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[No. 12

	PAGE		PAGE
<i>Astronomical Research in India: III.</i>		<i>Studies on the Preservation of Glands</i>	
C. V. RAMAN	313	II. <i>Preservation of Pituitary Glands.</i>	
<i>Sri Jayachamarajendra Institute of Indian</i>		BY B. B. DEY, P. S. KRISHNAN AND	
<i>Medicine, Bangalore</i>	314	M. GIRIRAJ	319
<i>Science and the Public Welfare.</i>		Dr. C. W. B. Normand, M.A., D.Sc., C.I.E.	321
BY PROF. A. V. HILL, F.R.S.	315	<i>Letters to the Editor</i>	322
<i>Souvenir to the Hon'ble Dewan Bahadur</i>		<i>Reviews</i>	335
Sir A. Ramaswami Mudaliar, K.C.S.I.	317	<i>Science Notes and News</i>	338
<i>The Centenary of the Rothamsted Experi-</i>		<i>Errata</i>	341
<i>mental Station.</i> B. VISWA NATH .. .	318	<i>Supplement: The Fundamentals of Crystal</i>	
		<i>Physics.</i> BY SIR C. V. RAMAN .. .	343

ASTRONOMICAL RESEARCH IN INDIA: III

ASTRONOMY makes an instinctive appeal to all cultured persons. Of a different nature is the interest it has for the physicist. As indicated in an earlier article, the observational discoveries of astronomy have had a profound influence on physical thought. *Vice versa*, the speculatively-minded physicist turns naturally to the facts of astronomy to find in them a confirmation of his ideas or at least some support for them. This inter-play between astronomy and physics has been vastly more active during the last thirty years, since Niels Bohr put forward his Keplerian model of the hydrogen atom and offered an intelligible explanation of the observed spectra of both terrestrial and astronomical sources of light. The influence of Bohr's theory of atomic structure on astronomical and astrophysical research has indeed been no less remarkable than its influence on the sciences of physics and chemistry. The interpretation of the spectra of the sun, the stars, of the nebulae, of inter-stellar clouds, and nearer to us, the spectra of the major planets and of the comets has been notably advanced and aided by the simultaneous advance in our knowledge of the structure of atoms and molecules and by laboratory investigations on the light emitted or absorbed by them under various conditions. The more recent advances in our knowledge of the structure of atomic nuclei and of their transmutations has similarly exercised a profound influence on speculative astronomy, and stimulated discussion on the internal constitution of the stars and the origin of the vast outpouring of energy from them which we witness daily. The work of the astronomical

theorist on these problems has necessarily to be based on the results of terrestrial experimentation and on such inferences from them as are justified by established physical principles having the widest generality. Such work has a claim to acceptance which would not be extended to *ad hoc* hypotheses and speculations having no solid basis of experience behind them.

It is not surprising that the general advance of scientific activity in India during the past thirty years has been accompanied by an increased interest on the part of Indian physicists and mathematicians in the problems of astronomy, astrophysics and cosmology. The contributions by them to these sciences have not passed unheeded by the professional astronomers in other countries. Indeed, it may be claimed without exaggeration that the influence of Indian work in this field has been surprisingly great in proportion either to its volume or the actual effort put into it.

Astronomy, however, like all other sciences, depends for her progress mainly on the work of those who have devoted their lives exclusively to her service. Surveying the contribution of India to astronomy during recent years, one of its most heartening features is the work done by the Nizamiah Observatory at Hyderabad (Dn.) under its present Director, Rao Saheb T. P. Bhaskara Sastri. The equipment of this Observatory is comparatively modest and consists principally of an eight-inch photographic telescope and a fifteen-inch visual instrument. This equipment has been used mainly for co-operating in the great international undertaking known as the "Carte du Ciel" which

consists in making a detailed photographic survey and chart of the stellar universe. Regular observations of the variable stars is also part of the programme of the Nizamiah Observatory. The reports of the International Astronomical Union bear testimony to the speed and thoroughness with which the undertaking has been carried forward. The twelve volumes of the *Hyderabad Astrographic Catalogue* published by the Observatory form an impressive record of its work. Numerous short papers arising out of the variable star observations have also appeared in the scientific periodicals.

