has sometimes been termed temporarily eka-manganese on account of its being considered to be a metal with properties similar to those of manganese.

Surely the best name and one most appropriate under the circumstances is Moseleyum. The actual discoverer, whoever he is, will lose little in yielding to such a suggestion which will certainly meet with general approval. Moreover, it is a name better and more international in character like true science itself than a latinized name of the discoverer's own kingdom or republic.

Whether we say that cruel war or that destiny decreed that young Moseley should be denied the great and happy privilege of pushing on to greater completion his wonderful and far-reaching experimental results, we know that his research has helped us in our search after truth. His step-like photographs have simplified our steps and we now roam on ahead.

There is little that we can do that will more fittingly show our appreciation of the best of his life's labor. Wherever the Periodic Table will be shown after this, let the outstanding name in the center of it be "Moseleyum," as an inspiration to the teacher and the earnest student and as a monument to man's own intelligence and the value of research.

To all I say: "Element 43 no longer but 'Moseleyum.' Make it unanimous."

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MUSCLE SHOALS VS. MUSSEL SHOALS

DR. A. E. ORTMANN'S suggestion on pp. 565 and 566 of the December 19th issue of SCIENCE to change the official spelling of Muscle Shoals to read Mussel Shoals, because of the fact that the Shoals are named after the well-known bivalves that abound in that locality, brings to mind a similar agitation in the south a few years ago when the Shoals were beginning to attract the attention of the investing public. A leading newspaper then advocated making the change for the same reasons advanced by Dr. Ortmann. The writer, who at that time was engaged on a waterpower investigation of the Tennessee River for the War Department, and happened to be familiar with the early history of the geographic name, was able to set at rest the minds and as a result the old spelling has since prevailed. The story is briefly this:

The writings of early settlers and explorers in that part of the United States give the spelling uniformly as Muscle Shoals, often followed by a note that the name was derived from the *muscle shells* for which the place had always been famous with the Indian tribes. The earliest map of the Shoals made by the government was that of 1832, prepared by officers of what was then known as the Corps of Topographical Engineers, U. S. Army. This map, which also shows the spelling Muscle Shoals, was for the purpose of locating a canal with nine locks around the Shoals to enable navigators to pass the latter. This canal is still in existence, though obsolete. All indications were to the effect that the name of the bivalve in those days was *muscle shell*. This was substantiated by referring to dictionaries and encyclopedias, both old and new editions. One standard dictionary, edition of 1875, showed a wood cut of the shell and gave "muscle shell" as the only form of spelling. Later editions give both forms of spelling. About 1895 the form "mussel" is given the preference. The most recent editions of Funk & Wagnalls' Standard Dictionary and Webster's International still mention under "muscle" the name of the shell as an old form.

In the earlier writings mention is made of the fact that the "muscle shell' is so named because of the powerful muscles that close the two valves. Any one who has worn out his jack knife pearl hunting on the Tennessee and tributaries can testify as to these muscles and wonders why "mussel shell" is not spelled "muscle shell."

The writer urges adherence to the old form of spelling the name of the Shoals for two reasons: It has been established through long usage, extending over more than a century; the new form of spelling *mussel* is no improvement over the old form *muscle*.

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SCIENTIFIC BOOKS

The Life, Letters and Labours of Francis Galton. By KARL PEARSON. Vol. I. Birth 1822 to Marriage 1853. Cambridge (University Press), 1914. Pp. xxiii + 246. 56 plates and 5 pedigree charts. Vol. II. Researches of Middle Life. Cambridge (University Press) 1924. Pp. xi + 425. 54 plates.

HAVING as its subject one who will probably be written down in the history of science bracketed with Darwin as one of the most important figures in nineteenth century biology, and for its author the pioneer explorer of a new field of biological thought and methodology, Pearson's "Life of Galton" is bound to be a work in the very first rank of significance. And it is. Such a biography as this stands alone. Biographies as monumental in point of size as this will be when finished are not rare. In contradistinction to all such, however, the thing which makes this unique is that it is a thorough piece of *scientific* research on the life of a great *scientist*. It is less entertaining than Galton's autobiographical "Memories," but immeasurably more valuable. For

it is a veritable document which will stand for all time as a source in the history of science.

