In an elaborate report to the Local Government Board for England upon the causation of the annual mortality from "diarrhoea," which is observed principally in the summer season of the year, the late Dr. Edward Ballard in 1887 advanced the proposition that the temperature of the soil is a far more effective element in raising the death-rate from diarrhoeal diseases than any other meteorological factor. He constructed for London and many other towns in the kingdom a large number of charts showing week by week for many years the earth-temperature at a depth of 1 foot from the surface and at a depth of 4 feet also, each chart showing in addition the diarrhoeal mortality of the corresponding weeks. The general result shown by these charts is as follows:

(a.) The summer rise of diarrhoeal mortality does not commence until the mean temperature recorded by the 4-foot earth thermometer has attained somewhere about 56° F., no matter what may have been the temperature previously attained by the atmosphere or recorded by the 1-foot earth thermometer.

(b.) The maximal diarrhoeal mortality of the year is usually observed in the week in which the temperature recorded by the 4-foot earth thermometer attains its mean weekly maximum.

(c.) The decline of the diarrhoeal mortality coincides with the decline of the temperature recorded by the 4-foot earth thermometer, which temperature declines very much more slowly than the atmospheric temperature, or than that recorded by the 1-foot earth ther-

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*a Read before the Section of State Medicine in the Royal Academy of Medicine in Ireland, on Friday, February 10, 1905. [For discussion on this paper see page 302.]

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The epidemic mortality may in consequence continue (although declining) long after the last-mentioned temperatures have fallen greatly, and may extend some way into the fourth quarter of the year.

(d.) The atmospheric temperature and that of the more superficial layers of the soil exert little, if any, influence on the prevalence of diarrheaea until the temperature recorded by the 4-foot earth thermometer has risen to 56° F. Then their influence is apparent, but it is a subsidiary one, notwithstanding the statement made by Dr. August Hirsch that the summer diarrheaea of children makes its appearance as an epidemic only in those districts whose average temperature for the day in the warm season is rather more than 15°C. (59° F.).

Dr. Ballard believed that a working hypothesis, or provisional explanation, that would best accord with the whole evidence then in his possession bearing on the production of epidemic diarrheaea, may be stated as follows:—

1. The essential cause of diarrheaea resides ordinarily in the superficial layers of the earth, where it is intimately associated with the life processes of some micro-organism not yet detected, captured, or isolated.

2. The vital manifestations of such organism are dependent, among other things, perhaps principally, upon conditions of season and on the presence of dead organic matter which is its pabulum.

3. On occasion, such micro-organism is capable of getting abroad from its primary habitat, the earth, and having become air-borne obtains opportunity for fastening on non-living organic material, and of using such organic material both as nidus and as pabulum in undergoing various phases of its life-history.

4. In food, inside of as well as outside of the human body, such micro-organism finds, especially at certain seasons, nidus and pabulum convenient for its development, multiplication, or evolution.

5. From food, as also from the contained organic matter of particular soils, such micro-organism can manufacture, by the chemical changes wrought therein