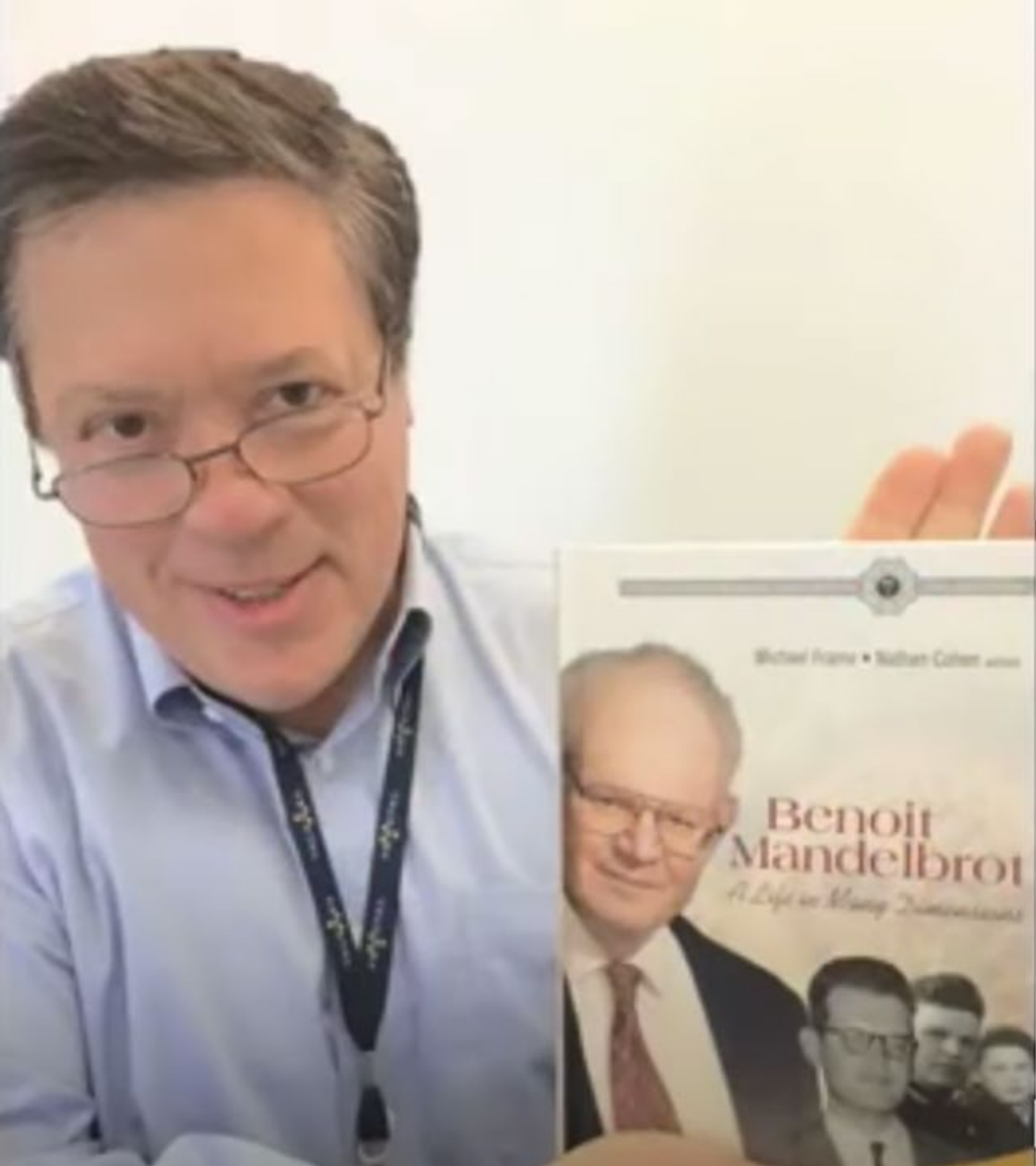


The Fractal Antenna

Miracle or Myth ?