The history of the book itself is of interest and must be told if the significance of the whole is to be understood. Pearson's original intention was to complete the work in two volumes and to supplement them by a collected edition of Galton's writings. The latter part of the project became impracticable, chiefly because of the increased costs of publication which have developed since 1914, and apparently in part for other reasons not clearly stated. In any case a revision of the whole plan became necessary.

> Thinking the matter out carefully, I determined that this second volume of Galton's biography should to a large extent supply the reader with what the collected works would have done; that the *résumé* of memoirs, books and articles should be full enough to enable the anthropologist, the geneticist and the statistician to appreciate what Galton had done, and so starting from his suggestions make a more thorough map of a district, where Galton would only claim to have made a chart of the cardinal points. In taking this determination I was soon aware that it meant adding a third volume to this *Life*. I have had to postpone to that volume the discussion of Correlation, the Statistical Theory of Heredity, Personal Identification and Description and Eugenics, together with many letters, characteristic of Galton's mentality and of his affectionate disposition. But that volume seems an easy one after the present, for it largely deals with work done after Galton had been recognized as a master and friend.

There seems to be now some possibility that a fourth volume will be necessary before the work is done. The ten years' delay between the two volumes which have appeared was unfortunate but unavoidable. This was not the only scientific enterprise which was abruptly halted by the general outburst of acute insanity in the summer of 1914. It is to be hoped, from many points of view, that the Life will from now on be rapidly pushed to its conclusion.

With so much by way of background let us consider the content and method of the two volumes before us. The first deals with Galton's ancestry, his childhood and boyhood, his *Lehrjahre* and *Wanderjahre,* the fallow years from 1844 to 1849, and, in part, with his explorations in Africa. Of these subjects the ancestry is the one most extensively treated. About one quarter of the first volume is devoted to a masterly piece of genealogical research on Galton's forebears, with a wealth of portrait and other illustrations. The four grandparents of Francis Galton were Samuel Galton, Lucy Barclay, Erasmus Darwin and Elizabeth Collier. Pearson shows clearly and in detail that there was abundantly represented in these four ancestral lines high types of intellectual, artistic, physical and moral qualities. It can not be maintained that from Erasmus Darwin alone Galton derived his scientific ability.

> When we examine the four grandparents of Francis Galton, it is difficult to give precedence to any one of them as more noteworthy than another. Lucy Barclay has been described by one of her granddaughters as a very clever, beautiful women, very dignified and queenlike in her manner. She possessed great talent and refinement, and she studied history and literature of every kind to educate her children. She brought the physique of the Barclays and Camerons and something of the courtly bearing of the Stuarts and the ability of their greater ancestors into the Galton stock. Samuel Galton himself contributed determination, industry and a strong element of Quaker stubbornness—but at the same time wide public and social sympathies and a distinct scientific bent. Elizabeth Collier, of more slender figure than Lucy Barclay, was not behind her in beauty. She supplied an artistic instinct, a joyousness in life, an appreciation of form and expression which are less usual among the Society of Friends; in her ancestry we trace in addition both love of adventure and love of learning. And last, but not least, we have Erasmus Darwin, who presented his descendants with that great gift, the scientific imagination—the match which light a strong fire in the solid fuel of other characters be provided.

The chapter on childhood and boyhood give a valuable picture of the educational methods of the time, and of the reaction of a gifted and original boy who was interested in science and bored by the classics. Of the years of medical education at Birmingham and London, and of mathematical education at Cambridge, between the ages of 16 and 21, one's first and strongest impression is that Galton had an extraordinarily good time while he was getting his formal education. With plenty of money, unusual social gifts and connections, a rare sense of humor and an unfailing joy of living he missed very few of the pleasant features of college life, whether of the intellect, of society or of sport. That he somewhat crowded the business of living in the later of these years is evidenced by a breakdown in health which compelled the giving up of the attempt for mathematical honors. But that no permanent harm was done is equally evidenced by his activities in after life and his great longevity.

The five years from 1844 to 1849, described by Pearson as "fallow years," were again mainly devoted to having a good time. Galton's father died in 1844. He was left with ample means and virtually complete freedom to do what he liked. He was tired of formal study. He was fond of hunting, of shooting, of travel and of society. These tastes he indulged. Why not? Pearson somewhat unhumorously endeavors to account for this period of apparent discontinuity in Galton's intellectual life by an analysis of his hereditary make-up. Galton's own

explanation, which was that he had "many wild oats to sow," seems human, satisfactory and sufficient.

