confirming that the Leonid group is composed mainly of stone meteors. The presence of the strong lines of CaII, MgII and SiII in this spectrum supports Millman's suggestion² that the excitation may depend on the geocentric velocity.

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⁴ Millman, P. M., *J. Roy. Astro. Soc. Canada*, **54**, 189 (1960).

⁵ Whipple, F. L., *Astrophys. J.*, **111**, 375 (1950).

⁶ Millman, P. M., *Nature*, **172**, 853 (1953).

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subjected to varying loads during steering. (4) The instrument can be designed with a focus tower built directly upon the ground. This possibility would free the reflecting surface and its supporting infra-structure from the static loads that would occur if the feed were supported conventionally by a tripod mount, and greater accuracy of the reflecting surface might therefore be possible. In this case the structure must be designed to rotate about an axis coincident with the focus tower and on circular tracks with the base of the focus tower at centre.

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RADIO ASTRONOMY

Radio-Transit Telescopes steerable in Azimuth

WHEN considering radio-transit telescopes, one ordinarily speaks in terms of instruments steerable in altitude. However, transit telescopes steered in azimuth have potentialities which should be evaluated. Bracewell¹ and Drake² have made suggestions for azimuth steerability. Both their designs utilize offset foci and the concept of a segmented reflecting surface.

The instrument proposed here would comprise a paraboloidal dish with fixed altitude supported by an infra-structure that is free to move in azimuth. Railway tracks may provide the azimuth mount; the 250-ft. Mark I reflector at Jodrell Bank is an example of this design³. The rotation of the whole structure through the desired angle accomplishes the steering. The structure behaves like a transit instrument for all sources at the declination which corresponds to the fixed altitude and adjustable azimuth. As usual with transit instruments, no guiding or scanning is possible.

The disadvantage of the instrument, compared with the altitude-steerable transit types which are designed to give horizon to horizon coverage, is that only a limited band of the celestial sphere between two declinations is accessible to observations. The altitude of the paraboloid determines the width of the band, and in general any source that lies within this band can be observed twice every 24 sidereal hours. To achieve complete sky coverage a number of such transit instruments at varying geographical latitudes would have to be erected, the number being determined by the altitude. If the altitude is too small, observations will be made too near the horizon and the height of the instrument may be too great if the diameter is large. If, on the other hand, the altitude is too great, there will be small sky coverage which will necessitate a larger number of instruments. Thus, for example, two azimuth-steerable transit telescopes each with an altitude $\alpha = 45^\circ + e$ ($e \sim 1^\circ$), with a diameter of D ft. and a maximum height $h \sim D \cos \alpha$ ft. situated at geographical latitudes 45° N. and S., would give complete sky coverage plus overlap at the equator with a half-power beam width of $112 \lambda/D$ min of arc at wave-length λ cm.

The number-diameter-altitude-cost-capability relationship of such a design could well be evaluated because of the following desirable features. (1) Greater resolution is achieved by spreading a greater projected surface area of the dish over a larger ground area. The rigidity of the Earth is therefore used to advantage. (2) The elimination of the degree of freedom in altitude simplifies construction problems. (3) The angle between the direction of gravity and any element both of the reflecting surface and the focus mounts will be the same for all positions of the telescope, and thus the structural members will not be

GEOPHYSICS

Susceptibility Anisotropy Measurements on some Silurian Siltstones

ANISOTROPY of magnetic susceptibility, in certain sediments, is probably due to the preferred orientation of elongated magnetic grains. Rees¹ has shown that for varved silt redeposited in the laboratory the direction of the axis of maximum susceptibility is controlled initially by the geomagnetic field and in the final stages of deposition by water current and 'compaction' effects analogous to those which have been shown to affect the direction of remanent magnetization. This work reported here was undertaken to determine whether natural sediments also have an anisotropy which can be related to the direction of paleocurrent flow indicated by geological observations.

Orientated samples were collected from siltstone beds in the Kerry, south-west Clun Forest and Bishop's Castle areas of the Welsh borderland. The siltstone beds are of Lower Ludlovian age, and it has been suggested by Cummins² that they were deposited by turbidity current flows. Evidence of the direction of these currents is provided, at many sites, by sedimentary structures and other forms of lineation occurring at the base of, and within, the siltstone beds. Fourteen samples were collected from such sites, and 45 orientated cylindrical specimens have been obtained from these by coring.

The siltstones have a median diameter of 30-60 μ m and are composed of between 30 and 40 per cent of clastic quartz in a matrix of finely divided sericite and/or calcite. Opaque minerals including magnetite form about 5 per cent of the rock.

For each specimen the directions of the principal axes of susceptibility were determined using a simple torsion magnetometer³. These directions have been plotted on a stereographic net. The maximum and intermediate axes of susceptibility lie nearly in the bedding plane, the minimum axes thus being perpendicular to it. A mean direction of the maximum susceptibility axis was estimated for each sample, from measurements on 3 or more specimens. These mean directions were plotted (Fig. 1) with respect to magnetic north, and were seen to have a considerable scatter. As an alternative, the mean directions were plotted with respect to the known current directions, determined from macroscopic indications, for the individual sampling sites (Fig. 2) and this considerably reduced the scatter. The directions of the mean maximum susceptibility axes appear to be aligned in the current direction and dip into this direction at an angle of about 10° .

Forces acting at the time of deposition control the orientation of the grains. On touch-down on the bed the grains tend to take up a position so as to offer least resistance to the flow. Rusnak⁴ showed, from studies on sand