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SCIENTIFIC ASPECTS OF SILK PRODUCTION

LIKE many other Indian Industries, silk production, in the past, has had to pass through many vicissitudes and misfortunes ; these periodic crises have been analysed neither with sufficient scientific precision nor with a full appreciation of the complex factors which influence the biological production of silk. The approach to the problem hitherto has been largely on the economic and organisational fronts and all the serious and conscientious attempts in this direction have not apparently helped this important industry to stabilise itself.

The finding that the silk fibre offers the best and the safest material for the manufacture of parachute fabrics, was responsible for rocketting the prosperity of the industry during the war. As was expected, with the return of peace, and with the phenomenally rapid rehabilitation and rise of the Japanese industry, the Indian silk is, at the moment, threatened once again with a crisis.

Our contributions to the scientific studies of the silkworm and of its fibre, have not been comparable either in quality or in quantity to those made by others in this field. Our researches in this direction would be appraised as comparatively inconsequential, mediocre and third rate. The reasons are not far to seek. In spite of the great and abiding interest which our National Government have recently been evincing, the general conditions for scientific work in the Country still remain uncertain and discouraging; they cannot attract first-rate men to take up scientific research as a career. Plans and proposals for starting a Central Institute for Silk Research, we are told, were made three years ago; nothing concrete, however, has so far emerged. The Government has been slow in taking decisions in this matter.

To-day, the investigator who aspires to

elucidate the fascinating problems of silk production—biological and biochemical—is in an exceptionally advantageous and a far happier position. If he is properly equipped, he can command a variety of experimental techniques and methods which have been developed in recent years. In this connection we must refer to the spectacular work of Zamecnik and his colleagues (*Science*, 1949, 109, 624) who, working in the Chemical and Biological Laboratories of the Harvard University, have accomplished the biological synthesis of radioactive silk. They have tested the ability of the giant silkworm *Platysamia cecropia*, to incorporate radioactive glycine and alanine into the silk it synthesises. The radio activity was shown to be present in the α-carboxyl group of some amino acid associated with the silk fibre.

Silk is a protein, biologically elaborated by the silkworm and broadly comparable to the casein elaborated by the mammary glands of the cow, to the albumin of the egg laid by the hen and to the wool grown by the sheep.

Thanks to the brilliant and sustained researches of the European, the American and the Australian investigators, the efficiency of the three biological agencies- cow, the hen, and the sheep—as conve of their respective feed proteins into characteristic protein secretions- casein of the milk, the albumin of the and keratin of the wool fibre—have worked out. The cow has been four possess a conversion efficiency of abou per cent.; the hen comes next with efficiency of only 50 per cent. In the of the sheep, Australian workers l found that a daily dose of a gran cystine increases the yield of wool by per cent.

The biological efficiency of the silkw as a converter of feed protein into protein is a problem which awaits solut There are several other problems similar magnitude and importance fa us in the field of silk production.

The All-India Silk Board, which, understand, has been constituted, will, hope, take up this question and lay d a progressive policy of vigorous sustained research which must be recog ed as the only infallible and ratic means of placing the silk industry c sound and stable foundation.

THE ATOMIC CLOCK

FOR many years, at the United States Naval Observatory and other national observatories where time is recorded and dispensed, quartz-crystal-controlled clocks have been used to keep time as accurately as does the earth itself—to about 1/1,000 of a second per day. Nevertheless, quartz-crystal clocks are subject to vagaries that have indicated the need for even more accurate means of control. This has now been found in what is known as the "atomic clock," developed at the National Bureau of Standards by Dr. Harold Lyons and members of the staff of the Bureau's microwave research laboratory.

The frequency of an absorption line produced in the microwave region of the spectrum by ammonia gas under a pressure of 10 or 15 microns is now used as the "governor" on apparatusc apable of time constancy of one part in 10 million, with a theoretical potential accuracy of one part ir billion or more. If the microwave signal out of a quartz-controlled frequency gener differs in frequency from that of the ammc absorption line, the control circuits gene an error signal which brings the microw signal back to the frequency of the spect line.

In addition to its obvious astronomical plications, such as furnishing an invar check of the earth's rotation, the atomic cl will prove invaluable in many fields. It provide room for more stations in the ra broadcast spectrum, as station transmitter quencies can be maintained to very close to ances. It will aid all radar operations and vigation systems that depend on radio, and assist in basic research in microwave spec scopy and molecular structure. (By courtesy *Sky and Telescope*, 1949, VIII, P. 223.)