D.D KOSHAMBI: A HISTORIAN (PART-2)

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HIS WORKS

- ***I. Books***
- *1.* ***An Introduction to the Study of Indian History*** *(Popular Book Depot, Bombay, 1956). 2. Exasperating Essays: Exercise in the Dialectical Method* (People's Book House, Poona, 1957) . *3.* ***Myth and Reality: Studies in the Formation of Indian Culture*** (Popular Prakashail, Bombay1962). *4.* ***The Culture and Civilisation of Ancient India in Historical Outline*** (Routledge & Kegan Paul, London, 1965) .

HIS WORKS

- ***II. Edited Works***
- *1. The Satakatrayam of Bhartrhari with the Comm. of Ramarsi,* edited in collaboration with Pt. K. V. Krishnamoorthi Sharma (Anandasrama Sanskrit Series, No.127, Poona, 1945) *2. The Southern Archetype of Epigrams Ascribed to Bhartrhari* (Bharatiya Vidya Series 9, Bombay, 1946)(First critical edition of a Bhartrharrecension.) 3. *The Epigrams Attributed to Bhartrhari* (Singhi Jain Series 23, Bombay, 1948), pp. viii+82+240. (Comprehensive edition of the poet's work

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remarkable for rigorous standards of text criticism.) *4. The Subhasitaratnakosa of Vidyakara,* edited in collaboration with V.V. Gokhale

(Harvard Oriental Series 42 1957 *5. The Cintamani-saranika of Dasabala;* Supplement to *Journal of Oriental Research,* xix, pt, II (Madras, 1952) . (A Sanskrit astronomical work which shows that King Bhoja of Dhara died in 1055-56.)

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- Damodar Dharmananda Kosambi1 was a man of many parts: Harvard graduate, mathematics professor, historian, archaeologist, epigraphist, polyglot, numismatist, Sanskritist, Indologist, and Marxist: the list of his identities and his personæ is a long and varied one.
- Over a period of a little over 35 years Kosambi built a reputation as a major (if somewhat maverick) thinker of modern India, and this reputation has largely remained intact over the years. Widely regarded as one of the founding figures of contemporary Indian historiography, Kosambi

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quantified numismatics and used statistical inference to inform the study of Indian history . His contributions to Indology and the study of prehistory have been fundamental, and his translations of the poetry of Bhartrhari are considered definitive. As it happens, while the historian, Indologist, and numismatist Kosambi has been written about and his articles and papers in those areas have been published in collections and celebrated, much less has been done with regard to his contributions to mathematics and statistics.

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- **As a mathematician**

This is surprising for at least two reasons. Kosambi was first and last a mathematician in that his first independent paper and his last-known academic contribution were both in mathematics. Indeed, mathematics was the one constant and consistent preoccupation of his professional life: he says as much in the epilogue to his posthumously published autobiographical essay

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his first paper was written when he, then 22 years of age, was temporarily at the Banaras Hindu University in 1930, and his final work, a monograph on prime numbers , was submitted to publishers very shortly before his death at the age of 59, in 1966. It can be argued that his major contributions in other areas were moulded by his knowledge and style of mathematics.

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Most scholars who have been influenced by the historical writings of Kosambi are acquainted with a lesser extent with the nature and range of his mathematical contributions . This is mainly a domain issue: as a field, mathematics and history are perceived as separated by a major cultural divide, and there is a general (and reasonable) feeling that the mathematics would be too difficult to understand by any but a trained mathematician. Ironically, Kosambi had in his lifetime experienced the

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same reaction from the other side—his scientist colleagues at the TIFR had also not appreciated the nature and the extent of his contributions to Indology and the study of Indian history. Kosambi's intellectual legacy needs to be considered in its totality; the mathematics is integral to his thinking and analysis and cannot be seen as separate from the work in numismatics or, for that matter, history. He wrote about 65 papers that were of a mathematical or statistical nature .

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Some articles were pedagogic expositions rather than original contributions, and some were multidisciplinary in the sense that they integrated linguistics or numismatics along with the mathematics or statistics. Two were the same work in two languages, Chinese and English . In addition, there were original contributions in German and French and one of his papers had been translated into Japanese .

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He wrote at least two mathematical monographs, but regrettably, these never appeared in print, and the manuscripts of both of them are lost. Towards the end of his life, he published two articles in the Journal of the Indian Society of Agricultural Statistics that tangentially implied that he had a proof of the Riemann hypothesis. These articles contained an incomplete and flawed approach to this very fundamental mathematical problem. the damage that they caused to his reputation as a serious mathematician was irreparable and irreversible.

