

effected. One is the sudden irruption of a species, when it suddenly appears in numbers in a territory where it had been either extremely rare, or entirely absent. Examples of this are to be seen in the sudden occurrence of the Sand Grouse in Europe in 1888; the appearance of great flocks of Brünnich's Murre on Lakes Ontario and Erie, 1894-97, and the great movements occasionally noted in Lemmings. Of the underlying causes of these strange migrations, whether they are due to inner psychological or outer physical phenomena, we are ignorant. These strange overflows seem so erratic and abnormal in the light that invasions of this kind do not succeed in forming permanent settlements on the new grounds, that it would be reckless at present, to use them as a basis for theorizing, until all other means fail.

The second method is by a force exerted from within an established range; and the third, an attractive one acting from without. These two, however antagonistic as they may superficially seem, are, at root, one and the same. They are both caused by differences in the desirability of two stations. One is caused by a decrease in the desirability of a present, and the other by an increase of the same quality in an adjoining territory. They are but ratios of desirability, and can both be expressed by fractions whose values depend upon the relative, not the numerical size of their terms. If, then, attraction is but a phase of driving, and birds cannot be driven from their haunts, we are forced to discard all our present theories of geographical distribution and return to that of special creation, or found our science upon the unknown quantities of general irruption probably caused by psychological disturbances of whose origin and intent we are ignorant.

Ranges can be, have been, and in the course of time, must many times have been, changed by necessity when the changes in conditions occur slowly enough so that, though individuals may not, the whole species might have advanced or retreated. In this same manner, we know that even our forests have migrated back and forth across the continent before the face of the glacial ice, climbed mountains and descended valleys, though each individual tree or plant remained rooted for life to the spot where it originally sprouted. If plants can and have done this, I see no reason why birds could not also, as even the most extreme case of local