PART I -

Return To On Knots

§1- The Place of the Subject

Since Galileo, the *Book of Nature* has been written in a geometrical language. The apparent polarity of Tait's *Oeuvre*, a whole that belongs in part to a tradition of physics (from Descartes to String Theory) and in part to a tradition of mathematics (from Gauss to modern knot theory), has inevitably led to a division of labor among the interpreters of *On Knots*. This specialization has often prevented a more delicate polarity from being investigated: that which juxtaposes a *place of the subject* to an *object*. As overtly a piece of mathematical and physical writing that *On Knots* is, it has primarily interested mathematicians and physicists. This is particularly true of the first thirty one pages of *Part I* (1876-77) of *On Knots* as the problems found therein do not confront the scientific researchers with the same difficulties that the remaining seventy pages do, sections in which it is not easy to overlook the subjective and conjectural dimension entirely. Indeed, it would take some degree of bad faith to reduce *On Knots* to simply a work in mathematics and physics without considering why a corresponding subjective dimension appears with remarkable persistence[1].

Sections I & *II* of *Part I* in *On Knots* are dedicated to the classification and enumeration of the forms of knots and it is largely within these sections that the contemporary theory of knots has succeeded in resolving some of Tait's initial conjectures. Another history begins, however, in *Section III – Reduction* & *Section IV– Beknottedness –*

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[1] See Appendix I

where the identity and existence of the knot is posed within Tait's knot theory as such. Although the existence of this object never coincides with an atom or a hypothesis of physics, it is never demonstrated as having a purely mathematical existence either. On the contrary, it is recognizable through a series of hesitations, false starts, and inconsistencies that any careful reader of the text will notice[2]. If the first quarter of *On Knots* can be accounted for by the classical interaction of *physics* and *mathematics*, the remaining three quarters have yet to receive a concentrated investigation. What is the cause of this lack of attention?

If one follows the consensus of the mathematical community, it seems to consist in avoiding a primitive or experimental character of *On Knots* that does not transpose into the abstract and modern mathematical methods. The contemporary French mathematician Pierre La Harpe sums up the problem as follows:

> From 1867, the Scottish physicist Peter Guthrie Tait had begun to tabulate knots; but there is no topology in the work of Tait; and thus, no group of the knot. The theory of knots also intervenes in the study of singularities isolated in the complex functions of two variables such as that which appeared in the limited diffusion in 1905 of the work of Wirtinger. For this reason, it is only later that theory of knots becomes 'respectable', when the work of Wirtinger was returned to by Brauner (in his 1928 doctoral thesis under the supervision of Wirtinger). [my translation][3]

In our return to Tait the lack of topology and 'unrespectable' aspect of *On Knots* will not be excluded, transposed, or used as a historical background by which to recount the autonomous formation of a formal knot theory, but will be used to slow things down in a re-

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[2] See Appendix I & II

[3] Des 1867, le physicien ´ecossais Peter Guthrie Tait avait commenc´e `a dresser des tables de noeuds ; mais il n'y a pas de topologie dans les travaux de Tait, et a fortiori pas de groupes de noeuds. La th´eorie des noeuds intervient aussi dans l'´etude des singularit´es isol´ees des fonctions de deux variables complexes, comme cela est apparu vers 1905 dans les recherches de Wirtinger ; celles-ci n'eurent qu'une diffusion limit´ee `a l'´epoque. Ce n'est que bien plus tard que la th´eorie des noeuds devint "respectable" pour cette raison, lorsque les recherches de Wirtinger furent reprises par Brauner (dans son habilitation de 1928 sous la supervision de Wirtinger), K¨ahler, Zariski et Burau ; voir [Eppl–95], d´ej`a cit´e, ou les pages 318-320 de [Eppl–99a]. Ce lien entre noeuds et singularit´es ne semble pas avoir jou´e de rˆole dans les motivations de Dehn. *Topologie, Theorie des Groupes et Problemes De Decision – Celebration D'un Article De Maxc Dehn De 1910.*

examination of knot theory since Tait. In this respect, we are not so much proposing a return to Tait in the tradition of knot theory, but to read modern knot theory with Tait. Can we be sure that the remarkable achievements of the second generation of group-theorists (Wirtinger, Dehn, Seiffert, Alexander) and third generation of the recent polynomial-theorists (Jones, Kauffmann, HOMFLY, Vassiliev, etc.) that go beyond Tait have not also trivialized a more delicate theory of *On Knots*?

To respond to this question, we will return to those points found in *On Knots* that do not transpose into the modern mathematical theories. Thus, we do not propose to return to *On Knots* as a historical document, but to excavate a site for the return of a set of problems that were first isolated by Tait that have never been resolved and have subsequently fallen into modern oblivion. Indeed, the *primitiveness* of *On Knots* acquires a particular significance once the *place of the subject* and an *object* of knot theory are made relevant. We will call such a reading *symptomatic*, in both the psychoanalytic and geometrical tradition.

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