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- A note on the trial of Socrates appeared in the magazine of Fergusson College in 1939, marking his initial professional foray outside mathematics. In 1940, this was followed by The emergence of national characteristics among three Indo-European people in the Annals of the Bhandarkar Oriental Research Institute. By this time, he had also begun his careful analysis of the weights of ancient coins—the first publication on this topic also dates to 1940—and marks the start of his use of quantitative methods in historical analysis.

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- The years of World War II saw Koshambi at his creative best. Between 1939 and 1944, he published 35 articles including two papers he wrote in 1943–1944 which brought him considerable renown. One that appeared in the Journal of the Indian Mathematical Society, Statistics in function space is a method for decomposing an arbitrary signal into its significant components, a technique termed the principal value decomposition. Today, this is known as the Karhunen–Loève expansion, although both Karhunen and Loève did their work only later, in 1947 and 1948, respectively.

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- It is regrettable that Kosambi's work was not followed up either by him or by others (although it was reviewed in Mathematical Reviews). The second contribution is in his 1944 paper in the Annals of Eugenics . This work in genetics, on what is termed the map distance, quantifies the genetic similarity in terms of the In 1945, Koshambi left Fergusson College to move to the newly established Tata Institute of Fundamental Research (TIFR) in Bombay meandering intellectual interests, his personal politics, his mathematical obsessions,

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and his personal angularities all combined to make his tenure at the recombination frequency of linked genes. At the time when he did the work, his knowledge of genetics was probably minimal, and the structure of DNA was itself largely unknown. Nevertheless, Kosambi provided an interesting and useful method to estimate the map distances from recombination values and this work continues to be used and cited even to this day. TIFR a fraught one.

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- following an invitation from the founding director, Homi J. Bhabha, to help establish a School of Mathematics. This remained his address for the next 16 years, although his increasingly
- The relationship between Bhabha and Kosambi started off on a cordial note. Bhabha was responsible for having koshambi elected president of the Mathematics Section of the Indian Science Congress that was held in Delhi in early 1947 where he gave his presidential address on "Possible applications of the functional calculus"

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a summary of his ideas on function spaces and the proper orthogonal decomposition .

Bhabha also helped arrange a year's visit to the USA for him .He gave a course of lectures on tensor analysis at the University of Chicago and also spent time at the Institute for Advanced Studies in Princeton as well as Harvard and MIT in Cambridge.

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- Towards the end of the 1950s, Kosambi started working on the Riemann hypothesis. He published two papers offering a proof of this problem, in the Indian Journal of Agricultural Statistics . The motivation for his foray into this work remains unknown since his approach, a probabilistic one, does not evolve out of his earlier work. At any rate, his choice of the journal and the scale of his claim (since the Riemann hypothesis remains unproven today)

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exposed him to ridicule, both professionally and in person. Mathematicians who knew Kosambi speak of this phase of his life with a distinct air of embarrassment.

The relationship with Bhabha soured, and Koshambi's contract with the TIFR was not renewed after 1962, making him one of the very few people to have effectively been fired by the Tata Institute of Fundamental Research. Between 1962 and 1964, he was without a formal position although he published papers both in and outside mathematics. Peculiarly, he wrote four of these under the pseudonym S. Ducray .

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In 1964, he was appointed a CSIR emeritus professor attached to the Maharashtra Vidnyanvardhini in Pune, a position he held until his death in 1966. There remain important gaps in writings by or on Koshambi that need to be filled in the order that an accurate picture of the evolution of his intellectual framework can be drawn. His extensive correspondence with Professor and Mrs. R.J. Conklin between 1930 and 1948, friends of him from his undergraduate years at Harvard, is only partly available.

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- The TIFR correspondence is on record, and the details of the relationship with Bhabha that started out so cordially and ended in so much acrimony that DDK could not bring himself to be generous even after Bhabha died are again well enough known but incompletely analysed. A series of letters exchanged between Divyabhanusinh Chavda and DDK in his final and very bitter years remain essentially unknown. Some of these gaps are being addressed, most recently in Unsettling the Past, a collection of essays by and on Kosambi.

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- Kosambi is best known as a mathematician, but he is endowed with a truly Renaissance versatility. His formula for chromosome distance occupies a central place in classical genetics. His work on coins makes the numismatics of hoards into an exact science. An unrivalled collection of microliths, the discovery of a Brahmi inscription at Karle, and of a remarkable number of megaliths with rock engraving form substantial contributions to archaeology. His editions of the poetry of Bhrtrihari and of the oldest known Sanskrit anthology are landmarks in Indian text-criticism. (To be continued)