the case. But such an inference goes too fast.

2. The behavior of certain groups, even when viewed phenomenally, in abstraction from their realities, as natural science views them, is different from the behavior of the aggregate of their components ungrouped; and the behavior of the components grouped is different from their behavior ungrouped; different as regards the scientific laws they observe. The proper number of electrons act differently, individually and collectively, before and after being grouped into an atom of helium. And so with the atoms that form molecules; the molecules that form cells; the cells that form organisms; the organisms that form crowds or societies.

Here, as I see it, emerges the question of the acceptance or rejection of vitalism, *as a factor in natural scientific explanation*—1, above, shows we must accept it as a fact. If it can be successfully maintained that a *full* knowledge of the *perceptual behavior* of electrons, atoms and molecules, before they are grouped and regrouped into cells and organisms, will enable us to predict their behavior, and the behavior of the cells and organisms they form, after the grouping and regrouping, then vitalism is not needed for natural scientific explanation. If not, non-perceptual realities being existent, potent and observable, in the case of conscious beings, they, and therefore vitalism, must be availed of to eke out our otherwise incomplete explanations. Of course, our present knowledge does not permit such predictions, and therefore ordinary intercourse, the social sciences, and psychology, are *per force* vitalistic in explanation, for the present at least. But the antivitalists maintain that full prediction will come some day, and that meantime we should not be scientifically—I should say natural scientifically; psychology at least is a science—satisfied till it does; while the vitalists believe our knowledge of outer perceptual happenings never will permit full prediction, though it probably will approximate more and more closely to doing so.

Whichever side is right, two facts should not be forgotten. (1) Though living cells and organisms act according to the chemical and physical laws observed by electrons, atoms and molecules in their simpler groupings, they also, *and in addition,* behave after the higher vital fashion; *i. e.,* intelligently and any explanation offered by natural science that pretends to explain intelligence *away* is incorrect or incomplete, because false to the facts it is bound to respect. (2) The *real agents,* whose activities the sciences of nature, among others, are called upon to describe and explain, are, in the case of us men, the Egos of which we are severally confusedly conscious.

In sum, then, natural scientists, as such, must deny vitalism, in order to achieve the maximum of explanation in quantitative and phenomenalistic terms; but practical and philosophic men, viewing their problem entire, and engaged in the larger game of living, must recognize and reckon with the effective reality of the human (and animal) Ego.

I ask indulgence for the dogmatic tone, assumed in the interest of terseness; it conceals not a few modesties.

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THE ANIMAL DIET OF EARLY MAN

It may be the merest speculation to say what early man did or did not eat, but, there appears to be rather strong zoological evidence that man and his ancestors have long indulged in three forms of animal food which to-day are commonly found in markets. The perfect adaptation to their definitive and intermediate hosts and the rather high degree of differentiation of the three large tapeworm parasites of man must impress itself upon every one who gives the matter consideration and yet it is a point which I have not seen mentioned in the books on animal parasites with which I am familiar.

The tapeworms referred to are the beef tapeworm, *Tænia saginata;* the pork tapeworm, *Tænia solium,* and the fish tapeworm, *Dibothriocephalus latus.* The definitive host of the two tænias is man, and I believe man alone. The intermediate host of *Tænia saginata* is *Bos taurus.* The common intermediate host of *Tænia solium* is the pig, *Sus scrofa,* less

commonly man himself, very rarely other animals. Both these tapeworms are rather highly specialized and do not appear to be readily adaptable to other hosts. The conclusion seems clear that man has been eating cattle and pigs or their immediate ancestors, and perhaps himself, for as many ages as needed for these tapeworms to attain their present degree of differentiation. We have no evidence that species of any kind are rapidly produced, and the parasites have probably had as slow an evolution as man himself. The fish tapeworm has other definitive hosts than man, notably the dog and the evidence is not conclusive that early man was piscivorous. The ease, however, with which man becomes infested with this parasite might indicate that he had eaten uncooked fish for a long period.

The adaptability of trichina, *Trichinella spiralis,* for man and pigs is rather significant in this connection, but trichina seems to thrive so easily in almost any mammalian host that not much weight can be attached to that parasite as indicating a pork diet for early man.

The idea of the concomitant evolution of these human parasites, of man, and of the animals serving as food for him and intermediate hosts for the parasites has interested me for some time. It has recently been brought to the foreground by Gregory's "Studies on the Evolution of the Primates"[1] in which he so graphically describes (pp. 342–344) the evolution of human food habits. On different grounds from parasitology Gregory concludes that the wild boar was "one of the first medium-sized animals that the nascent Hominidæ would be successful in killing." The only other animal mentioned by him as probable food of early man is the horse. Our knowledge of the beef tapeworm seems to indicate that *Bos taurus* or its progenitors were eaten as well as early horses. There is nothing to show that horses were not eaten, unless the rather widespread abhorence of eating horseflesh at the present time can be construed that man never adapted himself to that diet as he did to beef.

[1] *Bull. Amer. Mus. Nat. Hist.*, Vol. 35, pp. 239–355, June 16, 1916.

It is not beyond possibility that the acquirement of a meat diet by the vegetarian pre-men may by improvement of nutrition, by shortening of digestive processes, and by stimulating properties of proteins and their split-products have played an important part in man's evolution over his vegetarian competitors.

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SCIENTIFIC BOOKS

Napier Tercentenary Memorial Volume. Edited by CARGILL GILSTON KNOTT. Published for the Royal Society of Edinburgh by Longmans, Green and Company. London, 1915. Pp. xii + 422. Price, $7.00.

The International Congress which met at Edinburgh from Friday, July 24, to Monday, July 27, 1914, to commemorate the tercentenary of the publication of John Napier's "Mirifici Logarithmorum Canonis Descriptio" was the last great international assembly of scientists before the Great War. Appreciations of English scientists and congratulatory addresses by German scientists and German universities, in honor of an Englishman, will probably not soon be seen again.

The variety of interests touched by such an invention as logarithms, in its developments, is so well illustrated by the papers of this memorial volume that it seems desirable to present the list.

"The Invention of Logarithms," by Lord Moulton, president of the congress.

"John Napier of Merchiston," by Professor P. Hume Brown, University of Edinburgh.

"Merchiston Castle," by George Smith, master of Dulwich College, formerly headmaster of Merchiston Castle School.

"Logarithms and Computation," by J. W. L. Glaisher, Trinity College, Cambridge.

"The Law of Exponents in the Works of the Sixteenth Century," by Professor David Eugene Smith, Columbia University.

"Algebra in Napier's Day and Alleged Prior Inventions of Logarithms," by Professor Florian Cajori, Colorado College.

"Napier's Logarithms and the Change to Brigg's Logarithms," by Professor George A. Gibson, University of Glasgow.