Introduction

In the history of science there is a record of some of the great achievements of its pioneers. We mention, among others, the invention of analytic geometry by Rene Descartes, the calculus by Newton and Leibnitz, non-Euclidian geometry by Lobachevski, and quantum and wave mechanics by Heisenberg and Schroedinger. In the invention of projective geometry we may mention, among others, Desargues, Poncelet, Gergonne, and Mobius. Of the geometries mentioned projective is perhaps the most general. In connection with the invention of projective geometry there are many othere whose contributions entitle them to be included here but lack of space precludes it. Mankind is grateful for their contributions.

Each of these disciplines has a vocabulary and set of operating symbols appropriate for its propogation. Their mode of operation may seem strange and meaningless to the initiate. One may have to learn a new language to follow their message.

We ought to be able to improve on their creations and even make some original ones of our own since we have been heir to all the accumulated knowledgee of so many generations.

At this time we should like to introduce the reader to a new type of mathematics which we have called Mutation Geometry. The word mutation here is to mean intangible change. This type of change is implemented by a single postulate called alpha and a mutation diagram.

In this geometry there are two types of products, the alpha type and the omega type. The alpha type is of the form a . b. The omega type is of the form c . d e . f. The problems of the geometric world are divided into two categories, the alpha and the omega categories. Those that are associated with the alpha products are in the alpha category and those that are associated with the omega products are in the omega category.

Mutation Geometry operates from a single proposition of Mutation called omega. It splinters or disassociates omega type products into a sum of alpha type products. We now state the alpha postulate: The alpha and omega products are required to be tempo-locally invariant, time and locale having nothing to do with their value. These products may be shifted mentally (intangible change) from hither to yon without changing their value.

When the omega proposition is applied to a sum of omega products the fragmented alpha products are assembled, mentally herded (intangible change) into a single composite primordial alpha prototype product. This mental herding of the alphas, dispersed in the splintering, is implemented in a mutation diagram.

In the text it is shown how to solve a single alpha prototype both mechanically and analytically. If the omega proposition reduces omega type products to alpha type products and we can solve the alphas then, at least in principle, we can solve the problems of the geometric world.

It is literally impossible to over-emphasize the importance of the notion of Intangible Change . It is the cardinal principle of the new science of Mutation Geometry.

The same proceedure is applied whether one is dealing with college, analytic, or projective geometry. It would thus appear that Mutation Geometry is a truly pangeometry.

In Mutation Geometry one does not rotate axes to simplify the equation of a conic

$$(1) \qquad A x^2 + B x y + C y^2 = D x + E y + F.$$

One may either deal with the conic and its properties in respect to its original axes or a set of axes thru its center. In no case does one need to rotate axes. It offers several alternatives as may be seen in the text. As an example for central conics it easily calculates the Primal State numbers P and p and a transmute number T and writes the simplified equation:

$$(2) \qquad P x^2 \pm p y^2 = T$$

The eccentricity is given by

$$(3) \qquad e^2 = 1 - P/p$$

If one multiplies equation (1) by $2 P^{-1}$ getting the Primal State equation

$$(4) \qquad a x^2 + b x y + c y^2 = d x + e y + f$$

it is shown in the text that the eccentricity is given by

$$e^2 = 2 - a - c.$$

These expressions are unique with the new science of Mutation Geometry. It is also shown in the text how to easily calculate from the Primal State equation (4) the coordinates of the center, foci, vertices and other properties of the conic in respect to the original axes. One can do it practically at sight.

In this geometry there is no place nor necessity for sequence or logical order since all operations are due to a single postulate and a single proposition. This gives an enormous advantage over conventional geometry.

In the text we have generalized the more important theorems that were worth while in college geometry and likewise have done the essentials of synthetic projective geometry without us ing a projective formalism or any of the standard theorems of Desargues, Pascal, Brianchon, etc. We used only the alpha postulate and the omega proposition.

We trust that this introduction will open the gates to wide vistas of new horisons and that many pleasant surprises will await each student of the rising generations as he treks along its inviting pages.

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