

**AN INVESTIGATION INTO THE
ELASTIC CONSTANTS OF ROCKS,
MORE ESPECIALLY WITH
REFERENCE TO CUBIC
COMPRESSIBILITY**

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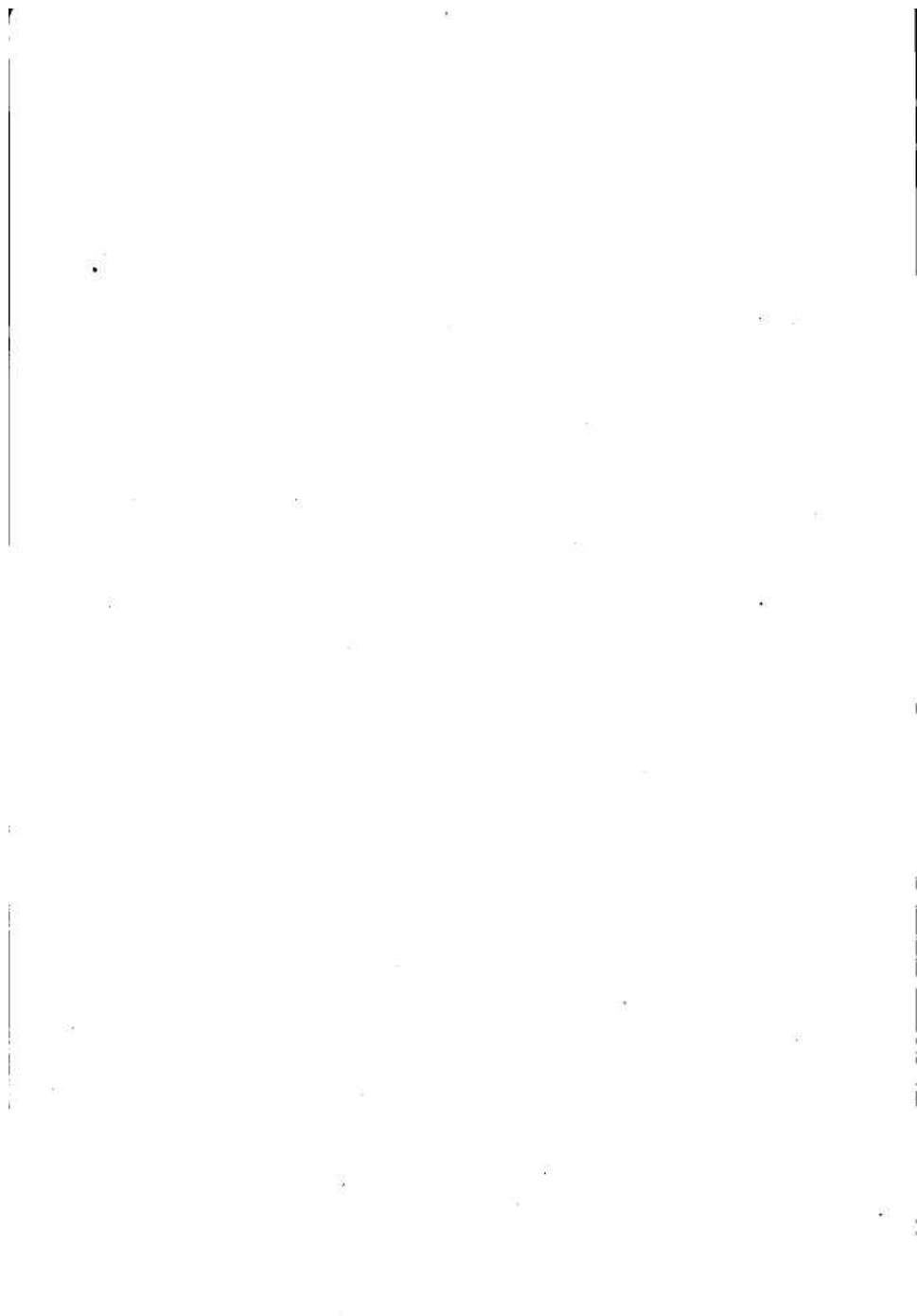
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AN INVESTIGATION INTO THE ELASTIC CONSTANTS OF ROCKS, MORE ESPECIALLY WITH REFERENCE TO CUBIC COMPRESSIBILITY.

INTRODUCTION.

The question as to the amount of cubic compression which rocks may undergo under the stresses to which they are subjected in the earth's crust is one which has a direct bearing on many very important problems in geophysics. It is, however, a subject which has been but little investigated as the experimental difficulties connected with it are very considerable. The importance of a series of determinations of the cubic compressibility of a few typical plutonic igneous rocks was some time since impressed upon the authors by Mr. G. K. Gilbert, with a request that if possible they should make such determinations in connection with the researches on rock deformation which are now being carried out at McGill University under the auspices of the Carnegie Institution of Washington. An examination of all the direct methods proposed or adopted for the measurement of the cubic compressibility of solids showed that none of these could be satisfactorily applied to such materials as rocks, but the indirect methods based on Hook's law and which have been applied to metals and other compact isotropic bodies having an approximately perfect elasticity promised to give satisfactory results if applied to certain rocks, more especially to the class of rocks referred to above, viz, the acid and basic plutonic rocks, which form the greater part at least of the outer portions of the earth's crust. The present paper sets forth the methods adopted and the results obtained.

The work which was carried out in the laboratories of McGill University was commenced by the authors whose names appear on the title page, and was carried well towards completion when Dr. Coker was called to take the professorship of mechanical engineering in the Finsbury Technical Institute of London, England. He was accordingly obliged to give up the work of the research and his place was taken by Mr. Charles McKergow, lecturer in mechanical engineering in McGill University, but who immediately on the completion of the work was appointed to the professorship in mechanical engineering in the University of Virginia. A large number of the very careful measurements of elastic constants which are given in the paper were made by the latter gentleman.