

Early research in India on primate tool using

Tool using by free ranging chimpanzees in East and West Africa is now well known to ethnologists. One of the earliest examples of the study of tool using by a captive chimp originates from the Teneriffe island research station¹. This was followed by the famous work of Koehler² in 1915 and later summed up³ in 1925.

We have recently come across a relatively obscure paper in which, as early as in 1902, tool using by a captive orang at Alipore Zoo, Calcutta was described by Sanyal⁴, the first Indian Superintendent

of that zoo. The orang at first tried, ineffectually, to reach the remnants of a proboscis monkey's breakfast in the adjoining cage. Then he collected straws from his sleeping quarters, fashioned a rough rope out of these. With the help of this rope he succeeded in pushing the tin of breakfast within reach.

- 1 Rothman, M. and Teuber, E., *Einzelausgabe aus der Anthropoidenstation auf Teneriffa*, 1915.
2. Koehler, W., *Aus der Anthropoidenstation auf Teneriffa*, 1915.

3 Koehler, W., *The Mentality of Apes*, New York, 1925.

4. Sanyal, R B., *J. Asiatic Soc. Bengal (Calcutta)*, 1902, LXXI(2), 92.

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More on microbiology

R. Maheshwari's commentary 'Whither microbiology' (*Curr. Sci.*, 1995, 69, 401-406) was an eye-opener even for a dyed-in-the-wool biologist like me. How many younger biologists would know without the benefit of this article that a study of microbiology will show that life is an autocatalytic process, that the principle of natural selection can be understood by raising enrichment cultures, that we can understand the unity of biochemistry, regulatory mechanisms, existence of permease, learn that bacteria invented photosynthesis and that plant chloroplasts are merely domesticated cyanobacteria, and that the study of *Neurospora crassa* led to the formulation of one-gene-one-enzyme hypothesis which revolutionized biology? Maheshwari has presented the case for the study of microbiology very persuasively and eloquently. To further strengthen Maheshwari's brief I quote the following from a recent article¹: 'Recent analyses of phylogenetic frameworks have confirmed that the filamentous fungi share the closest evolutionary relationship to

the Animalia of any non-animal group. As model systems for understanding biochemical genetics and gene regulation, the fungi have been particularly useful. Well-known examples include cracking the cell cycle using genetics and molecular biology, analysis of the mechanism of intracellular signaling via heterotrimeric G-proteins, cell type - specificity determination (all in the yeasts *Saccharomyces* and *Schizosaccharomyces*), and developmental patterning of growth habit as in the slime mould *Dictyostelium*. The best molecularly studied microbial clock system, and one of the best understood circadian systems in any context, is that of the ascomycete fungus *Neurospora crassa*, in which a circadian biological clock controls several aspects of growth and development. There is much reason to believe that the *Neurospora* clock system (input, mechanism and output) will be the first complete system to be resolved at the molecular level.'

Microbiology is nearly the whole of biology in a microcosm. Yet as C. Woese observes (cited by Maheshwari), 'Univer-

sity microbiology departments are withering. . . . Microbiologists are afraid to teach real microbiology anymore.' At the University of Wales, what was once a flourishing and world famous Department of Microbiology, headed by David Lloyd, was merged into rest of biology. I fervently hope that Maheshwari's stirring article will draw the attention of students who are on the threshold of choosing some kind of biology. In a lighter vein, in my ignorance I had all along believed that extremophiles, were scientists who went to extremes of maintaining that their kind of science alone mattered.

1. Loros, J *Sem. Neurosci.*, 1995, 7, 3-13.

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