pointed toward in this note. But if my view about the quantity-quality continuum is correct, that of itself disposes of the conclusion.

The sum and substance of my criticism is that Mrs. Gaskell's argument is a garment beautifully woven and patterned from ultra-modern materials (atomic physics) and draped upon a manikin of supernaturalism that is at least as old as the Pythagorean mysteries. Nor is there difficulty about so classifying this manikin as to bring out its kinship with others much more recent and, to biologists, much more familiar than its Pythagorean prototype. It will suffice to mention the Pangens of Darwin and the Determinants of Weismann. For these, each in its day, illumined the whole biological sky from horizon to zenith. Any biologist of forty years' standing will be able to enlarge the class to his heart's content.

Or if one's predilections whet his curiosity more toward the physical than the biological descendants of the Pythagorean system and precursors of Gaskellean system, the monads of Leibnitz modernized from those of Bruno should satisfy that curiosity. In fact the peculiar interiorness, so to speak, of Mrs. Gaskell's new unit is strangely reminiscent of Leibnitz's monad as a "purely internal principle." Mrs. Gaskell tells us, it should be noted, that the only space available for the new unit is "intraatomic space."[5]

There are two possibilities of real benefit from studying the ancestral line of units of this kind. One is in the chance afforded for seeing the particular ways in which the principle of quality-quantity can be violated. The other is in illustrations they furnish of the statement previously made that the super- or extra-natural can manifest itself in almost as great variety as the natural.

As I see the new theory it is only one more illustration of the self-defeat to which the imperialistic claims of atomism are bound to lead if pushed into the realm of mental life. And perhaps in this as in so many other situations self-defeat is the most effective kind of defeat and hence in a sense the surest promoter of truth.

Should the book before us contribute even in this negative way to the deliverance of mankind from bondage to all forms of supernaturalism, it would have rendered a great service. For all aspects of man's spiritual life—those to which are due his science, his philosophy, his ethics, his art, his religion, and all the rest—are subject in greater or lesser measure to this bondage.

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[5] p. 128.

HERMAPHRODITISM IN ARBACIA

HERMAPHRODITIC sea-urchins are rare. One has been reported from Africa; two from Europe. That is all, or at any rate all I have been able to find in a hasty search of the literature.

Viguier in 1900[1] makes brief mention of a hermaphroditic specimen of *Sphaerechinus granularis* collected at Algiers. He gives no details. Herlant, 1918,[2] describes a *Paracentrotus lividus* from Villefranche with three large testes, one atrophied testis and one mixed gonad. Drzewina and Bohn, 1924,[3] report a *Strongylocentrotus* (=*Paracentrotus*) *lividus* with four ovaries and one testis. This was taken at Roscoff. In all three of the above cases, self-fertilization was possible; and in the last two, normal larvae were obtained.

In spite of the many thousands of *Arbacia* used at Woods Hole, there is apparently no record of hermaphroditism in this form. On June 25, 1928, at Woods Hole, I found an *Arbacia punctulata* with four typically red ovaries and one ovotestis. The ovotestis consisted of a red ovarian portion with normal ova, and a yellow testicular portion with normal spermatozoa. On finding this hermaphroditic sea-urchin, I was reminded of an earlier discovery of the same sort. In the summer of 1915, while working at Woods Hole, I came across a specimen of *Arbacia* with two testes, two ovaries and one ovotestis. The ovaries and testes were alternately placed, that is to say, neither the two ovaries nor the two testes were adjacent to each other. In this case, as in the one previously mentioned, the eggs and sperm were normal and gave rise to normal larvae following self-fertilization.

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MICROPHOTOGRAPH OR PHOTOMICROGRAPH?

AFTER observing for several times in close succession what seems to me to be inconsistent use of these terms, I am moved to register my views on the subject. A microphotograph is logically, and by derivation, "a microscopic photograph of a macroscopic object" (Century dictionary). The man who claims to have originated the term meant it to be used in this sense only. A photomicrograph is "a macro-

[1] Viguier, 1900, *Compt. Rend.*, Acad. Sci. Paris, 131: 63.

