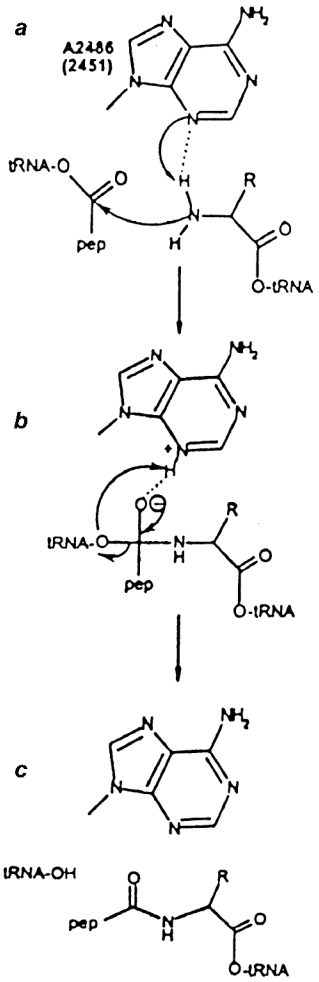

Figure 2. Adenine catalysed peptide bond formation in ribosome.

due of 23S RNA involved in catalysis in the first step, is presumably A2486 (equivalent to A2451 of *E. coli* and located in domain V) whose N3 is about 3 Å from its phosphoramide oxygen (analogue of tetrahedral carbon of the intermediate). No other base is closer than this. N3 (or N1) has to act as acid-base catalyst to carry out the desired function. The pK_a of N1 is about 3.5 and that of N3 is two units lower. To act as acid-base catalyst it should be 7 or more. Muth *et al.*[17] measured the pK_a of this particular base in domain V by pH dependence of dimethylsulphate modification and showed that it has pK_a of about 7.6 ± 0.2. The unusual pK_a may derive in part from the hydrogen bonding to G2482 (G2447 of *E. coli*) which also interacts with a buried phosphate. The mechanism of peptide bond formation as catalysed by adenine (through either N_3 or N_1) is shown in Figure 2. It should be mentioned in this connection that serine proteases act through similar tetrahedral carbon intermediate as in the case of peptide bond hydrolysis. However, histidine (imidazole N) acts as the acid-base catalyst. So the peptide bond hydrolysis (mechanistically) appears to be reversal of peptide bond formation.

Das *et al.*[18] have reported that the tetrahedral intermediate may be converted to six-membered intermediate involving 2′-OH group of peptidyl tRNA which may spontaneously break-down to peptidyl tRNA with the new amino acid and free tRNA. This mechanism cannot be ruled out, although it seems unlikely now on the basis of the mechanism discussed above.

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OPINION

Indian popular science books need popular appeal

Dilip M. Salwi

Popular science books aimed at the young between 6 and 16 are the need of the hour because science and technology is making inroads into their daily life. A society using science and technology in a big way, as is our society now, without making her young aware of science and technology and its effect on society is heading for suicide. Says the American science writer Seymour Simon, 'If they're (children) not reading books about science by the time they're twelve, you've probably lost them'. In India, writing popular science books for the young has still not caught on among scientists, except in Hindi and some regional languages like Bengali, Assamese and Marathi. Some science writers have certainly tried their hand at it, both in English and regional languages. But the question is, how good are Indian popular science books *vis-à-vis* those published in the West?

Under a fellowship of the International Youth Library at Munich, Germany, I

selected about 20 popular science books published in India and analysed their contents and presentation with the latest published in the West. My findings are as follows: (i) The Western books are more visual-orientated, less verbose and give more emphasis on conceptual understanding, rather than simply stating facts and figures; (ii) Indian books, at large, do not contain details of any experiments or activities supporting the text; (iii) Indian writers tend to present everything that they know of or have done research in. The Western writers instead give a wholistic idea of the subject by giving titbits in box items; (iv) Indian books are often serious, whereas some Western books are written in a lighter vein, showing that science and scientists also offer scope for fun or humour; (v) Indian books do not contain index or references for further reading, which have become a standard practice in all the Western books because they are often referred to in class rooms and personal studies; (vi) Indian books are entirely dependent upon artists for depiction of scientific information. The Western books not only use colour photos, but also label sketches, plaster of paris models and paper collages to explain science; and, last, but not the least; (vii) Most Indian books are produced in black and white and the paper used is of an inferior quality.

Why Indian books are so can be attributed to several factors: the way science was planted in the country, her educational pattern and publishing industry, lack of communication skills among scientists and science writers and their psychological makeup. Indian books can be improved if they are not considered to be the sole brain-child of the author by the publishing houses. The books should be produced only after consulting editors, scientists, artists and photographers in presenting the text and visuals. The books should first be test-read by the young before they are published. Interactive books containing experiments, activities, models, etc. should be written. Scientific information should be woven with history, biography, statistics, fun, etc. to make it more palatable to the young. The entertainment value of a popular science book should not be forgotten or ignored. Finally, nowadays, the young people do not 'read' books; instead they 'graze' books, i.e. they read books while they are engaged in other activities, especially watching television. The books have, therefore, to be written and produced in such a way as to be emenable to this practice of the young.

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Presidential Address

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I never realised, nor came near to realisation of the vast field that there is in India for the organised efforts of science until the census of 1931 put me into a position in which I could hardly overlook it. The first essentials of sociology are accurate statistics, and most of the few statistics available in India are obtained by crude methods and give results which are insufficiently exact. We know for instance that the population has increased but we can only guess at the causes; we cannot in India as a whole be certain of where or when the increase took place beyond locating it over a period of 10 years. In Madras alone was the registration of births and deaths sufficiently accurate for the population of 1931 to be determined approximately before the counting took place, and even then we cannot be sure that that accuracy was not an accident. How far the variation of fecundity in different parts of India is due to environment, heredity or social customs we have no means of knowing, since detailed local studies are wanting. Mr Porter in Bengal has embodied in his Census Report for that province an interesting speculation on the future growth of the population of Bengal; but the figures on which it is based being limited to seven enumerations are not enough to warrant our taking it as more than a speculation. Even so it leads us at once to the urgent need of a greater application of science to matters of rural economy. It is probably true enough that improved methods of agriculture can so increase production that the population of this country is not an immediate danger of outstripping its potential food supply. But I say potential advisedly. It is very clear that in other respects the position is serious. The vast majority of India's population live an agricultural life not only by force of circumstances but by deliberate preference and under their existing conditions of ignorance and of absence of capital, the population attempting to live by agriculture is likely to become, if it has not already done so, much too numerous for the land to support. The subdivision of holdings which are insufficient to maintain their owners, must tend to reduce the economic output from their land while the increase of cultivators and in particular of landless agricultural labourers calls for an increasingly high return from the land. In limited areas and to a limited extent some relief is afforded by seasonal industries (such as cotton in Central India) which enable the agricultural population to add to the income derived from land; in other areas cottage industries give similar assistance, but the extent of these reliefs is entirely inadequate to the need, and there is an obvious call for a great extension of part-time industries in which the cultivator can find employment when he is not required on his fields. To give one instance, it is probable, if not certain, that the application of scientific methods of breeding, feeding and selection could double the out-turn of silk in India without any increase in the number of cocoons, and could at the same time enormously improve the quality of the silk. Indeed, for at least one Assam tribe the silkworm provides not only clothing but an article of food, as the pupa is much relished and reserved as a delicacy for favoured guests. But without seeking to popularise this use of the silkworm, the extension of silk producing, on scientifically improved methods, as a cottage industry might make India easily the premier silk-producing country in the world.