CHEMISTRY.

President: Dr. Horace B. Dunnicliff, M.A., SC.D., F.I.C., I.E.S.

IN dealing with a subject of the utmost importance, the rôle of chemistry in the advancement of India, Dr. H. B. Dunnicliff has introduced a very refreshing departure from the usual practice of Presidents to deliver discourses on recent developments in special branches of chemistry. The address is most opportune; it is a matter of great importance and urgency for a developing country that all chemists "should realise their responsibility to the community and appreciate, how, in a spirit of service, they can subscribe to the progress of their native land and bring to their fellowmen the benefits of systematic scientific study." In India to-day, there is a growing need for men, who, by virtue of the training they have received, can help in the improvement of the conditions and amenities of life and assume a share in the development of the country. For this purpose the younger generation must be adequately equipped. Perhaps the most pressing need to-day is to provide an efficient educational system so that it would ensure a sound training "in the discipline and fundamental truths of both theoretical and practical chemistry and involve the provision of technological institutions in every city of commercial importance in India." "Equally important is a continuance of the systematic development of all branches of agricultural chemistry and soil physics accompanied by an initiation of industries to deal with nature's products under systematic and scientific control. Other national obligations are the organisation of pharmacy, the introduction of a Foods and Drugs Act in every province, the establishment of more laboratories as for public health, provision for better sanitation and regulated sewage disposal which, properly administered, serves the dual function of improving public health and fertilising the land."

Equally important is the need for improving the pay and prospects of the practising chemist. The tendency in the technical world is to try to obtain "the services of chemists at salaries which would not attract other professional men, for example, engineers of equivalent qualifications. It is not reasonable to expect first class results from second class material and as in every other walk of life, the best men will go to those who offer the best prospects. The chemist, by the nature of his training, is a disciplined and docile worker who carries out his duties conscientiously and without fuss. I therefore invoke the sympathy of all Governments and all private employers and earnestly beg them to offer to chemists such terms of engagement and prospects as will enable them to carry out their duties free from anxiety about the necessities of life and without embarrassment concerning the suitable education of their children."

A critical examination of the case for an Indian Chemical Service suggested by Prof. J. F. Thorpe who, as long back as 1920, expressed the view that the development of chemical industries in India could only be adequately realised through the agency of an efficient Government Chemical Service having as its primary objective the encouragement of industrial research and development, reveals that the administrative and technical difficulties of the proposal are too many. General industrial research is better carried out by an individual who has an abiding interest in the discovery he makes and who, while in safe receipt of a living wage, stands to make great profits as a result of successful investigation than by a Government official who is securely employed on terms of continuous service. The only possible department in which centralisation is at all possible is in the case of appointments dealing with analytical work which have a common basis of qualifications and in the institution of a Central Bureau of records, information and advice. There would also be a distinct advantage in having a "Central Laboratory, very well equipped, which would be an All-India Bureau of Standards, and to which analytical and testing work of almost any kind could be sent and dealt with by well-qualified chemists, physicists and engineers on payment of fees. This laboratory would be served by smaller laboratories in important places, of which the scope will be limited.... The function of the subsidiary laboratories should be confined to general types of analysis to relieve the central laboratory from undue pressure and guarantee speedy disposal of routine samples."

ZOOLOGY.

President: Prof. P. R. Awati, B.A. (Cantab.), D.I.C., I.E.S.

PROF. P. R. AWATI puts forth a vigorous plea for the introduction of biological studies in our elementary and secondary schools. He rightly deprecates the unimportant position biological sciences have been assigned, in spite of their widespread educational importance. "Food production, cattle breeding, dairy farming, fruit cultivation, control of pests damaging our crops and prevention of the diseases of our cattle require a trained body of experts in the various subsciences of biology."

The application of biological knowledge to the needs of every-day life would be far more insistent than that of physical sciences but the attention given to biology is quite incompatible with the service that this science has rendered to mankind. The cytologist, the entomologist, the biochemist, the mycologist, the bacteriologist and the eugenist all meet on the common ground of biology and the contributions of every one of these have done much to lighten the burdens of life.

The amount of ignorance therefore that pervades the average mind on biological problems is immense. Some of our greatest statesmen would probably pause before they answered where their hearts lie in their body and this is mostly due to the ap.thy on the part of the educational authorities,—especially in India,—towards biological teaching. And again, it is in this country, more than any other, that a strict censorship, based on a certain unreasonable attitude of mind, is exercised over sex education, which, doubtless, should form an essential part of the educational equipment of every future citizen. The impartial examination of issues like marriage, inbreeding and outbreeding, the caste system and indeed of our theological concepts themselves would yield results extremely useful in unravelling many complicated tangles of our social systems.

