This finding immediately raises several questions. First, what is the mechanism for adding or losing a base during replication; second, why does the addition or loss of a base occur so frequently, 50 per cent of the time, and are both types of molecule infective? If it turns out that both classes of molecule are infective, it follows that the number of bases preceding the initiation signal which starts protein synthesis is unimportant because the initiation signal in Q β RNA lies beyond the 5' terminal sequence. This in turn would imply that the bases preceding the start signal do not have to be read in any particular reading frame. It is, of course, early days yet and it will no doubt take several months to digest this apparent contradiction of the current idea that viral RNA molecules are a structurally homogeneous population.

CANCER

Urinary Steroids in Breast Cancer

from our Medical Biochemistry Correspondent

BREAST cancer kills several thousand women in Britain each year. The growth of the tumours is often influenced by sex hormones, and advanced cases are often treated by giving sex hormones (additive therapy) or surgical removal of endocrine glands (ablative therapy). In 1960, Bulbrook *et al.* (*Lancet*, i, 1154; 1960), studying the urinary excretion of steroids, defined a discriminant function (DF) as $80-80 [17\text{-hydroxycorticosteroids (mg/24 h)}] + \text{aetiocholanolone } (\mu\text{g/24 h})$. In a random trial, women with a positive DF were more likely to respond to ablative therapy than women with a negative DF.

Since 1960 several groups have found that steroid assays are useless in predicting the response to additive therapy. And last year Sneddon, Steel and Strong (*Lancet*, ii, 892; 1968) showed that the DF was always depressed in the presence of abnormalities in thyroid function. The predictive value of the test will therefore be reduced when the thyroid is abnormal.

The group who introduced the DF recently reported a new trial where pituitary removal (hypophysectomy) in DF negative patients had a success rate of 13 per cent compared with removal of the adrenals and ovaries in DF positive patients, with a success rate of 30 per cent (*Lancet*, ii, 1261; 1968). In an accompanying paper (*Lancet*, ii, 1255; 1968) they reviewed the results of ten years' investigation of the DF. A positive DF was significantly associated with a good response to hypophysectomy, but for adrenalectomy the difference was not statistically significant. The two operations were equivalent for patients whose breast had been removed (mastectomy), but all patients who had not had a mastectomy responded very poorly to adrenalectomy. The success rate increased with the length of the "free period" (between mastectomy and recurrence of symptoms) particularly if the DF was negative. The response was not related to the menopause in DF positive patients, but in DF negatives the response was worse immediately after the menopause than before or more than six years later. The rather depressing conclusion is that the situation is more complex than it seemed. Different types of breast tumours respond to hormones in different ways, and very large-scale studies are needed—surely a good subject for a cooperative study involving several

different centres. At the least, however, the DF can now identify women who are most unlikely to benefit from the major surgery of ablative therapy. These patients should be spared surgery and treated in some other way.

PLANT PATHOLOGY

Plants from the Air

from our Microbiology Correspondent

A STIMULATING review of the present and projected use of aerial photography in the study of plant diseases has been made by G. H. Brenchley (*Ann. Rev. Phytopathol.*, 6, 1; 1968). Although this means of surveying plant disease was considered first in the 1920s, little notice was taken of it until the past decade. The realization of aerial reconnaissance in plant pathology has been slow, but Brenchley's discussion should direct further thoughts in this direction. The principal advantages of aerial photography appear to be the detection of diseases—and sometimes their identification—and their distribution in time and space. The definition of patterns of disease incidence, severity and development may be possible only from aerial photographs, while the feasibility of very large scale studies is obvious. Brenchley stresses that aerial photography, far from being a rival or substitute, can be an ideal complement to ground investigations and that the collaboration of various specialists such as soil physicists, soil chemists, agronomists and pathologists may be essential for the decipherment of aerial photographs.

The technology of this branch of phytopathology clearly requires expansion and refinement. Although diseases which produce patchwork patterns caused by necrosis, colour change or abnormal growth are relatively easy to spot, those that cause a general reduction in vigour or only a slight colour change will require special techniques. It will be hard to distinguish between minor tonal and colour changes caused by mild disease symptoms and those for which other factors are responsible. The identification of a disease from aerial photographs is more hazardous, but the use of multi-band photography (series of different film-filter combinations) can lead to exact diagnosis and equivocal situations can be investigated further from the ground. The unique contribution of aerial photography to phytopathology is its ability to record accurately and clearly distribution patterns of diseases. This feature is illustrated well by reference to recent occurrences of sugar beet stunting and take-all of wheat in eastern England. Aerial studies showed that the beet condition was confined to drift soils, particularly if they had a poor structure, while impeded drainage was found to be a major factor in take-all distribution.

Aerial photography provides an ideal means for making dynamic studies of plant diseases and may be the only effective way of monitoring the rapid spread of epidemics over a large area. Thus the success in forecasting the spread of potato late blight in East Anglia has resulted from a joint recourse to photographic and local meteorological records. By a judicious choice of photographic techniques and film, it may be possible to obtain data on the present condition and recent history of epidemic disease foci, for instance, information which could be very