The coming into being of organo-metallic and organic associations brought with it differences not only in composition but also in constitution resulting ultimately in the separation of optically active isomers by a process of gradual elimination.[4] The arboreal growth, retaining certain basic features of form inherent in their structural mineral radicles or groups, lost its arbitrary direction and became definitely orientated in accordance with the predominating stereo-isomeric form of its constituents.

The alteration in the direction of twist with age, recorded by several observers, is not really surprising. The great enzymatic transformation during embryonic development, ripening of fruit, as well as the intimate connection existing between enzymes and the cell nucleus—naturally involve a radical change in all plant constituents, which may of course be followed by a corresponding reversal of the helix.

Thus we find that the cause of the general twisting of trees is two-fold—internal and external. The internal factor is found in the specific character of the plant constituents (fusion products of heredity and environment) which determine the type of capillary spiral movement of its fluid nutrients and fibrillar depositions operating on the general principles of periodicity. In the case of young non-rigid plants these internal influences are enhanced or retarded (as the case may be) by light tropism and prevailing air currents. The systematic effect of these contributing external causes is however reduced to a minimum in old rigid formations.

Here, temperature, pressure, winds, sunlight as well as various parasitic and toxic influences may affect stature and produce structural abnormalities but do not participate in the evolution of the regular twisting in trees.

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CHLORPICRIN INJURIOUS TO GREENHOUSE PLANTS

IN view of the promising indications for chlorpicrin as a soil fumigant for nematode control, reported elsewhere,[1] recent evidence of the capacity of small concentrations of this gas in the air to injure greenhouse plants may be of special interest to investigators.

In an experimental fumigation of a plant bed just outside one of the Plant Pathology greenhouses at the University of California, Berkeley, California, some of the gas escaping from the soil found its way into the house and caused severe injury to tobacco, strawberry, coleus and other plants. The actual concentration of the gas as it became diffused into the greenhouse atmosphere was very low, probably not greater than 20 parts per million. It was detectable by a smarting of the eyes but not by odor. Details of the arrangement of the fumigated plot with relation to the greenhouse, together with illustrations and descriptions of the signs of injury produced upon the plants, will be presented in another paper, probably in *Phytopathology*. This preliminary statement is made as a warning to other investigators who may be contemplating making applications of chlorpicrin to greenhouse soils to control nematodes. If applications are made in benches or beds inside the house with growing plants elsewhere in the house, such plants may become severely injured from the escaping gas, even though they may be some distance away from the site of fumigation.

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THE ANNIVERSARY OF THE NORMAL CURVE

THE two hundredth anniversary of the discovery of the normal probability curve falls this year. It is interesting to note that the discovery of the curve was made by a man whose name is seldom, if ever, attached to it. It is also significant that the discoverer thought that his contribution was to pure or abstract mathematics and that the most practical use that could ever be made of his discovery was in connection with games of chance.

The man was DeMoivre. He published his findings on November 12, 1733. Since that time such wide use has been made of the curve that the above date becomes a landmark of considerable importance, especially in the social sciences.

In a recent book on the history of statistics[1] the following treatment of the event is found:

> The intensive study which DeMoivre gave to this work, together with his applications of the binomial theorem, led him a few years later—probably about 1721—to discover a formula for the ratio between the middle term and the sum of all the terms of $(1-1)^n$, and thus become the discoverer of the normal curve. Many of the recent treatises on probability and sampling approach the matter by a method quite similar to DeMoivre's use of the binomial expansion.
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> This formula, first published November 12, 1733, is the *fons et origo* of the normal curve. In 1730 DeMoivre had brought out his *Miscellanea Analytica* and

[4] Mills, Brit. Assoc. Adv. Science, York meeting, 1932.

[1] M. O. Johnson and G. H. Godfrey, "Chloropicrin for Nematode Control." *Indust. and Eng. Chem.*, 24: 311–313. 1932. Other papers on this subject have been submitted for publication.

[1] Helen M. Walker, "Studies in the History of Statistical Method," pp. 13–14. Williams and Wilkins: Baltimore, 1929.