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"INTERMEDIATE MATTER": CONJECTURES ON IMPONDEROUS MATTER AS INDUCED BY KEY CONCEPTS OF SYMMETRY; MATTER AS FIELD - FIELDS AS MATTER II

PETER KLEIN

Name: Peter Klein, Prof. Dr. phil. Dipl. Phys. Physicist, Educator (b. Breslau / Germany, 1940)
Address: Universität Hamburg, Faculty of Education, von-Melle-Park 8, D-20146 Hamburg
Priv. address: Babendiekstr. 13, D-22587 Hamburg, Tel. +49-(0)40-862266
Email: klein@erzwiss.uni-hamburg.de
Fields of interest: Philosophy, Physics, Education

Abstract: *Long time there are unanswered questions about the interference between matter and mind. How can we step over the "materialistic monism"? What can be the bridge between the impenetrable and heavy matter and the field of life and mind? How can we explain the interference between matter and mind? Energy became the crucial point in concepts between forces and matter. In the course of the growing importance of fields of force compared with classical matter, the importance of ether also grew, so that in the 2nd half of 19th ct. both were equivalent in intensity and extension, as a recently detected early manuscript of Hertz ("die constitution der materie") indicates.*

4 INTERMEDIATE MATTER AS FIELDS OF FORCE: "ETHER"

Energy was to become the crucial point in concepts about the relation between forces and matter. Before, however, what happened in the meantime with "matter"?

The mechanistic tradition in fact survived in that way that the new dynamical effects demanded mechanistic explanation. This caused difficulties in so far as the impact of these forces reached into far distances, and the merely verbal explanation of "instantanious" "far distance" effect was no longer convincing. Instead specific kinds of "imponderous matter" were postulated, which were gradually united in the course of the unification of the different forces. Finally, when only one kind of forces remained (namely the electrodynamical, after the last differing, light, had been (though with incorrect arguments) incorporated by Faraday, Maxwell and Heinrich Hertz), there remained need to postulate only one kind of imponderous matter as the transporter of electrodynamical force into far distances, a universally spread fine substance called "ether".
Now, in the course of the growing importance of fields of force compared with classical

matter, the importance of ether also grew, so that in the 2nd half of 19th ct. both were equivalent in intensity and extension, as a recently detected early manuscript of Hertz ("Die Constitution der Materie") indicates.

Today, we use to demonstrate the insuitability of the ether concept by the listing the absurd qualities we must attribute to ether as a solid body ofextreme elastic density (as a medium suitable to transport the transversal el.magn. waves with light velocity). The arguments of Hertz, however, were much more subtle: Instead of fighting with exotic features of the solid state, he confines himself to analyse only qualities that would be specific for Maxwell´s theory as such: he merely examines the adequate states of polarisation of space, completed by a symmetrical reformulation of Maxwells equations and the harsh axiom, that ""Maxwells Theory" is simply identical with the system of Maxwells equations", whereas all speaking about ether as a mediating substance is just a "fancy dress", serving human weekness that likes intellectual comfort by illustrations he is accustomed to. Thus already in 1891 Hertz comes to the conclusion to expel the whole ether concept as "unnecessary" at all.

So not Einstein in 1905 made that step first! On the contrary, Hertz´ considerations on the process of physical measurements in the "Prinzipien der Mechanik" (1994) (which Einstein continued and completed in the "Special Theory of Relativity" (1905)) made Einstein to re-introduce in a certain respect the old Ether-concept (by the General Theory of Relativity), when he again attributes physical qualities to empty space, insofar the distribution of gravitating matter in space determines its metric structure (cf. Einstein; Äther und Relativitätstheorie; Leiden 1920).

5 MATTER AS FIELD; FIELDS AS MATTER

But what does it mean still to speak about matter, when one keeps in mind that in the course of modern atomic physics matter in the classical sense does no longer exist. In fact, in contemporary physics those bold, massive portions of unpenetrable bodies have been changed into centers of fields of force, as concrete results of the hierarchically ordered interaction of four basic forces, and their resp. grades of resistance against penetration have been precisely quantified. The universe now appears as an accumulation of "Matter as a Field" (F.Hund).

What still remains, however, is the second classical indication of matter, „gravity", and it appears as a twosided medal:

a) To the one side: It was again Einstein in his annus mirabilis 1905, who now re-installed the traditional notions about material qualities even for the atomic fields,

- in a first sense by attributing universal gravity even to such a spurious and artificial (i.e. not directly sensually conceivable) magnitude like „energy" through his famous E = m x c2.

- and in a second by the quantization of the fields themselves, esp.the electrodynamical (photons), and even of only geometrically defined states of disturbance in particle systems,

namely those (only virtual) “quasi-particles” like phonons, exitons asf.

b) That any fields can be identified with the most characteristic classical defining quality of matter, gravity, and that they interact via “gravitons”, remains the (last?) unsolved problem in particle physics, which is expected to be solved in the “Great Unification of Interactions”, the “Theory of Everything”.

