is striving to relate the work of such schools to the needs of industry and commerce. Each has recently tended to make special claims concerning the aims and results of its syllabus. The following summary, taken from Section IV. of the report, would appear, so far as the engineering trades are concerned, to support the claims already made by the junior technical school: "(1) Boys who have had a purely academic training do not improve in ability to tackle these tests to the same extent as boys of a somewhat lower intellectual level who have received further education with an engineering bias. (2) Boys who have had further education with a different vocational bias (commercial) do not improve in ability to tackle these tests to the same extent as boys of a slightly lower intellectual level who have received further education with an engineering bias."

It is to be noted that the investigators did not use only the method of 'tests'. Criteria of apprentice ability of the individuals were supplied by instructors and the test results were compared with the respective criteria.

Priestley as a Pioneer.

UNDER the title, "Joseph Priestley and his place in the History of Science", Sir Philip Hartog delivered a discourse at the Royal Institution on April 24, a reprint of which, with a postscript dealing with some additional points, has been received. Sir Philip traces the main events in Priestley's life, bringing out the fact that he was more than a man of science; he was a teacher, theologian, politician, and defender of liberal thought. His scientific work has been variously assessed and perhaps some aspects have tended to have been overshadowed by his discovery of oxygen. Priestley made some important experiments in electricity, and his work on the "History of Electricity" includes, among other matters, a statement that the inverse square law is contained in the experimental fact that there is no electrification inside an electrified metal vessel. This was probably the starting point of Cavendish's better known investigations. Priestley also made experiments on electric discharges, which are now seen to have raised fundamental issues.

Priestley's attitude to hypotheses in science is examined, and in his indifference to his own theories and those of others, he is thought to have been influenced by Franklin. In his chemical investigations he accepted the phlogistic theory as a pupil, with docility, since he was "no professed chemist". His practical investigations of gases, although preceded by important publications of Cavendish, led to the acquisition of much new knowledge on gases. This formed the basis of Lavoisier's theoretical revolution in chemistry. Sir Philip Hartog is inclined to allow Lavoisier more originality in the matter of the discovery of oxygen than has been usual, although he admits in more than one instance that the memoirs of Lavoisier as they finally appeared had been amplified from the original communications, a circumstance which makes it necessary to use the greatest care in dealing with this author. Although Priestley's intelligence "remained intact, bright and lively to the end", Sir Philip thinks his memory was failing him when he wrote his well-known complaint of Lavoisier's claims some years before his (Priestley's) death.

Sir Philip Hartog's discourse makes it clear that Priestley more than once was tempted to adopt Lavoisier's new view of the chemistry of combustion, but that he was restrained by the results of experiments, these being either faulty in themselves or wrongly interpreted. He nearly reached a true conception of the composition of water from his own experiments, but says he "was taught by Mr. Watt to correct this hypothesis", an event which does not help in the attempts which have been made to credit Watt with the discovery of the composition of water. One of Priestley's greatest stumbling-blocks was his confusion of the two inflammable airs, hydrogen and carbon monoxide, which was only cleared up by Cruickshank in 1801. Priestley's work on respiration and that on the growth of plants were the starting points for investigations of others, the first for Lavoisier's great researches on animal respiration.

Sir Philip Hartog believes that it is easy to understand why Priestley's work and his character have been under-estimated in the past. His electrical work and his clear views on the use of hypothesis and on scientific theory generally have been eclipsed by his chemical work, in judging which it is no simple task to divest his language of the enveloping veil of the phlogistic theory. He deserves a greater place in the history of science than he has hitherto been accorded.

Some Phenomena of the Upper Atmosphere.

THERE are three layers in the upper atmosphere in which dissociation is produced by the absorption of solar radiation. These are the layer of ozone, with its maximum concentration at about 50 km., and the two ionised layers at about 100 km. and 220 km. The absorption of solar radiation of any kind in a gas of which the density varies exponentially with height $h(ae^{-h/H})$ has a definite distribution relative to the level of maximum absorption; this distribution depends only on H. It is shown that the main regions of absorption associated with the three layers are well separated, though the dissociation of molecular oxygen which results in the formation of the ozone layer has an important influence on the whole of the overlying atmosphere, in which atomic oxygen is a permanent constituent, its concentration increasing with height. The concentration of ozone, on the other hand, must decrease with height above a certain level, a conclusion which bears on the maintenance of a high temperature in the upper atmosphere.

Milne's theory of photoelectric ionisation is applied to the earth's atmosphere, assuming that the sun's radiation even in the far ultra-violet is that of a black body at 6000°. It suggests that the ionisation of the upper layer is due to the absorption of ultra-violet radiation, probably by atomic oxygen.

Considering both magnetic and radio evidence, it is inferred that the agent responsible for ionising the lower layer consists of neutral atoms from the sun, emitted from the sun at the same time as the charged atoms that are responsible for magnetic disturbance, the number of the two kinds of particles varying in unison, from time to time. They travel together from the sun until within a few earth-radii distance from the earth, when the charged particles are deflected by the earth's magnetic field towards the polar regions, there producing auroræ, while the neutral atoms travel straight on and ionise the sunlit hemisphere.

On considering the origin of the green light of the night sky, making use of Rayleigh's recent measure-

ment of the absolute photometric intensity of the light, it is inferred that the excited atoms that emit the light are produced continuously during the night, the energy coming from energy of dissociation or ionisation stored up during the day. The level of the emission may be assigned as between 100 km. and 200 km.