w6nbc.com/slides.html



Nathan Cohen

Fractal Inventor

United States Patent US 7,256,751 B2
Cohen *Aug. 14, 2007

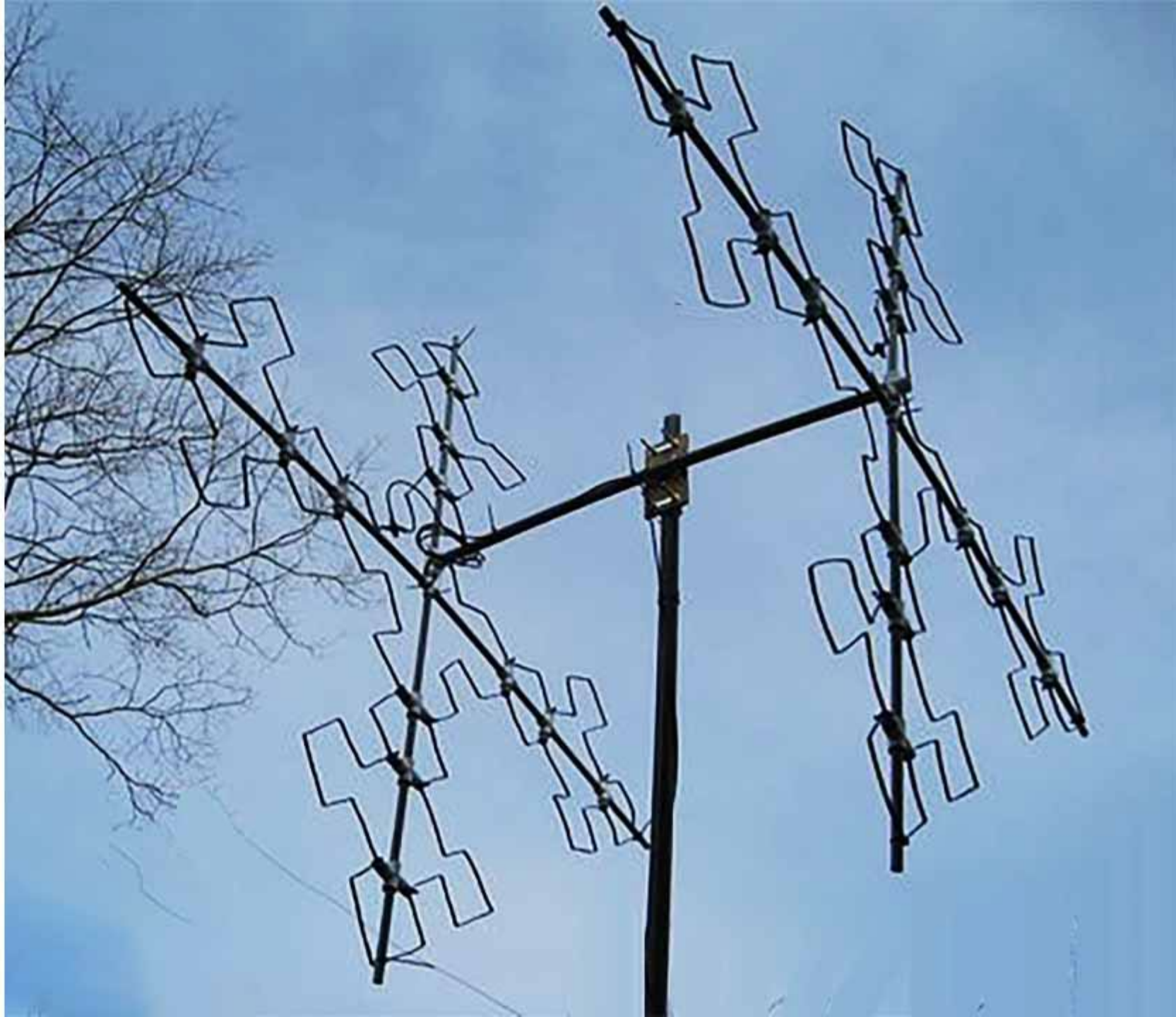
*Validly Defends
Fractals*

