



Indra's Pearls: The Vision of Felix Klein

By David Mumford, Caroline Series, David Wright

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Felix Klein, one of the great nineteenth-century geometers, rediscovered in mathematics an idea from Eastern philosophy: the heaven of Indra contained a net of pearls, each of which was reflected in its neighbour, so that the whole Universe was mirrored in each pearl. Klein studied infinitely repeated reflections and was led to forms with multiple co-existing symmetries. For a century these ideas barely existed outside the imagination of mathematicians. However in the 1980s the authors embarked on the first computer exploration of Klein's vision, and in doing so found many further extraordinary images. Join the authors on the path from basic mathematical ideas to the simple algorithms that create the delicate fractal filigrees, most of which have never appeared in print before. Beginners can follow the step-by-step instructions for writing programs that generate the images. Others can see how the images relate to ideas at the forefront of research.

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Bibliography

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Editorial Review

Review

"[This book is] richly illustrated with these wonderful and mysterious pictures and gives detailed instructions for recreating them, right down to the level of computer programs (written in pseudo-code, and easy to translate into any computer language) ... the reader who attempts any substantial subset of [the projects] will gain enormously ... Even those who are convinced they have no ability to visualize may change their minds ... It is almost required reading for the experts in the field ... I truly love this book."

John H. Hubbard, *The American Mathematical Monthly*

"It has been a great pleasure to read such a gracefully written, original book of mathematics ... it is a flowing narrative, leavened with wit, whimsy, and lively cartoons by Larry Gonick. The three authors, with the support of Cambridge University Press, have produced a book that is as handsome in physical appearance as its content is stimulating and accessible. The book is an exemplar of its genre and a singular contribution to the contemporary mathematics literature."

Albert Marden, *Notices (journal of the American Mathematical Society)*

"The production of the book leaves nothing to be desired. It is splendid. Printed entirely on glossy paper, with practically all of the many figures in glorious color, the book has a number of admirable design features: large type and wide margins wherein references are given and occasional comments (often quite talky) are made. Cambridge University Press has done a beautiful job, and David Tranah of the Press deserves special commendation for his role in pulling out all the stops."

Philip J. Davis, *SIAM News*

"All of it is patiently explained ... By the time you finish, you'll know your way around the complex plane."

Brian Hayes, *American Scientist*

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Michael Field, *Science*

"I rarely feel a certain kind of euphoria by just looking at the cover of a mathematics book. But that happened with Indra's Pearls: The Vision of Felix Klein ... [contains] fantastic illustrations together with apparently well-founded mathematical explanations ... [it is] presented in an accessible way which dares to prioritize general comprehension above a strict theoretical approach ... As far as I know, this book is one of the most beautiful examples of the illustration of the inherent aesthetic beauty (which exists) within mathematics ... the images are of the highest quality obtainable at present for mathematical structures. Everyone, who ever tried to create something comparable, knows how difficult it is."

Jürgen Richter-Gebert, *Technische Universität München*

"This unique book can serve as a pedagogical and visual introduction to group theory for schoolchildren, and yet is just as suitable for professional mathematicians: I believe that both of them would read the book from the beginning to the end. Finally, it can be used as a book for popularising science, but is very different from most fashionable books on strings, black holes, etc: it gives you the joy of seeing, thinking and understanding."

European Mathematical Society

"This is a beautifully presented book, rich in mathematical gems."

The Mathematical Gazette

"One can browse through the numerous beautiful and fascinating pictures and marvel at them ... Readers with widely different backgrounds will find something enjoyable in this unique book."

Acta Scientiarum Mathematicarum

About the Author

David Mumford has been University Professor in the Division of Applied Mathematics at Brown University since 1996. Before that he was at Harvard University for thirty-five years. He has been a contributor to the Calculus Textbook Project, led by Hughes-Hallett and Gleason. Over his long and distinguished career, Professor Mumford has received many awards and honours, including the Fields Medal in 1974, the Wolf Prize in 1998 and the National Medal of Science in 2010.

Caroline Series is Professor of Mathematics at Warwick University where she currently holds an EPSRC Senior Research Fellowship. She was Kennedy Scholar at Harvard University from 1972 to 1974. In addition to technical publications, she has contributed widely to the popularization of mathematics. In 2014, she won the first Senior Anne Bennett Prize of the London Mathematical Society for contributions to mathematics and to the advancement of female mathematicians. She edits the new International Women in Maths website <http://www.mathunion.org/wim/>.

David Wright is Professor at Oklahoma State University. He has held a guest professorship at the University of Göttingen, and was Sloan Fellow at the Institute for Advanced Study in Princeton from 1988 to 1990. From 1997 to 1999 he helped establish the famous William Lowell Putnam Mathematical Competition. In 2009 he received a Distinguished Teaching Award from the Mathematical Association of America.

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