The "fallow period" culminated and came to an end in Galton's exploring trip to Africa. His book "Tropical South Africa" is one of the most interesting accounts of travel in unexplored territory ever written. It went through a number of editions. Probably few biologists of the present generation have ever read it.

The second volume of the Life opens with these words:

> We left Francis Galton at the end of our first volume aged 32, married, with many social friends, and ample competence, and a mind trained both in observation and analysis. His experience had been such that he knew more of mathematics and physics than nine biologists out of ten, more of biology than nineteen mathematicians out of twenty, and more of pathology and physiology than forty-nine out of fifty of the biologists and mathematicians of his day. Added to these advantages he had gained a knowledge of man and his habits in various lands; this gave him additional width of view, if it rendered less obvious to him that field of investigation wherein his powers were ultimately to achieve their most noteworthy successes.

This second volume is written, as already explained, on a different plan from the first. It contains, to begin with, much more matter. Not only are there more pages, but the type is noticeably less heavily leaded, with the consequence of a great many more words to the page. The six chapters deal with the following subjects: VIII. Transition Studies: Art of Travel, Geography, Climate. IX. Early Anthropological Researches. X. The Early Study of Heredity: Correspondence with Alphonse De Candolle and Charles Darwin. XI. Psychological Investigations. XII. Photographic Researches and Portaiture. XIII. Statistical Investigations, especially with regard to Anthropometry.

This volume is a masterpiece. I can not too strongly urge upon every statistician, anthropologist, psychologist and biologist (especially the student of any phase of human biology) the importance of reading it. He will find in it a perfect wealth of suggestive ideas for his own researches, as well as a most stimulating picture of the extraordinary originality and fecundity of Galton's mind. Like all really original persons Galton had a vast lot of ideas which he never had time to work out. Fortunately for the world he put many of them on paper in one form or another, and with masterly skill and insight Pearson has dug them out of memoranda as well as from published papers and books, and put them together in orderly fashion. Furthermore he has done a great deal of work on many of them in the way of bringing them into relation to present-day modes of thought and of notation, and has shown how they bear upon current problems.

Galton first attained eminence in the fields of geography and meteorology. The "Art of Travel" was, and still is, an extremely valuable handbook for the traveller, indeed even for the casual and occasional camper. It went through many editions. It has been well-nigh forgotten now that Galton was the first person in Europe (and perhaps in the world) to devise and publish a weather map. He also invented a number of instruments for plotting and analyzing meteorological data mechanically. He played an important rôle in the organization and development of the official British weather service.

The transition from physical geography to anthropology was a simple one. It began with an interest in the human side of geography. One of the earliest papers marking the transition is a discussion of the first steps in the domestication of animals by savage peoples, in which Galton suggests that animals were kept as pets long before there was any thought of their utility, and that the limitation to the forms that can be domesticated is set by traits of the animals themselves, with the result that about all the animals capable of domestication have been domesticated at some time or other. The real foundation stone of Galton's anthropological work was a paper published in 1864 on "Hereditary Talent and Character." Pearson says that he had been working on the subject for six or seven years before. The main thesis was the equal inheritance of psychical and physical characters. The method is that of his 1869 book, "Hereditary Genius," which first brought general recognition of his leadership in this field. In this paper he clearly enunciated the two doctrines with which his fame has been popularly most associated, namely, eugenics and the law of ancestral inheritance.

> As we can not doubt that the transmission of talent is as much through the side of the mother as through that of the father, how vastly would the offspring be improved, supposing distinguished women to be commonly married to distinguished men, generation after generation, their qualities being in harmony and not in contrast, according to rules, of which we are now ignorant, but which a study of the subject would be sure to evolve. (p. 163.)
>
> The share a man retains in the constitution of his remote descendants is inconceivably small. The father transmits, on an average, one half of his nature, the grandfather one fourth, the great-grandfather one eighth; the share decreasing step by step in a geometrical ratio, with great rapidity. (p. 326.)

Pearson points out that this is not an exact statement of the law as it came later to be formulated, but when it is remembered that it was published in the very early stage of his work on heredity it is a remarkably close prevision.

