except by sliding one sheet over the other, when the motion of some of the dots with respect to the others immediately betrays its situation. R. S. CAPON.
Oxford.

MR. M. E. J. GHEURY concludes a note in the issue of NATURE of March 27, relating to the gain of definition obtained by moving a telescope, with the words: "Perhaps some of your readers have noticed something similar and could throw a little light on this mysterious phenomenon."

By a curious coincidence "something similar" did come to my notice just one day previous to my reading of Mr. Gheury's note. I do not propose to throw any light on the question, nor do I wish to imply that there is anything more than an accidental and external similarity between the two cases in question. But it may not be out of place to direct attention to a peculiar observation recorded in *The Mechanic's Magazine* of the year 1829, and rescued from oblivion in a recent number of the German periodical *Prometheus*. The experiment is extremely simple, and can be repeated by anyone with the very simplest materials.

Take a piece of paper of such thickness that when it is laid over a sheet of printed matter the characters just show through but cannot be read. Place this over a page of printed characters, move it about with a circular motion, and you will no doubt be surprised to find that now the print shows through and can be read with comparative ease. It is, of course, necessary to adjust the thickness of the paper and the size of the type, but two or three trials are sufficient to determine the right conditions for the experiment.

ALFRED J. LOTKA.

New York, April 11.

THE NEW SEISMOLOGY.

FOR very many years past in Italy, and to a lesser extent in other countries, earthquakes had been recorded, while a few private individuals collected and analysed earthquake statistics. These, however, were the days of seismoscopes and the old seismology. The new seismology did not come until macroseisms had been measured and teleseisms had been discovered. With their arrival new lines of physical, and particularly geophysical, research were opened for exploitation. Commencing in Japan, the desire to record and discuss the felt and unfelt palpitations of our earth spread like an epidemic round the world. In 1880 the Seismological Society of that country was founded, and the twenty volumes which it issued contain initiatives for very many of the investigations carried out since that date. When this society ceased to exist the Japanese Government established an Earthquake Investigation Committee, which up to date has published more than eighty quarto volumes.

In the early days attention was first directed towards obtaining instruments which would give actual measurements of earthquake motion. Steady-point instruments were devised, and, for earthquakes we feel, are now in use throughout the world. From a knowledge of the actual nature of earthquake motion derived from these instruments, new rules and formulæ for the use of engineers and builders were established. To test

the suggested new departures in building and engineering practice, structures in brick and other materials were fixed upon platforms actuated by powerful machinery and subjected to movements closely corresponding to those of heavy earthquakes. The results of these investigations in Japan and other countries have been extensively applied in the construction of piers for bridges, tall chimneys, walls, ordinary dwellings, embankments, reservoirs, &c. Inasmuch as the new types of structure have for very many years withstood violent shakings, while ordinary types in their neighbourhood have failed, it may be inferred that much has already been accomplished to minimise the loss of life and property.

The application of seismology to the working of railways, particularly in Japan, led to the localisation of faults on lines, and alterations in the balancing of locomotives. The result of the latter has been to decrease the consumption of fuel.

Later, instruments were devised to record earthquake motion which cannot be felt, with the result that a person living in any one part of the world can record and obtain definite information about any *large* earthquake originating even so far off as his antipodes. These records of the unfelt movements of earthquakes have from time to time indicated the position, the time of occurrence, and, what is of more importance, also the cause of certain cable interruptions. The practical importance of this latter information, especially to communities which may by cable failures be suddenly isolated from the rest of the world, is evident.

The many occasions on which earthquake records have furnished definite information respecting disasters which have taken place in distant countries, corrected and extended telegraphic reports relating to the same, is another illustration of the practical utility of seismic observations. Seismograms have frequently apprised us of sea waves and violent earthquakes in districts from which it is impossible to receive telegrams, while the absence of such records has frequently indicated that information in newspapers has been without foundation or at least exaggerated. Localisation of the origin of these world-shaking earthquakes, besides indicating sub-oceanic sites of geological activity, indicates positions where the hydrographer may expect to find unusual depths. They have also shown routes to be avoided by those who lay cables.

Seismograms of unfelt movements throw light upon what have but recently been regarded as unaccountable deflections in the photograms from magnetographs, barographs and other instruments sensible to slight displacements. They have also explained unusual rates in certain time-keepers.

Among the very many scientific results which the new seismology has contributed to science is that it has given us the velocities at which motion is propagated in various directions through the world. Until these observations had been made our knowledge respecting the interior of the earth