When allowance is made for lines missed due to atmospheric absorption in the infrared and to obscuration by the solar lines themselves, which tends to occur in the ultraviolet—and according to Allen this is the hardest part of the work—there is good agreement, except that the theoretical estimates tend to be too high. To discover why, the expected contributions from individual atoms have been compared with what is observed, and the discrepancy narrowed down to the contribution of heavy atoms such as iron, manganese, cobalt and vanadium. For these atoms the expected counts are well above the observations, and clearly they dominated the original analysis. Judging by what Allen said, it is still not certain why the calculations are wrong for the heavy atoms, but he suggested that a correction factor of two ought to be applied to stars of the solar type, and to stars much later than the Sun, although it is unnecessary for spectra not dominated by the iron group.

MID-OCEANIC RIDGES

Ocean Floor on Land

from our Geomagnetism Correspondent

LITTLE is known about the material produced along the axes of mid-oceanic ridges. On the mid-Atlantic Ridge ultramafic intrusions are exposed in the fracture and transverse fault zones, but rarely elsewhere; and Muir and Tilley (*J. Geol.*, **5**, 409; 1964) have suggested that well developed layered gabbro intrusions should occur at "quite moderate depths" below the basalts forming the crust of the ridge. But much more direct geological exploration is needed. In view of the obvious problems involved in investigating submerged ridges, it would be convenient if there were exposed regions which have developed in a similar way to the ridges.

Varne *et al.* (*Science*, **166**, 230; 1969) claim to have discovered such an area in the Southern Ocean. Macquarie Island lies close to the axis of the seismically active Macquarie Ridge about 1,100 kilometres south-south-west of the southern limit of New Zealand and is elongated parallel to the ridge axis. In the northern third of the island, investigated by Varne *et al.*, the oldest rocks are pillow lavas with interstitial *Globigerina* ooze, hyaloclastite and greywacke—an association characteristic of the ocean floor. According to palaeontological evidence the ooze was deposited at cold water depths of between 2,000 and 4,000 m during the Pliocene, which implies that the island has risen since the deposition took place.

The lavas are intruded by ultramafic and mafic bodies and dyke swarms which form a well defined belt about 4 km wide and trending 330° ETN obliquely across the island. The intrusive sequence seems to be quite simple. Initially harzburgite was intruded along a narrow tensional crack. Gabbro then entered, producing further dilation, and was later forced apart by swarms of dolerite dykes dense enough to exclude almost all of the country rock. Chemical analysis of basalt, dolerites and gabbros from Macquarie shows that their compositions are very similar to those of mid-Atlantic Ridge basalts.

The close proximity of Macquarie Island to the ridge crest, the evidence for ancient submergence and the chemical compositions of the rocks strongly suggest that the island is actually Pliocene oceanic crust. If this is so, could the intrusive belt crossing the island be typical of the form taken by new oceanic material introduced at ridge crests, and could this then be the type of structure producing the characteristic linear magnetic anomalies of the ocean floor?

Varne and his colleagues are prepared to pose the question but not to commit themselves to a definite answer. The evidence is circumstantial rather than direct. It is possible, for example, that the intrusive belt could be an older structure raised to the surface by faulting along the ridge not directly related to the sea floor spreading process. Moreover, there is the question of scale. The Macquarie intrusive belt is only 4 km wide, whereas linear oceanic anomalies are typically a few tens of kilometres wide. Nevertheless, the hypothesis is sufficiently intriguing to warrant further investigation.

QUASARS

Like the Sun

from our Cosmology Correspondent

THE composition of quasars may not differ greatly from that of other stellar objects, if the results of an analysis of the emission lines from 3C 48 and 3C 273 carried out by Bahcall and Kozlovsky (*Astrophys. J.*, **158**, 529; 1969) prove to be characteristic of all quasars. Bahcall and Kozlovsky have calculated the ionization distribution in the emission line region of 3C 48, thus extending the work earlier carried out on 3C 273 (*Astrophys. J.*, **155**, 1077; 1969). Unlike that of 3C 273, the spectrum of 3C 48 contains the strong line from the forbidden transition O II. Indeed, this line is seen so strongly that it is likely that the oxygen abundance in this quasar is as much as an order of magnitude greater than that in the Sun.

No other observed abundances differ so greatly from the solar values, however, and the observations can be fitted adequately by a shell model, in which a strongly radiating central object is surrounded by a shell of the material emitting the observed line spectrum. An electron number density of 9×10^{13} cm^{-3} in a shell of inner radius 62·5 parsec and outer radius 190 parsec is particularly suitable, material closer to the central source having presumably been blown outwards by its intense radiation pressure. More complicated models can be constructed for which even the oxygen abundance agrees with that of the Sun, but the importance of these results, taken with those for 3C 273, is that plausible structures with isotope ratios roughly like those of the Sun can produce the observed spectra. It would be pushing the significance of this work too far to suggest that the calculated structures are necessarily correct; at this stage it is more than enough to know that there is solid evidence for believing quasars to be made up of the same isotopes in comparable ratios to those that make up the Sun.

CHROMOSOMES

Cytological Clarity

THIS unusually clear micrograph of chromosomes in a dividing cell of *Zea mays* was taken during trials of the action of compounds which interfere with cell growth