[1] Abstract of the Bakerian Lecture delivered before the Royal Society on June 25, by Prof. S. Chapman, F.R.S.

Birthdays and Research Centres.

Sept. 14, 1849 (old style), or Sept. 26.—Prof. I. P. PAVLOV, For.Mem.R.S. and Nobel laureate in 1904 for physiology and medicine, director of the Institute of Experimental Medicine, Leningrad.

I am continuing the investigation of the highest nervous activity by the method of conditioned reflexes. This investigation includes in its scope the study of the normal activity, as well as that of different pathological states, which we are provoking intentionally, and the recovery of the normal after them.

Sept. 17, 1859.—Prof. F. D. ADAMS, F.R.S., emeritus professor of geology, dean of the faculty of applied science, and vice-principal of McGill University.

I am at present engaged in a study of the historical development of our knowledge of certain phenomena of physical geology and of our views on the nature and classification of minerals in the time antedating the rise of historical geology at the close of the eighteenth century; also in a study of certain points in connexion with the geological relations and petrography of the Palæozoic intrusions of the Monteregian Hills.

One of the most important pieces of work which could be undertaken at the present time in geology would be a comparative and at the same time comprehensive study of the great developments of the Pre-Cambrian exposed in certain typical areas such as those in North America (the Canadian Shield), Finland and Scandinavia (the Baltic Shield), and in South India and Ceylon, as recently suggested by Dr. Sederholm, of Helsingfors, with the view of advancing, so far as possible, our knowledge of the geological succession as set forth in these ancient records of the beginnings of the history of the earth.

Sept. 17, 1870.—Lieut.-Col. S. P. JAMES, F.R.S., I.M.S. (retired), medical officer and adviser on tropical diseases, Ministry of Health.

At the Malariotherapy Centre which was established by the Ministry of Health and the London County Council at Horton in 1925, psychiatric studies on the effect of induced malaria on general paralysis go hand in hand with investigations into the malarial infection itself, its natural history in man and in mosquitoes, its treatment, and its prevention. Recently attention has been devoted chiefly to chemotherapeutic experiments with a view of improving the treatment of obstinate cases of malignant tertian malaria, and to chemoprophylactic experiments having for their object to ascertain whether any known or reputed antimalarial remedy is a true preventive of human malarial infection contracted in the natural way by the bites of mosquitoes. The former experiments have not, as yet, yielded a noteworthy result, but from the latter the striking fact has emerged that the German synthetic preparation 'plasmoquine', when taken in suitable doses before and after a person is bitten by infective mosquitoes, possesses the remarkable property of preventing him from becoming infected.

These and other experiments now being conducted at Horton indicate that a subject to which attention might usefully be given is the revision of the classical chemotherapeutic method of testing antimalarial drugs (the method devised and practised so diligently by the late Dr. Roehl) in the light of the new knowledge that not all the different phases or forms of the malaria parasite which occur in the human host are amenable to the same drug, and that the problem of controlling malaria by the use of drugs is not so much a problem of finding a drug which is more effective than quinine against the fever-producing forms of the parasite as it is of finding other drugs that will be effective against the sporozoite stage, the sexual stage, and the stage responsible for relapses.

Sept. 18, 1854.—Sir RICHARD GLAZEBROOK, K.C.B., F.R.S., formerly director of the National Physical Laboratory.

The date that stands above, Sept. 18, 1854, will tell my friends that I can no longer ask their interest in or their support for personal investigations. The time for these is over, but in the future there are many problems I would wish them to carry forward to a complete solution.

Thirty years of a not inactive life have been given to the endeavour to bring home to all the need that, if we are to maintain our place in the world, we dare no longer trust to the natural advantages of our position and to the fact that during the past century great Englishmen have been the foremost to advance natural knowledge. We must apply to our daily wants the truths they wrested from Nature.

This lesson was never more necessary than to-day. There are among us men most skilled in unveiling Nature's secrets; others there are well fitted to apply the knowledge so gained to the problems of each day's life. I wish to see the work of these men helped onwards by all means in our power, while at the same time our leaders, and those they lead, grasp the truth that it is on such foundations that they must build.

Sept. 18, 1865.—Sir ALEXANDER HOUSTON, K.B.E., C.V.O., F.R.S., director of water examinations, Metropolitan Water Board.

Systematic search might usefully be made for the presence and numerical abundance of the microbes of epidemic water-borne disease (typhoid and paratyphoid) in sewages, sewage effluents, and in sewage polluted rivers. Very little is known of this subject despite the pioneer work carried out by Wilson, Gray, Begbie, and Gibson, and the Metropolitan Water Board.

The extensive work already achieved in the examination of the dejecta of enteric fever patients and of 'carriers' should be greatly extended in the direction of estimating the number and not merely the presence of the germs of enteric disease. In positive cases, the opportunity should be seized of determining the vitality of these 'uncultivated' pathogenic organisms in the materials examined at different temperatures.

Turning next to a totally different problem. Is there not room for further research on the cause, prevention, and treatment of that painful and often most intractable disease herpes zoster, and its alleged relationship with chicken-pox?

Sept. 18, 1881.—Prof. ARTHUR M. TYNDALL, Henry Overton Wills professor of physics, and director of the Wills Physical Laboratory, University of Bristol.

The activities on the [illegible] side of the Wills Physical Laboratory at Bristol are mainly concentrated upon three subjects: spectroscopy, magnetism