

The “What Is...?” Column Turns 50

Allyn Jackson

With this issue of the *Notices*, the “What Is...?” column reaches a landmark, its 50th installment. The column was born in 2001, when for some reason I was wondering what a *brane* is. What a strange name, I thought. What could a brane be?

Mathematics is replete with bland terms like *normal space*, *regular map*, *simple group*, *complex number*. But there are also plenty of names just as intriguing as brane—terms like *amoeba*, *gerbe*, *shtuka*, and *grope*. As I accumulated a list of such terms, a concept emerged for the “What Is...?” column: Each installment would focus on a single mathematical object, preferably one with a whimsical name that was being bandied about, making people wonder what the thing could be. I imagined people hanging around in math department common rooms asking each other, “Just what is a gerbe anyway?” Then someone who had been leafing through a copy of the *Notices* would burst out, “Hey! It’s right here! In the *Notices*! There’s an article called ‘What is a gerbe?’” (This column, written by Nigel Hitchin, appeared in the February 2003 issue.)

Requiring that every “What Is...?” topic have a wonder-inducing name like “gerbe” seemed to narrow the field too much. By relaxing that rule a bit the list of possible topics grew to about fifty terms, some of which (*dunce hat*, *crumpled cube*, *Lego*, *nurb*,...) never went anywhere. Once about twenty topics were paired with potential authors, the column looked viable.

The “What Is...?” column harks back to the classic *What Is Mathematics?* by Richard Courant and Herbert Robbins. Another precursor is the distinguished series of articles with “what is” format titles that appeared in the *American Mathematical Monthly*, such as “What Is Geometry?” by Shiing-Shen Chern [97 (1990), no. 8, 679–686]. But the *Notices* column would be different from these venerable progenitors. Rather than tackle a wide swath of the field, the “What Is...?” column would zero in on one particular object. By describing the role the object played, the column would ideally provide a window on the branch of mathematics in which the object arose.

Allyn Jackson is senior writer and deputy editor of the *Notices*. Her email address is axj@ams.org.

From the outset, we wanted the “What Is...?” column to be conceptual and nontechnical. We imposed a strict limit of just two pages partly to discourage authors from larding their columns with technical detail. A list of “Further Reading” would contain no more than three items—usually expository works that develop the topic further rather than research papers that support the assertions made in the column.

Early on, before the column established an identity, it was often difficult to get people to write. Nowadays it’s a bit easier, for people seem to understand what the column is about and agree more readily to write. And we have gotten some high-quality unsolicited contributions. But the challenge of identifying good topics and good authors still remains. The *Notices* Editorial Board has been an important source of ideas and advice for the “What Is...?” column, particularly Susanne Brenner (Louisiana State University), the board member designated to help with the column. From the column’s inception, D. Kotschick (Ludwig-Maximilians-Universität München) has generously provided much guidance and help.

The “What Is...?” column was in part inspired by the phenomenon of math department seminars like the “Basic Notions” seminar at Harvard, whose goal is to present informal, nontechnical expositions about fundamental ideas in mathematics. This inspiration has now come full circle with the establishment of “What Is...?” seminars in mathematics departments at, for example, the University of Michigan, Cornell University, and the ETH (Eidgenössisches Technische Hochschule) in Zurich. The University of Massachusetts at Amherst took the spirit of the column very much to heart by giving its seminar the whimsical name TWIGS (The “What Is...?” Graduate Seminar). TWIGS also recently celebrated its own milestone, the 100th installment of the seminar.

The target audience for the “What Is...?” column is first-year graduate students in mathematics. If the columns really are written at that level, many seasoned mathematicians enjoy them as well. We have had mixed success in making the columns really accessible. Some were way too difficult; others were just right. I don’t think any have been too easy. Some of the topics have been too recondite, while others have hit the mark in zeroing in on a concept that plays a key role in current research. Among those in this second category, my favorites include “What is a pseudoholomorphic

curve?” by Simon Donaldson (October 2005) and “What is an expander?” by Peter Sarnak (August 2004).

The inaugural column, “What is an amoeba?” by Oleg Viro, remains one of my favorites. It demonstrates the quintessentially mathematical act of taking a very complicated object and constructing a second, simpler object that amplifies some salient features of the original object so that those features can be visualized and studied.