Prof. Awati is of opinion that the future of India will largely depend on a consideration of

many of her problems from a sound biological point of view. But the truth must not be hid that public opinion and public co-operation are both necessary for any successful termination of such a venture. For this purpose, wide-spread and popular propaganda and the commemoration of great biologists that lived and did meritorious service to mankind are necessary. In the popular mind there still exists the belief that biology merely consists in the repetition of long-winded names and the dissection of numerous dead bodies. Measures must be taken to disabuse the popular mind of this mistaken notion.

Prof. Awati concludes his inspiring address with an appeal for the introduction of biologlcal education in every grade of teaching.

B. R. S.

BOTANY.

President: Prof. R. H. Dastur, M.Sc.

PROF. R. H. DASTUR departs from the traditional practice and speaks on the mighty but enticing theme of the nature of living matter.

The subject has attracted the attention of thoughtful men from the earliest times and, although no substantial progress has been made, it has yet led to more divergent views than any other theme recorded in human history. The philosophers of the pre-evolution days devoted considerable amount of abstract thinking to the subject, and arrived at diverse metaphysical concepts which, though highly fascinating, have yet failed to explain the concrete character of the world of reality. The scientists of the later times have sought to explain the evolution of living organisms as being governed by the universal law of redistribution of matter and energy, but they also differ fundamentally in their views regarding the nature of life. As the result of the above, we now have diverse schools of thought the guiding principles of which may be designated (1) Vitalism, (2) Mechanism, and (3) Holism.

The vitalists argue that living bodies exhibit (1) a spiritual and a mental character which cannot be explained in terms of matter and energy, and (2) the capacity of producing antigens for the reproduction and differentiation of tissues and for the unceasing transformation of energy, a phenomenon which is opposed to the second law of thermodynamics. The mechanists, on the other hand, point out that various phenomena which were once regarded as being vital have since been explained in terms of physics and chemistry. Although certain aspects of life may still be inexplicable, the living cell does, as a whole, obey the more important physical and chemical laws. With further enquiry, all the phenomena associated with life should be explicable in terms of matter and energy. A compromise between the two extreme views is provided by holism which enunciates that matter and life are not distinct entities, but that they overflow into one another to form the progressive series of the great process of whole-making. This theory has found some acceptance in recent years, but it is rather difficult to see how it differs from vitalism. "To a man of science it carries no conviction: to an enquiring mind it brings no relief."

Our knowledge of the physics and the chemistry of protoplasm has lately increased considerably and while, on the one hand, we find that the ordinary physical laws cannot be applied to it, there are yet several phenomena of life which can be readily explained in terms of modern colloid chemistry. Furthermore, we have succeeded in not only isolating but also establishing the chemical nature of many of the delicate agents—the enzymes, the harmones and the vitamins—employed in the laboratory of the living organism. Recent developments in the technique of tissue culture have also enabled us to grow and to study changes in portions of the living body as distinct from the organism as a whole.

Our concept of the unit of life has lately undergone considerable change. The nucleus which controls the reactions in the cytoplasm is itself made up of the chromosomes which, in turn, are composed of the genes. The invisible protogene is thus the first manifestation of life on this earth and the most pressing problem of the day is to determine the precise nature and the manner of functioning of the gene.

Recently, evidence has been obtained to show that living cells give off characteristic radiations which induce division in other cells. The genes themselves can be induced to undergo mutation by treatment with X-radiations. In the light of these and the fact that, by the complex working of their energy, the genes can transform inorganic matter into their own substance, the phenomenon of life would appear to be one of rhythmic interplay of the energy of these radiations with its environment.

The knowledge of life must help the causes of human betterment and progress. It has got an ethical value and will raise mankind towards the highest level of perfection. It can be obtained only as the result of constant endeavour and steady endeavour on the part of those engaged on the enquiry. To this end, the science of the future shall be directed and it may even be that the science of life will give new life to all the sciences.

GEOLOGY.

President: Prof. K. K. Mathur, B.Sc. (Hons.), A.R.S.M.

IN his presidential address to the Geology Section of the Indian Science Congress, Prof. Mathur deals with some "Problems of Petrogenesis in the Deccan Trap", with special reference to the rocks intrusive into the Deccan Trap proper. These he classifies into three groups: (*a*) the 'trachytic' or acid type consisting of granophyric trachyte, rhyolite, felsite, microgranite and granophyre; (*b*) syenite, diorite, nepheline-syenite, monchiquite, and other lamprophyres which constitute the central mass of Mount Girnar; and (*c*) olivine bearing rocks consisting of olivine-gabbro, olivine dolerite, oceanite, peridotite, limburgite, etc.

The rocks of the first group occur as large and small dykes, lava flows, and laccoliths intrusive into the Deccan Trap. The peripheral hills of Girnar provide a beautiful example of a *ring dyke* of granophyre intrusive into the basaltic flows. In the hills of Utan and Dongri in the western part of Salsette, we have a large intrusive mass of micro-granite, felsite and granophyre. A laccolitic mass is illustrated by the Barda hills of Porbunder State. Among extrusive rocks may be mentioned the rhyolite flows of Pavagad hill and the two horizontal flows of acid lava beautifully