It affects the nervous system of mature people and the mesenchymal tissue of the embryo.

Few animal experiments have been done. As previously mentioned, thalidomide does not induce sleep in the usual laboratory animals. Grünenthal has tried to reproduce phocomelia in rats, mice, and rabbits and has failed. In Keil the drug was fed to hens and the chicks were normal.

Grünenthal has shown that the drug passes through the placenta of rabbits but in their experience the offspring were normal. Somers (16) has, however, recently reported the production of abnormalities in rabbits which are remarkably similar to those in infants. Although the offspring were not equally affected, the extremities did appear to be grossly abnormal and radiological examination of the extremities showed that the long bones were defective. Although Somers believes the ill effects of thalidomide are proven; others disagree. Murphy (17) has recently reported the production of phocomelia in the offspring of a rat by intraperitoneal injection of an enormous dose of thalidomide on the 12th day of pregnancy. Clearly these observations require confirmation. Should the observation not be confirmed, it should be remembered that thalidomide makes a horse sleep. Therefore, the horse might be found to react as man does. Simian experiments would also be of interest.

Once a susceptible animal has been found, a new avenue of approach to malformations will be available. It is quite clear that the drug acts during the period in which the embryo is developing as is the case with the virus of German measles. It is equally clear that it acts at a different point or in a different way than does the virus of German measles; the resultant malformations are totally different. Furthermore, thalidomide is a synthetic chemical and it should be possible to test the action of the separate chemical radicals from which the drug is compounded.

Even though this drug has not been conclusively demonstrated to have the same effect on animal and man, it does indicate that all new drugs which circulate through the blood stream should be screened for their effect on the offspring of pregnant animals. Distillers Limited is already attempting to develop tests by which to screen drugs for this serious untoward effect. It is, however, an extremely difficult problem and it demands extensive study. Our Food and Drug Act, although better than most of the other countries, should be strengthened. Women in the childbearing age must be educated not to take new drugs. Often the harm is done before they know they are pregnant and with the best of medical knowledge some other harmful preparation may be incorporated into some drug. We do not know how to completely eradicate such a danger, but let us do what we can.

Thus the tragic effects of thalidomide have opened up a new avenue of approach to the etiology of malformations. What is the precise factor that causes phocomelia? Where does it act? How does it inhibit growth? Many physicians have also asked how about its effect on cancer? One sad story is, we hope, coming to an end. It should be the dawn of new and better control of drugs. Let us hope that it is also the dawn of new knowledge.

SUMMARY

In 1960 Kosenow and Pfeiffer reported a new clinical syndrome; the essential feature was phocomelia. The incidence of the malformations rapidly increased and by the end of 1961, thousands of children had been born with severe malformations of the extremities. The causative factor appeared to be an exogeneous agent. Many retrospective studies were instituted.

Almost simultaneously Lenz in Hamburg and McBride in Australia suspected that the malformations were caused by taking thalidomide in early pregnancy.

Thalidomide is a synthetic drug deveoped by Grünenthal and marketed in Germany as Contergan, in England as Distaval, in Portugal as Softenon, as Kevoadon in the United States (though not released by our Food and Drug Administration) and as Kevadon and Talimol in Canada. It was an excellent sleeping tablet and tranquilizer and was added to a number of other compounds which were used for the relief of grippe, migraine, and asthma and also for expectorants.

The circumstantial evidence is overwhelming that this drug does cause severe malformations of the extremities. Grünenthal showed that the drug passed through the placenta of rabbits. Distillers, Ltd., in England, have reproduced the malformations in rabbits by feeding the drug to pregnant animals. Murphy has