

and flames, that they are sensitive only over a small range of gas pressure, and, therefore, of efflux velocity, is shown by the curves and by theory. It is a consequence of the hyperbolic relation between L and V_0 , that at a certain value of the latter a small increase in velocity due to aerial disturbances causes a large change in length, so that in using a sensitive flame it is necessary to work on the part AB of the curve.

E. G. RICHARDSON.

University College,
London, W.C.1.

Science and Intellectual Freedom.

ON my return from abroad a few days ago, I found your letter of June 30 awaiting me. Allow me to express regret that circumstances prevented an earlier reply. Perhaps it is not too late for a brief statement of opinion on the controversy raised by the trial of Mr. J. T. Scopes of Tennessee.

Two questions of supreme importance have emerged: Liberty of scientific research; and the bearing of the doctrine of evolution on religion.

It is certainly an astonishing thing that, after the history of human thought during the last two hundred years, the legislatures of States which lay claim to some degree of civilisation should be found restricting science within limits prescribed by special interpretations of Holy Scripture. It does not seem to have occurred to these good people that, on such conditions, scientific research becomes impossible. Nor do they see that they are seeking to restore that very state of things which delayed the advance of human knowledge for centuries. They have still to learn that truth must be sought for its own sake.

Again, they are mistaken in thinking that the doctrine of evolution is anti-Christian. To my judgment, exactly the opposite is the fact. Evolution teaches the unity of all creation: it reveals an organic relationship among all living things, making us all akin: it enables us to form a conception of the Creator as One who is not remote from us in some transcendent sphere, but is Life of our life and continually at work in the universe. These are Christian ideas: they may be said to be among the essential ideas of Christianity.

As to the early chapters of Genesis, their sublime accounts of the beginnings of things lose all their true value if we regard them as scientific statements. They are full of meaning if we view them as the expression of fundamental religious principles in the language and imagery of the age to which they belong.

CHARLES F. ARMAGH.

THE Tennessee trial has given the readers of NATURE an amusing motley of opinion, but are we not, perhaps, treating the rejection by "Main Street" of the much over-advertised Mr. Scopes too seriously and missing the real significance of the occasion? Is not a lesson of profound social importance behind it all? We are talking glibly of interference with "freedom of thought." Is there any such thing—even in the ranks of our boasted "science"? Are not the teachers, for the most part, just repeating what they have been told, without exercising any thought? Is the Pauline injunction, *Prove all things, hold fast that which is good*, in any way followed? If it were, societies would have no difficulty in meeting costs of publication. Whatever may be the case in biology, it certainly is not on the physical side. We mostly use the "Main Street" method but are at the disadvantage that we have no bible holding our faiths which can be put into the hands of the public. Consider our Press, consider our politicians—the Cabinet,

even our Public Schools, are not all these located in "Main Street"?

Scientific method, the method of proving all things, is only known to and used by the few who are real makers of knowledge—science factors. The scientific, like all artistic gifts, we must recognise to be an "inborn error of metabolism." Our text-books are as dogmatic as is the great book used of "Main Street." This not only has the advantage of great beauty of language but also a concealed authority behind it—Man's innate belief in a superior being—which we cannot command. The "Aunt Susans" who teach it do so with a thoroughness and sense of conviction which we can in no way match.

Any one who wishes to gain some inkling of its power should study Ruskin's "Modern Painters"—the work of an arch critic gifted with a mind of transcendent power, not an obscurantist. The practical achievements of the scientific mind are blinding us to our failure to teach and use scientific method in our ordinary affairs. We need be in no hurry to force our speculations into the schools—better not. We do need to teach all to respect our method, though, maybe, it is that used only in the best circles. We need, on all possible occasions, to make clear, to ourselves and others, the significance of the assertion, to which Sir Bryan Donkin and Sir E. Ray Lankester directed timely notice recently, made by the late W. K. Clifford—*It is wrong always, everywhere and for any one to believe anything on insufficient evidence*—let alone teach it as truth, as is so often done in our classes. We have gradually to repave "Main Street" with such doctrine: our difficulty is that most of us are born to live in it—as it is. Yet when Bishops can write as do those of Birmingham and Durham, we need not altogether despair—though these also are probably "metabolic errors."

HENRY E. ARMSTRONG.

Changes in the Ultra-violet Absorption of Gelatin.

IN some investigations on the ultra-violet absorption of gelatins, we have discovered that the absorption spectrum changes in a characteristic manner according as the gelatin is on either side of the iso-electric point, indicating that the different P_H values are associated with a definite change in the chemical constitution. Taking the iso-electric point as 4.7, when the P_H value of a gelatin rises above this, there is a characteristic increase in absorption from about 3500 Å.U. towards the red end, while with a fall in P_H there is an increase in absorption in the region of shorter wave-lengths. These very marked changes in ultra-violet absorption would appear to provide a valuable means of investigating minute changes in the constitution of gelatins.

T. THORNE BAKER.

L. F. DAVIDSON.

The Oogenesis of Lumbricus.

REFERRING to Dr. Graham Cannon's letter in NATURE of July 18, I may be permitted to remark that the reason why it is not only inadvisable but even unprofitable to discuss oogenesis in general, on the basis of work done on a single species of one order, is that, unlike the chromosomes, the Golgi bodies and mitochondria are variable in behaviour in different orders, and even within a single family. This is the most important fact which recent researches on the cytoplasmic inclusions have revealed, and, of course, throws a clear light on the question of the status of these bodies in heredity.

J. BRONTË GATENBY.

Trinity College,
Dublin.