It is impossible to review in the space available the wealth of detail which makes up this second volume. Much of great interest must be passed over. The correspondence with De Candolle and Darwin on heredity includes the difficulty between Galton and Darwin about the experimental work on pangenesis, which Pearson handles with fine diplomacy and tact but still in such a way as to permit the reader to form a sound judgment for himself as to what actually occurred. The psychological investigations can only be mentioned. The chapter on "Photographic researches and portraiture" must be more particularly noticed, because in composite photography was one of Galton's most ingenious ideas. It was technically so difficult that it was never followed up thoroughly. But its theoretical bearings and potentialities are so great that it seems certain that some day some one will build the proper superstructure on the solid foundation Galton laid. Pearson sketches these bearings in the following passage:

To grasp fully Galton's photographic activities at this time we must bear in mind two important facts. He was still searching for some physical features which should have high association with the mental characters. This attitude was perfectly reasonable at that date, because not only no correlations between such characters had been determined, but the methods of measuring correlations were of the crudest kind. Further Galton was a traveller, and every traveller is accustomed as he passes along to notice that the racial mentality changes with the change of the physical characters. The conception therefore naturally arises that physique and mentality are highly correlated. The American Indian, the Negro, or the Arab has each his individual physique, and each also his individual mentality. But this appearance of high correlation may be most deceptive; it does not follow that there is any organic linkage between the physical and psychical characters. If a race be started from a pair of individuals both possessing a physique of type A and a mentality of type A′, we may find in later generations an apparent linkage of A and A′ in all the members; but this is not a true correlation, and a cross-breeding may show that A and A′ have no organic relation, and can be at once separated. In the second place Galton did, like most men of his generation and probably like most of us to-day, consciously or unconsciously, give weight to physiognomy. So impressed by physiognomy is mankind in ordinary every-day life, that we hardly realize how much confidence we place in it. We say a person is good or bad, is intelligent or stupid, is slack or energetic, on what is too often only a rapid physiognomic judgment. The custom is so universal as a rough guide to conduct, that we are almost compelled to believe that there is in human beings an intuitive or instinctive appreciation of mental character from facial expression. Galton differed only from the mass of us in desiring to ascertain on what physiognomic appreciation is based. He belonged to a generation in which the influence of Lavater and the belief in some form of phrenology were still appreciable. He accordingly sought to isolate types and to measure deviation from facial type, in order to determine whether facial variations were correlated with mental variations. He was really attempting to make a true science out of the study of physiognomy.

The final chapter deals with Galton's early statistical investigations, which were mainly along anthropometric lines, but also included many studies in the theory of statistics. From a technical point of view this is one of the most valuable chapters in the book, because of Pearson's penetrating comments on Galton's work. The following quotation from the lecture on "Generic Images" published in the Proceedings of the Royal Institution in 1879 epitomizes the point of view from which Galton approached the problems in which he was interested—and the range of his interests knew no bounds—perhaps better than anything he ever wrote.

General impressions are never to be trusted. Unfortunately when they are of long standing they become fixed rules of life, and assume a prescriptive right not to be questioned. Consequently, those who are not accustomed to original inquiry entertain a hatred and a horror of statistics. They can not endure the idea of submitting their sacred impressions to cold-blooded verification. But it is the triumph of scientific men to rise superior to such superstitions, to devise tests by which the value of beliefs may be ascertained, and to feel sufficiently masters of themselves to discard contemptuously whatever may be found untrue. (p. 168.)

It is unfortunate that the manner in which this biography has had to be prepared precludes the possibility of an index until the whole work is finished. This lack is especially felt in the second volume. But even the mildest of critics of any point whatever must be disarmed in the face of the extraordinary excellence of this biography. It is a wholly worthy memorial of a very great man.

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SPECIAL ARTICLES

CHROMOSOMES AND SEX IN SCIARA

A STUDY of the chromosomes of *Sciara similans* Joh. (manuscript)[1] has disclosed a condition which, so far as known to the writer, has not been observed in any other organisms. Both sexes of this fly are diploid. The chromosome group of the female consists of four symmetrical pairs of chromosomes,

[1] The writer is greatly indebted to Professor O. A. Johannsen for identifying this as a new species and for giving it a manuscript name, which is used here. His taxonomic description will appear shortly.