Publishing columns by such masters of exposition as David Ruelle (“What is a strange attractor?”, August 2006), Harry Kesten (“What is percolation?”, May 2006), and Martin Davis (“What is Turing reducibility?”, November 2006) was a real privilege. The wisdom and experience shared in their writings are priceless. Other favorites of mine include “What is a free lunch?” by Fredy Delbaen and Walter Schachermayer (May 2004), which explains with verve and style just why the Black-Scholes theory is so powerful in finance, and “What is a minimal model?” by János Kóllar (March 2007), which manages to be both concrete and elegant. Valentin Poénaru’s recent “What is an infinite swindle?” (May 2007)—with evocative illustrations created by *Notices* Graphics Editor Bill Casselman and David Austin of Grand Valley State University—is written in a rapturous style that for me captures a sense of the magic and fascination that drives the best mathematics.

All the “What is...?” authors have worked hard to meet the column’s goal of offering brief gems of exposition that can be understood and appreciated by a wide mathematical audience. As we look to the next fifty columns, the *Notices* welcomes comments and suggestions from readers, which may be sent to notices-what-is.org.

The First 50 “What Is...” Columns

1. What is...an **amoeba**?

Oleg Viro

September 2002

2. What is...the **monster**?

Richard Borcherds

October 2002

3. What is...a **building**?

Kenneth S. Brown

November 2002

4. What is...an **alteration**?

Frans Oort

December 2002

5. What is...a **shtuka**?

David Goss

January 2003

6. What is...a **gerbe**?

Nigel Hitchin

February 2003

7. What is...a **train track**?

Lee Mosher

March 2003

8. What is...a **stack**?

Dan Edidin

April 2003

9. What is...a **worm**?

Harold Boas

May 2003

10. What is...a **bubble tree**?

Thomas Parker

June/July 2003

11. What is...a dessin d'enfant?

Leonardo Zapponi

August 2003

12. What is...a **curvelet**?

Emmanuel Candès

December 2003

13. What is...a **quasi-morphism**?

D. Kotschick

February 2004

14. What is...a **billiard**?

Yakov Sinai

April 2004

15. What is...a **free lunch**?

Fredy Delbaen and Walter Schachermayer

May 2004

16. What is...an **operad**?

James Stasheff

June/July 2004

17. What is...an **expander**?

Peter Sarnak

August 2004

18. What is...a **grope**?

Peter Teichner

September 2004

19. What is...a **topos**?

Luc Illusie

October 2004

20. What is...a **motive**?

Barry Mazur

November 2004

21. What is...a **flip**?
Alessio Corti
December 2004
22. What is...an **open book**?
Emmanuel Giroux
January 2005
23. What is...a **brane**?
Gregory Moore
February 2005
24. What is...a **dimer**?
Richard Kenyon and Andrei Okounkov
March 2005
25. What is...a **horseshoe**?
Mike Shub
May 2005
26. What is...**property tau**?
Alex Lubotzky
June/July 2005
27. What is...a **compacton**?
Philip Rosenau
August 2005
28. What is...a **Lefschetz pencil**?
Robert Gompf
September 2005
29. What is...a **pseudoholomorphic curve**?
Simon Donaldson
October 2005
30. What is...a **Gröbner basis**?
Bernd Sturmfels
November 2005
31. What is...a **random matrix**?
Persi Diaconis
December 2005
32. What is...a **quantum group**?
Shahn Majid
January 2006
33. What is...a **graph minor**?
Bojan Mohar
March 2006
34. What is...a **syzygy**?
Roger Wiegand
April 2006
35. What is...**percolation**?
Harry Kesten
May 2006
36. What is...a **coarse structure**?
John Roe
June/July 2006
37. What is...a **strange attractor**?
David Ruelle
August 2006
38. What is...a **quasicrystal**?
Marjorie Senechal
September 2006
39. What is...a **bad end**?
Charles Epstein
October 2006
40. What is...**Turing reducibility**?
Martin Davis
November 2006
41. What is...a **quasiconformal mapping**?
Juha Heinonen
December 2006
42. What is...a **projective structure**?
William Goldman
January 2007
43. What is...a **Young tableau**?
Alexander Yong
February 2007
44. What is...a **minimal model**?
János Kollár
March 2007
45. What is...a **tropical curve**?
Grigory Mikhalkin
April 2007
46. What is...an **infinite swindle**?
Valentin Poénaru
May 2007
47. What is...a **Galois representation**?
Mark Kisin
June/July 2007
48. What is...a **Higgs bundle**?
*Steve Bradlow, Oscar García-Prada,
and Peter Gothen*
September 2007
49. What is...a **Woodin cardinal**?
John Steel
October 2007
50. What is...**Boy's surface**?
Robion Kirby
November 2007