observations are giving way to ultracentrifuge studies the picture may become clearer. Hotta, Stern and their colleagues have been investigating events during meiotic prophase with the ultracentrifuge. In 1966 they showed that a small amount of chromosomal DNA is synthesized during prophase and suggested that this is associated with chiasma formation. Now, Hotta, Parchman and Stern (*Proc. US Nat. Acad. Sci.*, **60**, 575; 1968) have extended these observations. They have used the anthers of *Lilium* as a source of large numbers of synchronized meiotic cells. They introduced radioactive leucine at different stages of prophase and they isolated the radioactive proteins synthesized in the nuclei at the various stages. As cells passed into the zygotene-pachytene phase, a sharp increase was recorded in the synthesis of a particular protein extractable at *p*H 8·0. A small but significant amount of DNA is also synthesized at the same time and, significantly, this newly synthesized DNA is isolated in the *p*H 8·0 fraction, whereas very little of the total nuclear DNA occurs in this fraction. Density gradient centrifugation showed that the DNA and protein synthesized in zygotene-pachytene sediment together, and so Hotta *et al.* infer a functional relationship between the DNA and protein; their experiments with cycloheximide support this idea. A low concentration of cycloheximide selectively abolishes the synthesis of both the protein and the DNA and, in turn, chiasma formation does not take place. From this the authors conclude that protein synthesis in meiotic prophase is necessary for the synthesis of DNA, which is essential for chromosome pairing and chiasma formation.

Synthesis of DNA is also characteristic of developing amphibian oocytes. Gall (*Proc. US Nat. Acad. Sci.*, **60**, 553; 1968) has now described the nature of the DNA synthesized at pachytene in oocytes of *Xenopus*. The newly synthesized DNA has a higher density than somatic nuclear DNA; it is double stranded and anneals with ribosomal RNA. Apparently the new DNA represents localized duplication of genes for ribosomal RNA and its function is to serve as extra templates for the massive synthesis of *r*RNA that occurs in oogenesis. The ribosomes of the oocyte maintain protein synthesis in the early stages of embryo development.

Clearly the *r*RNA locus has exceptional properties. The behaviour of this locus is also curious in *Drosophila* where loss of the *r*DNA locus gives rise to the "bobbed" phenotype. With appropriate genetic crosses, Ritossa (*Proc. US Nat. Acad. Sci.*, **60**, 515; 1968) has shown that *r*DNA can be added back to the genome to give reversion of the phenotype. But reversion is not always stable, which indicates that the