

The mathematics of egg shape

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Abstract

This paper explains why the shapes of eggs are oval, or why eggs stop on slopes. After touching Descartes and Cassini's oval curves, eggs are classified into 4 groups; oval, pyriform, circular, and elliptical. Because oval and pyriform eggs only stop on slopes, it is mentioned that eggs shape may be related to Darwin's evolutionary theory.

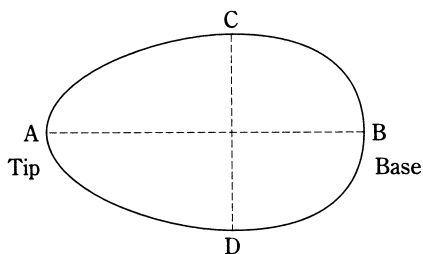
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1. Eggs stop on slopes

The main topic of interest in biology at the moment is DNA, but if you pay attention to shapes and numbers you will see that many mathematical elements are included, and in this essay, I'd like to explain the peculiar shape of eggs. I made a presentation about this topic at the August 1979 'mathematical seminar' under the title 'The shape of eggs', which was a long time ago but rereading it now, their shape seems just as strange.

Hasn't everyone thought that the shape of eggs used for cooking is strange? Eggs are oval, which means egg-shaped, so while the inquiry is just like a Zen riddle, let's reveal the secret little by little. In mathematics, a representative example of round forms is the circle. Circles may be determined by their center and radius. At high school we learn about ellipses, which are circles stretched sideways and their curve is determined as a constant sum of the distance to two foci (or fixed points).

Eggs are neither circular nor elliptical. Eggs are oval. If you observe an egg closely, the distance from the center is not a fixed circle. The horizontal aspect has a longer ellipse-like form. Observing closely once again, one horizontal direction is roundly curved but the other is pointed (Figure 1). This is the shape of an egg. The longer axis is called the major axis, and the shorter is called the minor axis. The rounded end is called the base and the pointed end is



AB: Major axis, CD: Minor axis

Figure 1 the shape of an egg

