mitted to the offspring. The solid fabric which Darwin did so much to erect, and which is essentially based on the affirmative proposition, has been most persistently stormed, especially by a certain class of embryologists, and the question is too complicated and far-reaching to be lightly considered. It may be well to bear in mind, however, that the solution of the problem involves the psychical as well as the physical facts, and that the former cannot be revealed by scalpel or microscope. The naturalist who studies the development, and the actions of living organisms, in their relations to each other and to their environment, and who seeks to confirm his views by experimentation is, in my judgment, better qualified to draw reliable conclusions than either the histologist or the embryologist. Modern laboratory methods of zoological work, encouraged by the importance of bacteriology, have been so generally influenced by the microscope that they have pushed beyond the short-line of safe induction, and we already hear the murmurings of the reactionary wave which will carry us back toward the more comprehensive methods of the older school of naturalists whose names adorn the annals of our science. The microscope, however important in revealing the processes of growth, will yield us the secret of heredity no sooner than it will yield us the secret of life itself.

The latent potentiality contained in the germ, and the psychological directing force which modifies its later development, must always escape such methods. What we now most need to establish any sound theory of heredity is experimentation, intelligently planned and carried on through a series of years, not alone during embryonic, but during the whole development of the individual, and to include all the elements in the problem. Such experimentation on a sufficiently broad scale can hardly be undertaken by individuals, and the institutions which liberally endow and equip a chair of experimental zoölogy to this end will deserve well of mankind. The zoölogist, while skeptical of the ordinary theological and metaphysical interpretations of mind phenomena, is not disposed to dogmatize. His attitude is one of agnosticism on all questions as to the origin, nature and end of life, whether in its simpler or more complex manifestations; and he simply insists with Wordsworth that, "to the solid ground of Nature trusts the mind which builds for aye!"

The subdivisions of our science in which just now investigation is most active are those which shed light on the general subject of animal evolution, and our program shows that palæontology, embryology, kinetogenesis, bioplastology, heredity and kindred subjects will not lack for eminent exponents. It would be unwise to delay proceeding with such an interesting program by further remarks of my own, and I will at once call for the reading and discussion of the formal papers.

LETTERS TO THE EDITOR.

***Correspondents are requested to be as brief as possible. The writer's name is in all cases required as a proof of good faith.

On request in advance, one hundred copies of the number containing his communication will be furnished free to any correspondent.

The editor will be glad to publish any queries consonant with the character of the journal.

Red Birds and a Grosbeak.

A friend of mine bought a pair of young red-birds, from a lad who had taken them from the nest. At the same time he gave her a rose-breasted grosbeak, which he said he had found sitting on a bush, and "looking sick like." The grosbeak had no wounds, and no broken bones, and my friend placed it on a perch in the cage with the red-birds. It remained there twenty-four hours, refusing food and drink, drawing itself into a heap, and looking very miserable. Meantime the red-birds were vociferously hungry, but unable to take food for themselves, and my friend was obliged to feed them by taking them in her hand, and putting the food into their mouths with a little stick. The grosbeak surveyed this proceeding very intently, with an expression of scorn for human awkwardness!

As, during twenty-four hours, the grosbeak had seemed to make no improvement, my friend, taking him in her hands, gave him a minute examination, and found on the back of the neck the skin raised in a clear, tense bubble, as large as a bean, and of a yellow hue. She clipped a little hole in this bubble, using a pair of small sharp scissors. Only air exuded, no pus nor moisture; in a moment or two the rising was gone, and the skin resumed its place. She rubbed the incision with a drop of oil, restored the bird to the cage, and within ten minutes he was eating, drinking and hopping about in fine style.

He at once installed himself as foster-father to the red-birds. He hung over them with soft "feeding cells," holding the prepared food, and dropping it into their open throats. The little birds throve under his administration, and in a week were taking care of themselves.

