PHOTOSPHERIC PATHS IN GRANULAR MATERIAL BETWEEN SPOT GROUPS

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On white-light solar photographs of good to excellent quality it has been noticed that between spot groups there is a barely perceptible path. The length of the path may be up to half the solar disk. The path is formed by an ordering of the bright granules and the black intergranular material. The paths are most often ragged and may have several branches which proceed to the other groups even in opposite solar hemispheres. When the photograph is looked at under sufficient magnification to see the individual granules, the build-up of the pattern seems to be chiefly through the joining of the dark intergranular material. The dark material usually runs in a zig-zag fashion and embraces various shades of darkness, but is not always contiguous. There are breaks caused by the bright granular material, but the dark material is filamentary in the general direction of the path.

Too great a magnification loses the pattern and the continuity. The clearest paths are formed by white roads of granules, bordered on both sides by the blacker intergranular matter. The appearance is almost that of scar material along a healed knife wound. There are various other patterns which arise from random configurations or possibly from weak fragmentary magnetic fields, but these patterns are shorter. The paths between spots, with which we are concerned, are formed of slightly brighter granular material and slightly darker intergranular material than at other randomly located places on the Sun.

In an attempt to render the phenomenon less subject to suspicions of illusions, microdensitometer traces were taken across one of the patterns found on the film taken at the height of activity during the International Geophysical Year, 1958 January 4, at 00.18 h. U.T. with the 4-inch (10 cm) refractor of the Manila Observatory in Baguio, Philippines. Figure 1 is an enlargement of a portion of the film mostly in the north-east quadrant. At the top of the photograph is the lead spot of a C-type group at N29 E29 and the bottom of the picture contains most of an E-type group at N15 W07. Scans with a microdensitometer were made across the line joining these two groups at the places shown on figure 2. The direction of the scans was from SE. to NW. and the scans were made in 1 mm steps with a scanning slit 10 microns wide and 1 mm long. The long direction was in the direction of the pattern line. Thus individual solar granules along the length of the pattern were smoothed out, but features across the pattern on the 96 mm photograph of the Sun were resolved. One second of arc is 50 microns on the original photograph. The magnification used with the microdensitometer was $\times 10$. Figure 2 is a tracing made from the enlargement showing the pattern.

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