<https://www.youtube.com/watch?v=6pRhGTD4caE>

**Even if NOT
a Myth**

**Hams are still
Uncertain**

**Is this →
Worth Doing**



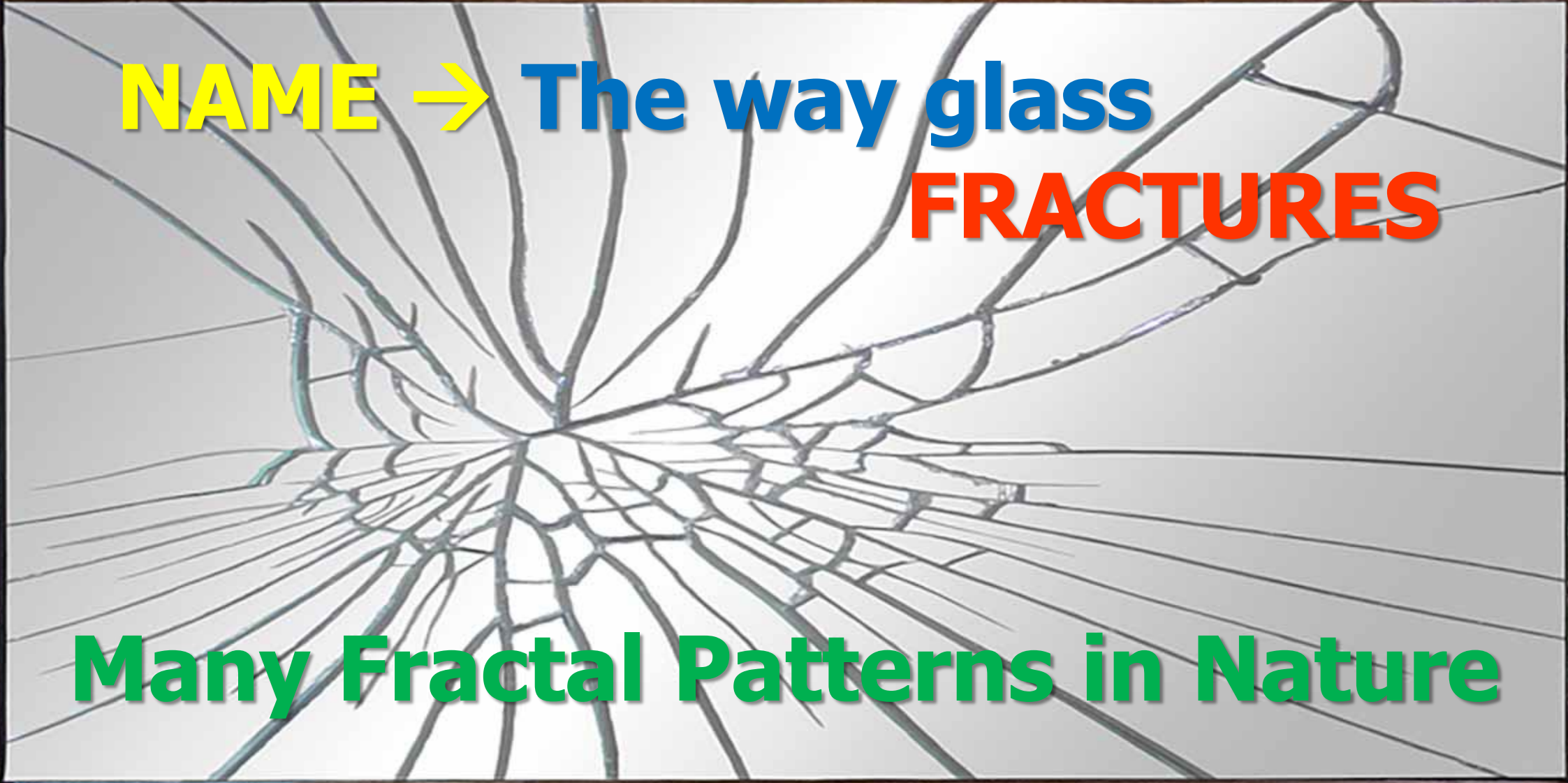
What are Fractals ? How are They Used in Technology ?