6 MONISTIC MIND: EMERGENCE INSTEAD OF “INTERMEDIATE MATTER”

Finally let us return to Humboldts categorization of the mind as belonging to a substancially different category than matter. Traditionally, to accept this view would mean to return to a dualistic ontology by introducing the mind as a second autonomous substance, with all Schillers problems behind. Indeed a strong tendency towards such self-understanding can be stated for contemporary neuroscience. On the other hand, “classical” empiricists, who accept only that one substance based on physical causality, and who confine themselves to explain natural phenomena only by using the hierarchy of ontological levels that can be derived via continuously extended physical laws (“physicalism”), miss the problem from the opposite side.

Let us illustrate this by looking on the arguments meant to solve what seems to be a contradictory concept of “time”, namely that time is perceived as asymmetrical in our conscious experience, but is a symmetrical magnitude in physics. This contradiction is usually “solved” by the statistical interpretation of the second thermodynamical law that states the directed time for all natural events as caused by the necessary growth of entropy, which, to its side, is said to be a result of the statistical disorder of particles, thus of growing disorder in the universe as a whole. This final result, however, is in striking contrast to at least two processes of internally caused growing order, the natural order of crystals, and the evolution of matter to generate life, finally even rationally behaving creatures. I will not discuss the false arguments to unify these disparate tendencies (mainly caused by the lack of clear distinction between free and bound particles). Instead, I would suggest a different argument: namely to distinguish simply between different fields of validity for two different meanings of “time”:

- “time” as a physical magnitude, symmetrical in classical mechanics, and conceptually extended by the Theory of Relativity, and

- “time” in the sense of Aristotle: as a parameter of experience in animals, a mental structure “a priori”, meant to perceive events in a serial order by an innate direction of sensual perception, created in evolution in accordance to the structure of the world outside, thus enabling a successfull life.

This evolution happened – as we may generalize the argument - as a process of selforganisation of matter, that creates new systems´ qualities by innate emergence under the conditions of variation and selection (plus some billion years of time). This emergence needs no further metaphysical principle, but gains its justification and explanative power

by the empirically verified principle of evolutionary continuity, that can be demonstrated, at least re-constructed, at any level of evolutionary development.

Alexander von Humboldt's Latin-American expedition

With Aimé Boupland, a botanist, Humboldt spent 5 years traveling in South America and Mexico, with visits to Cuba and finally to the United States, returning home in August 1804. The achievement was magnificent, for it included new material on volcanoes and on the structure of the Andes, with a vast array of data on climate and on plant geography. The Personal Narrative of this expedition was published in French in 1814-1819, and an English translation appeared in 1825; among its admiring readers was Charles Darwin. Humboldt was a splendid scientific observer. He saw that excessive tree felling could be followed by soil erosion, eagerly noted the relics of the Inca and Aztec civilizations, and in France carefully worked out the climatic conditions under which vines could be grown.

Armed with powerful recommendations, they sailed in the Pizarro from A Coruna, on June 5, 1799, stopped six days at Tenerife for the ascent of the Peak, and landed, on July 16, at Cumaná, Venezuela. He visited the mission at Caripe where he found the oil-bird, which he was to make known to science as Steatornis caripensis. Returning to Cumaná, Humboldt observed, on the night of the 11-12th of November, a remarkable meteor shower (the Leonids) which forms the starting-point of our acquaintance with the periodicity of the phenomenon. He proceeded with Bonpland to Caracas; and in February 1800 he left the coast for the purpose of exploring the course of the Orinoco River. This trip, which lasted four months, and covered 1725 miles of wild and uninhabited country, had the important result of establishing the existence of a communication between the water-systems of the Orinoco and Amazon River, and of determining the exact position of the bifurcation. Electric eels were captured by von Humboldt (with Bonpland) around March 19, 1800. The researchers received massive electric shocks during their investigations.

On November 24, the two friends set sail for Cuba, and after a stay of some months regained the mainland at Cartagena. Ascending the swollen stream of the Magdalena, and crossing the frozen ridges of the Cordillera Real, they reached Quito after a tedious and difficult journey on January 6, 1802. Their stay there was marked by the ascent of Pichincha and Chimborazo. Humboldt and his party reached an altitude of 19,286 feet, a world record at the time. The journey concluded with an expedition to the sources of the Amazon en route for Lima. At Callao, Humboldt observed the transit of Mercury on November 9, and studied the fertilizing properties of guano, the introduction of which into Europe was mainly due to his writings. A tempestuous sea-voyage brought them to Mexico, where they resided for a year traveling to different cities, followed by a short visit to the United States of America, they set sail for Europe from the mouth of the Delaware, and landed at Bordeaux on August 3, 1804.