

## PASTA PUZZLE

**Question:** If you bend a piece of dried spaghetti it breaks into three pieces with the middle piece flying out. Why does this happen?

*In answer to this question we first reproduce a letter that appeared in the New Scientist on 18 February 1995 from Oliver and Richard Nickalls and J.E. Reeve—Ed.*

*Your recent letter on Feynman's joke (New Scientist, 14 January, 1995) reminded us of the passage in the book No Ordinary Genius (edited by Christopher Sykes; 1994) in which Danny Hills describes his and Feynman's experiments with spaghetti: "If you get a spaghetti stick and break it, it turns out that instead of breaking in half, it will almost always break into three pieces. Why is this true—why does it break into three pieces? ... Well, we ended up at the end of a couple of hours with broken spaghetti all over the kitchen and no real good theory about why spaghetti breaks in three."*

*The remaining replies below attempt to solve this problem—Ed.*

**Answer:** The sequence of events can be determined by looking at the broken ends. When a break occurs the fracture starts cleanly on the stretched convex side, and ends slightly raggedly on the compressed concave side where a small splinter is usually torn away from one side of the break. Careful inspection of the ejected middle piece will reveal evidence of spicule formation at both ends and that these are on opposite sides. This shows that the two breaks which generate the middle piece each occur while the spaghetti is bending in opposite directions, which is consistent with the dynamics of linear spaghetti structures.

*Oliver Nickalls, London University*

*Dick Nickalls, City Hospital, Nottingham.*

[www.nickalls.org/dick/papers/spaghetti/spaghetti\\_NS\\_1998.pdf](http://www.nickalls.org/dick/papers/spaghetti/spaghetti_NS_1998.pdf)