BIO-MIMICRY

Using
Patterns in nature
to improve
technology

E.G. Ornithopter – mimick birds



**NAME → The way glass
FRACTURES**

Many Fractal Patterns in Nature



Snowflake Fractal

Koch Fractal

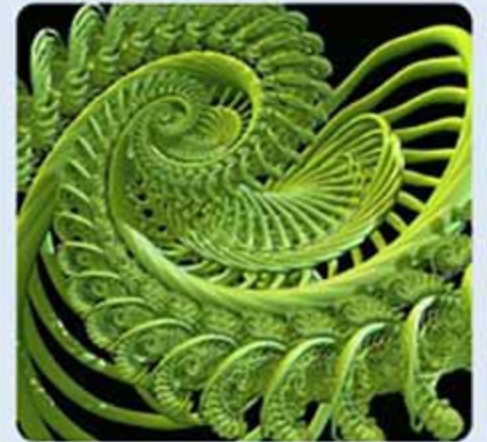
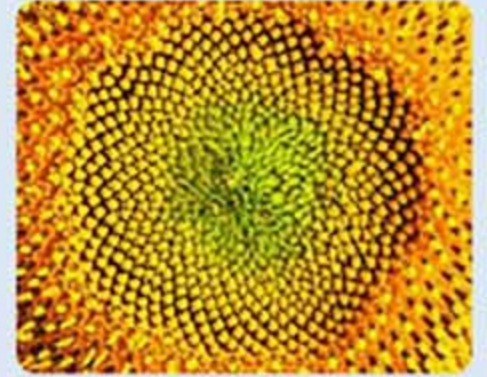