[2] Herlant, 1918, "Notes et Revue," *Arch. de Zool. exp. et gen.*, 57: 28.

[3] Drzewina and Bohn, 1924, *Compt. Rend.*, Acad. Sci. Paris, 178: 663.

scopic photograph of a microscopic object." Funk and Wagnalls dictionary says, "Photomicrography is the art or process of making photomicrographs: opposed to microphotography."

Webster and Oxford give definitions for the two terms similar to those above quoted, but, unfortunately, give the other word as a second choice in both cases. Oxford, however, quotes Sutton and Dawson, "Dictionary of Photography," "Microphotography . . . is now used to designate the reduction of negatives to very minute size, and serves to distinguish it from the process denominated photomicrography."

Obviously to me, "photomicrographs" is the correct term to use for the numerous reproductions appearing in current scientific literature and advertisements, of all manner of photographs taken through microscopes. I deplore such misuse as is evidenced in the *Scientific Monthly,* September, 1928, page 209 (the same article uses the term "microorganism"); in SCIENCE, advertisements in various 1928 numbers; in *Industrial and Engineering Chemistry,* volume 20, number 10, advertisement on page 62; and in other places, the exact references to which I have forgotten. In the *Scientific Monthly* referred to, the misuse of "micro" as a prefix is carried to "microcinematographic photographs." May I mention a paper by R. B. Harvey and myself (*Phytopathology,* volume 11, number 3) in which the perfectly good and logical, though somewhat long word, "cinematophotomicrography," is used?

It would seem that "custom" has already permitted the misusage indicated. I protest. I wonder if it will do any good.

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WHEN IS NORMAL NORMAL?

MUCH has been written about the concept of normality, especially in statistical and educational literature, but the terms "normal" and "abnormal" are commonly used both in those fields and in general biological terminology to denote approach to or deviation from the usual or average, without qualification as to whether they refer to the medium considered or to the causative factors involved. For this reason entirely normal reactors are frequently described as "abnormal," when in reality only the causative factors deviate from the average, and contrariwise abnormal reactors are described as "normal" because they have not shown "normal" responses to abnormal conditions.

Examples of this could be taken from almost any field of biology, but consider the case of an originally normal child whose experiences have caused it to develop certain inhibitions and behave quite differently from other children. In such a case the deviation of this child's behavior from the average behavior of children of his class is accepted as a measure of his abnormality. Suppose, though, that practically all average children when subjected to the same or similar experiences react in the same or in a similar manner. Then this child and his behavior are entirely normal when considered in the light of his past experiences, and it is only his experiences which are abnormal. Furthermore, if this child remained unaffected by the abnormal conditions he had experienced and which it had been shown would bring about a new type of behavior with average children, then, though still behaving like normal children without the same experiential background, he would be abnormal because he had not been normally affected by his unusual environment.

The same principle applies equally well, it seems to me, whether the unusual growth or other function of a tissue or organism or any other similar biological phenomenon is being considered. The medium itself may be abnormal and demonstrate appropriate abnormal behavior; again it may be entirely normal but attract attention by its response to abnormal causative factors.

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SCIENTIFIC BOOKS

Scientific papers of William Bateson. Edited by R. C. PUNNETT. 2 vols. Illustrated. The Macmillan Co., N. Y.

THESE two beautifully printed volumes from the Cambridge (England) University Press contain the collected scientific papers of Bateson reprinted from various journals and books. An account of his life and work by Mrs. Bateson and his more popular writings have already been published elsewhere. These volumes contain the record of his work, as he published it from time to time, conveniently brought together in one place. Like all "collected papers," many of these have now only a historical value. They have had their effect on contemporaneous scientific thought and investigation and are chiefly valuable now for the unified picture which they present of the achievements of one of the leading scientists of our time. To a student of the history of biological science in one of its periods of most rapid progress they will be of great value.

In order to understand what these papers are about and why they were written, one should have