Though not actually "made in India", the work of S. Chandrasekhar, now Professor of Astrophysics at Chicago University, has a claim to notice in an article on astronomical research in India, if only as an indication of what could be accomplished in this country under favourable conditions. It would require an entire number of *Current Science* and not a paragraph or two to sketch the many fields of astronomical and astrophysical research traversed by Chandrasekhar and the results obtained by him during the last fifteen years. The *Monthly Notices* of the Royal Astronomical Society during the years Chandrasekhar was at Cambridge, and the last ten volumes of the

Astrophysical Journal since he went to the United States bear witness to his energy, the strength and range of his scientific interests and his powers of investigation and exposition. His two treatises on "Stellar Structure" and "Dynamics of Stellar Systems" published by the Chicago University Press make his work in the respective fields conveniently accessible to specialist and non-specialist alike. A memoir on "Stochastic Problems in Physics and Astronomy" which appeared as the January 1943 issue of the *Reviews of Modern Physics* establishes links between the problems of stellar astronomy and those arising in colloid chemistry, and is a very remarkable effort in scientific synthesis.

In concluding this series of articles, the writer ventures to express the hope that they will not altogether fail to accomplish their purpose, namely that of impressing on all those interested in the scientific and cultural progress of India, the need for making generous provision for the promotion of astronomical study and research in our country, of encouraging those who are interested in the subject, and of making it possible for Indians working in their own country to contribute to its progress.

C. V. RAMAN.

SRI JAYACHAMARAJENDRA INSTITUTE OF INDIAN MEDICINE, BANGALORE

ON the occasion of the Laying of the Foundation Stone of Sri Jayachamarajendra Institute of Indian Medicine at Bangalore held on December 11, 1943, His Highness the Maharaja of Mysore declared:—

"I have watched with interest the researches made in this country from time to time in the indigenous systems of medicine. For want of facilities or due to other circumstances, they do not seem to have been conducted on modern recognised lines. It is only exhaustive investigation based on scientific methods in a well-equipped laboratory that will help the achievement of definite results of permanent value.

The rapid spread of education and the introduction of the more scientific and systematic methods of allopathy have led to the neglect of our ancient Ayurvedic and Unani systems of medicine. No one can deny that many indigenous drugs and medicinal preparations are potent and valuable. But the days of blind belief in the authority of the written word are gone and any system of medicine must stand scrutiny by the searching eye of accurate observation and experiment. A careful and assiduous application of modern scientific methods of chemical and biochemical research into the actions and uses of our indigenous drugs can alone convince a thinking public. I am, therefore, glad to note that the aim and object of this Institution is not merely to train

pupils in the art of preparing and modes of using the medicinal preparations for which Ayurveda and Unani are noted. It will be a centre for organized research, on modern scientific lines, into the actions and uses of our indigenous drugs and herbs.

The advent of allopathy has made it imperative to import from foreign countries large quantities of drugs and medicines, many of which are expensive. I hope that every attempt will be made, by diligent research in this Institution, to find out simple and inexpensive substitutes which will be within the reach of even the poorest class of patients.

It has been said that no two practitioners of Ayurvedic or Unani prepare their medicines according to the same formula. There is great scope for improvement in this respect; and the standardization of indigenous medicines may very well be another object deserving of consideration in this Institute.

I should like to see greater mutual understanding, a spirit of give and take, and more co-operation between the practitioners of indigenous systems and allopathy. After all, where a patient's ailment is concerned, it is his speedy recovery and restoration to good health that counts, and not the particular method of treatment adopted, and faith plays no small part in the process of healing. This Institution, I expect, will be a meeting place for all practitioners—indigenous and allopathic alike."