pottery supply? Presumably London, but pots almost identical to those made at Highgate have been found as far away as Welwyn. Only when all the material has been analysed statistically and chemically will a comprehensive picture of the pattern of distribution of the wares emerge. And how were the pots transported? Except for Watling Street to the west and Ermine Street to the east, there is no solid evidence for Roman roads in the Highgate, Hampstead and Haringey area of London. Various odd Roman finds have been recorded in the Highgate area—the best known of them is the hoard of 600 Roman coins of the first to third century found about half a mile from the pottery in 1928, which may imply a settlement. So where did the potters live? Clearly the Highgate pottery was, by the standards of the time, a sizable enterprise, but the excavations have not so far revealed any potting or drying sheds or any dwellings. And why did the Highgate potters flourish for such a short time when there was certainly no shortage of clay or, presumably, of wood? At least some of these questions may be answered by further excavation.

QUASARS

Far or Not so Far

from our Astronomy Correspondent

THE vexed question of quasar sizes and distances has been hanging fire for some time now, but in recent weeks more fuel has been added to the flames. Last year, a group of astronomers from the National Research Council, the University of Toronto, Queen's University, Ontario, and the Department of Energy, Mines and Resources in Canada has been developing long baseline techniques for the measurement of the angular diameters of quasars. In May last year, the group used a baseline of 2,000 miles between Algonquin Radio Observatory in Ontario and the Penticton Observatory in the Rocky Mountains of British Columbia. Preliminary results have now been released of the group's latest experiment, involving a baseline of 3,200 miles between Algonquin and the 250 foot radio dish at Jodrell Bank. According to a report from the National Research Council, the experiment, which was carried out towards the end of June this year, confirms that none of the eleven quasars measured is larger than earlier estimates.

An experiment such as this, involving two spaced telescopes, is fraught with difficulties. The Canadians came to Jodrell Bank with a precise tape recorder which they connected to the receivers for the dish, and a rubidium clock to synchronize the recorder to a millionth of a second or so with a similar recorder at the Algonquin telescope.

The outcome is that the quasars measured subtend an angular diameter of less than 0.01 second of arc, an upper limit which is a factor of two better than previous estimates. If quasars are indeed at cosmological distances, this implies diameters less than about 100 light years. At first sight, then, the Canadian work seems to make that much harder the problem of understanding how quasars can radiate as much energy as galaxies while their diameters are some thousand times smaller. Improved estimates of angular diameters may become available shortly. While the Algonquin-Jodrell Bank link was operational, record-

ing was also, it seems, taking place at Penticton. By combining the Penticton and Jodrell Bank records, it may be possible to obtain estimates referring to a baseline extending across the Atlantic and the North American continent. Jodrell Bank is meanwhile planning a similar experiment in conjunction with the fixed 1,000 foot dish at Arecibo in Puerto Rico.

Before the apparent diameter of a quasar can be converted to an absolute diameter, the distance must be known and this has for some time now been a crucial question. Last year, Dr T. A. Matthews of the University of Maryland seemed to have found evidence that one quasar at least—3C 287—was at a distance of less than about 10^5 light year, making it a comparatively local object. This estimate is based on what seems to have been a brightening of a nebulosity associated with 3C 287, involving an angular diameter of about 2 seconds of arc and taking place over about a year. The argument is that because the brightening can hardly spread across the nebulosity faster than the speed of light, the emitting region must be less than one light year across. Even if, for geometrical reasons, the brightening can seem to proceed faster than the speed of light (see *Nature*, **219**, 894; 1968), 3C 287 must nevertheless be nearer than its cosmological distance of 10^{10} light years (*Astrophys. J. Lett.*, **152**, 139; 1968).

The snag is that the brightening of 3C 287 was deduced in the first place by comparing two plates taken in 1965 and 1966, but with different telescopes and different emulsions. The 1965 plate was taken with the 100 inch telescope on Mount Wilson, and the 1966 plate with the 48 inch Schmidt telescope on Mount Palomar. Reports from Kristian and Peach at the California Institute of Technology now say that a series of 16 plates taken between 1950 and January 1968 fail to show the brightening described by Matthews. What seems to have happened is a blurring of a faint companion of 3C 287, caused by adverse observing conditions, when the quasar was photographed in 1966 with the Schmidt telescope, appearing to Matthews as a brightening. In any case, the lower resolving power of the 48 inch Schmidt telescope compared with the 100 inch telescope means that even under the best conditions it could not resolve 3C 287 from its companion (*Astrophys. J. Lett.*, **152**, 161; 1968).

GYNAECOLOGY

Ancient Peruvian Abortions

A SET of surgical instruments which was used to carry out abortions in ancient Peru is described in the latest issue of *Antiquity* (**42**, 233; 1968). The instruments were found, among scalpels, needles, forceps and bandages, in burial grounds dating from the Chimú period (about AD 450–750) and have been described by Dr Oscar Urteaga-Ballon of the National University of San Marcos and Dr Calvin Wells of the Castle Museum, Norwich. There are four dilators and five curettes which closely resemble the modern instruments used to scrape a uterus in order to produce or complete an abortion. Although the metal of which they are made—copper with a small admixture of iron—has been corroded, it would apparently still be possible for a gynaecologist to use these instruments.

There would, however, have been danger in performing abortions in this way. The dilators are straight and