A few months later, my friend being away from home over night, the servant who had charge of the birds, neglected to put any hard-boiled egg in the cage, putting in only bread and seeds. When the lady returned the grosbeak seemed to be alarmed and suffering, and, examining him, she found a wound on his back, some skin and a little flesh being gone. Thinking that a mouse, or rat, or cat near the cage might be the author of the trouble, she dressed the injury with carbolic salve, and hung the cage higher. All went well until she was again absent for two days, and there was the same neglect of diet. On her return she found the grosbeak in a very low condition, and this time with a large hole in the fleshy part of the breast. The servant said that "twice the red-birds had been fighting the grosbeak." The fact was evident, craving stronger food, they had helped themselves from the living body of their poor little foster-father. The care and skill lavished on him, and a cage for himself, were not sufficient to save him, and he died the next day from the effects of his injury.

J. McNair Wright.

Space Relation of Numbers.

With reference to the graphic presentation of numbers in the imagination, narrated by Mr. Martin in a recent issue of *Science*, I may add the following personal record. I daresay it will be found, as in most such cases, that what Mr. Martin imagined as peculiar to himself, exists in some form or other in nearly all minds, though I do not recollect having seen any reference to it, a fact due doubtless to the limited character of my reading on the subject.

From an early age I remember noting the fact, at least as early as my sixteenth year and I think a year or two before, the period being one in which I passed from arithmetic to algebra and geometry, that it became apparent to me that in the first hundred numbers the first ten appeared to lie on a horizontal line, the next ten arose at right angles and that the remaining numbers, from twenty up to a hundred, lay with more or less distinctness, not so much as visualized numbers as concepts of numbers independent of symbol, in an inclined line at an angle of about thirty or forty degrees with the horizon. Beyond one hundred I have no imagination on the subject. I may add that I was taught in the ordinary mental and high school arithmetic before Grube's system had made

its appearance in American teaching. Precisely why these numbers should lie as they do, I was never able to see, although for many years I have been conscious of this arrangement and have wondered what its origin might be.

The letters of the alphabet arrange themselves for me in a visual way which is easily explainable. This is in three rows of eight each with Y, Z and Ampersand together below. The reason for this, I think, is that I learned to read without the preliminary of learning my letters, and after having been reading for several years, in my eighth year, my teacher made the agonizing discovery that while I was reading pretty much anything I pleased I did not know the order of my letters. I was, accordingly, set to work mastering an order which I will admit I have found most useful for every purpose except reading and writing. I learned the alphabet in this summary fashion out of a primer which had the alphabet disposed on its second page at the top of the page in the order which I have mentioned, and in all the manifold use of the alphabet for purposes of classification with which we are all familiar, but which we are apt to forget as a comparatively modern invention, the alphabet always seems to me to be in the three lines I have mentioned.

TALCOTT WILLIAMS.

COLUMBIAN CONGRESSES ON SCIENCE AND PHILOSOPHY.

AT least eight congresses were held during the week of August 21-26, and six are announced for Aug. 28-Sept. 2. The International Electrical Congress awakened much general interest, Professor Helmholz being a prominent figure. An illustrated lecture was given on the evening of Aug. 25, by Mr. Nikola Tesla, on Mechanical and Electrical Oscillators. This took place within the Exposition grounds, where about 70 per cent of the total horse-power of steam engines is used for electrical purposes. The Chamber of Delegates made their report on the special work entrusted to them.

The Congress on Psychical Science, with suggestions of spiritualism and hypnotism, also awaked some popular interest.

The Congress of Chemistry has been carefully worked up by Dr. H. W. Wiley, and 77 papers were announced. These were arranged in sections, as Analytical, Agricultural, Technological, etc.

Among the foreign chemists present, were Prof. Otto N. Witt, of Berlin; Prof. George Thoms, of Riga; Prof. H. R. Proctor, of Leeds; Prof. E. Engler, of Carlsruhe; and Prof. George Lange, of Zurich. X.

PALENQUE HIEROGLYPHICS.

IT is gratifying to learn that Dr. Valentini, after a long absence from the field of paleographic investigation, is about to return to it. There is one statement, however, in his communication to *Science*, Aug. 18, which needs correction. He says "Mr. Förstemann's theory of reading double columns is untenable." Now if he will refer to my "Study of the Manuscript Troano," printed in 1882, pp. 199-203, he will find this theory there set forth, as I think, for the first time, and, also, evidence of its correctness, which has apparently satisfied most students who are devoting attention to the Central American inscriptions and codices.

His statement that no month symbol appears on the tablets is made in face of evidence to the contrary, which seems to be conclusive.

I may add here that Dr. Brinton's acceptance (*Science*, Aug. 11) of the rendering given by me of the month name *Kayab*, necessarily forbids its derivation from *Kay* "to sing or warble." A compound of *ak* and *yab* cannot be a derivative of *Kay*. The *ak* may be obtained from the symbol on the rebus method of Aubin, which Dr. Brinton has rechristened by the name "Ikonomatic," but it is difficult to explain the symbol representing the last syllable *yab* by this method. If the name was formed as I suggested, and as admitted, (*Ak-yab*) the signification, with the month determinative added, is "the month when turtles abound."

CYRUS THOMAS.

Frederick, Md., Aug. 31.

COLOR VISION.

I AM very much surprised to see that Professor Ebbinghaus, in the last number of the *Zeitschrift fur Psychologie*, announces as new a discovery which has a critical bearing upon Hering's theory of color-vision,—the fact, namely, that two greys composed the one of blue and yellow and the other of red and green and made equally bright at one illumination do not continue to be equally bright at a different illumination. If two complementary colors were purely antagonistic, that is, if the color processes simply destroyed each other, as processes of assimilation and dissimilation must do, and if the resulting white was solely due to the residual white which accompanies every color and gives it its brightness, then the relative brightness of two greys composed out of different parts of the spectrum could not change with change of illumination. The fact that they do change is therefore completely subversive of the theory of Hering, or of any other theory in which the complementary color-processes are of a nature to annihilate each other. This consequence of the fact, as well as the fact itself, I stated at the Congress of Psychologists at London in August, 1892, and it was printed in the abstract of my paper which was distributed at the time and also in the Proceedings of the Congress.

Professor Ebbinghaus's discovery is apparently independent of mine, for he supposes that the phenomenon cannot be exhibited upon the color-wheel. This is not the case; with fittingly chosen papers (that is, with a red and green which need no addition of blue or yellow to make a pure grey, and with a corresponding blue and yellow) it is perfectly evident upon the color-wheel. The same paper circles which I used to demonstrate it in Professor König's laboratory, in Berlin, are, at the request of Professor Jastrow now on exhibition at the World's Fair at Chicago. While Professor Ebbinghaus's discovery of the fact is therefore doubtless independent of mine, I allow myself to point out that mine is prior to his in point of time.

CHRISTINE LADD FRANKLIN.

MYOLOGY OF THE CAT; OR THE M. FLEXOR ACCESSORIUS OF THE HUMAN AND FELINE FOOT.

THE supposed new muscle in the cat's foot (*Science*, Aug. 18, 1893, p. 97,) is, so far as Mr. Thompson's description allows of identification, probably no other than the

> Accessoire du grand flechisseur (Bich.) of the Cat,
> Accessoire du perodactylus (Str.-Dur.) of the Cat,
> Caput plantare flexoris digitorum (Caro quadrata Sylvii) of Man,

or the M. flexor accessorius of human and feline anatomy

The flexor accessorius muscle in man originates by means of a muscular (internal and larger) head from the inner border of the calcaneum, which may be entirely absent, and by a tendinous slip which comes from the outer face of the Os calcis, just in front of the external tubercle, and from the long plantar ligament. As it has two quite constant sources of origin, so it has two insertions, one of which, however, is not constant. The usual insertion is that into the external border and upper surface of the M. flexor longus digitorum pedis, just where it divides into the four branches for the toes. (Most of the fibres of this