Canyons



COASTLINES

Biological Fractals





Tree Branches

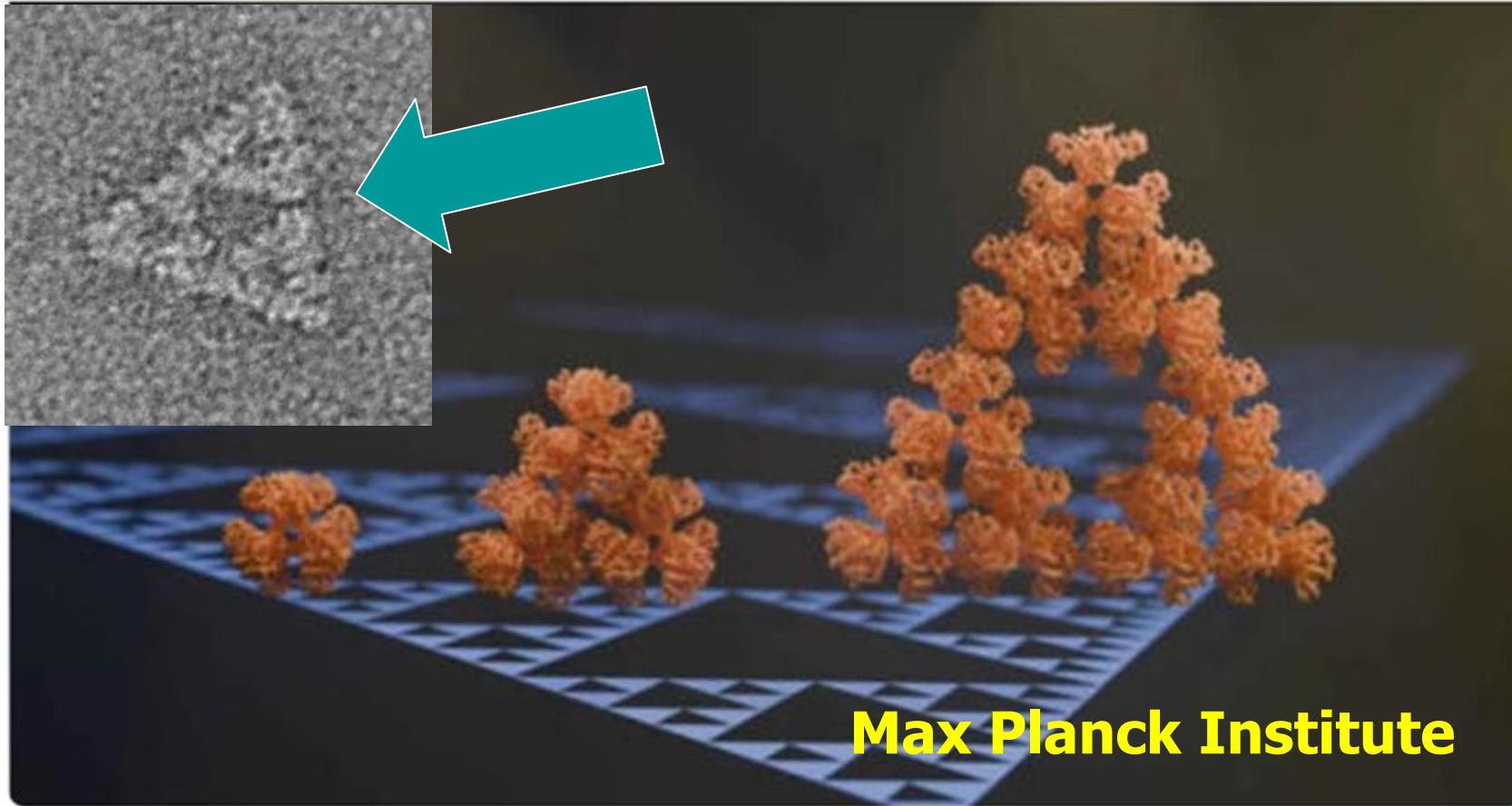


London, Rome



Phoenix AZ

: This is the first fractal molecule in nature

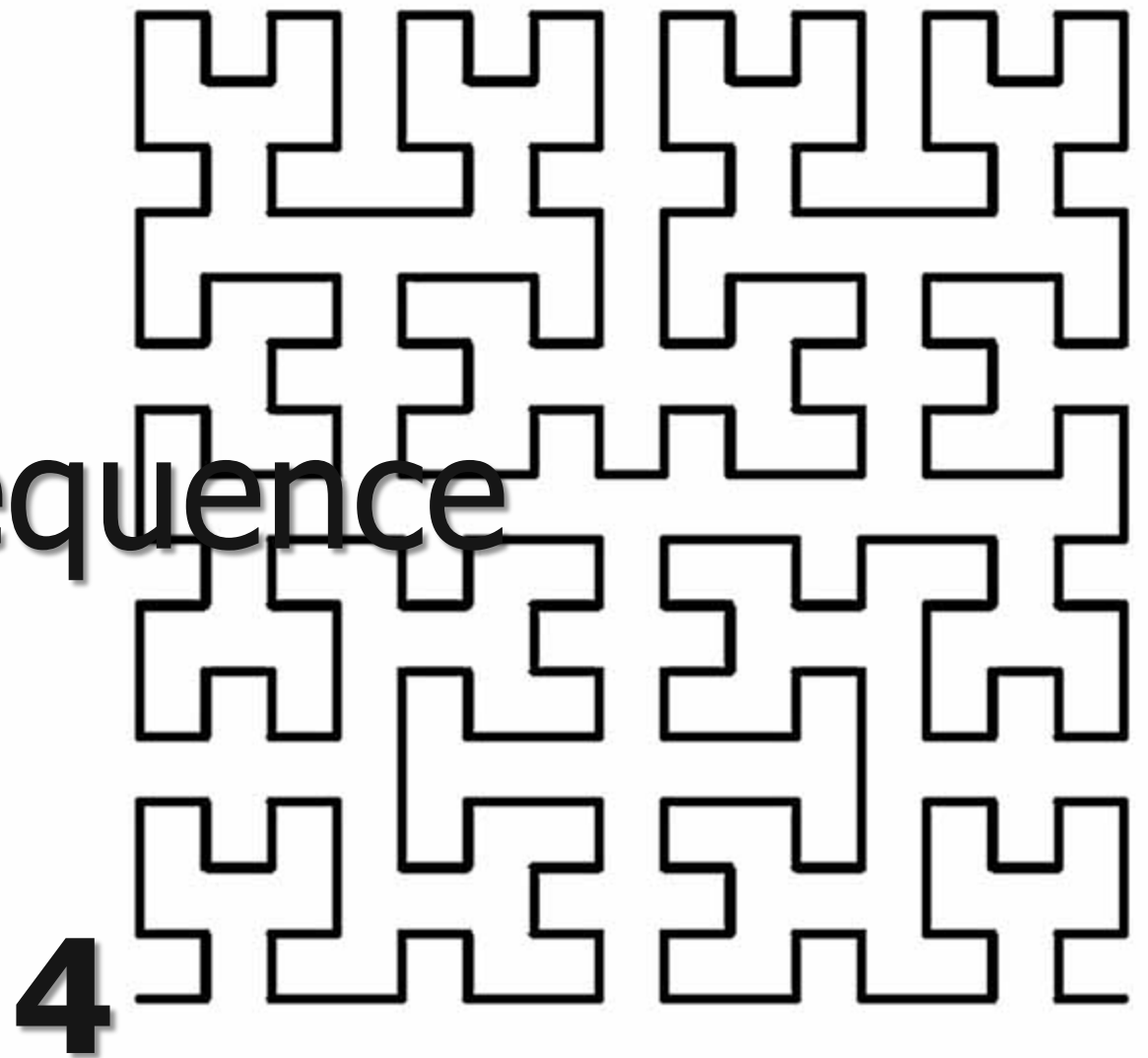
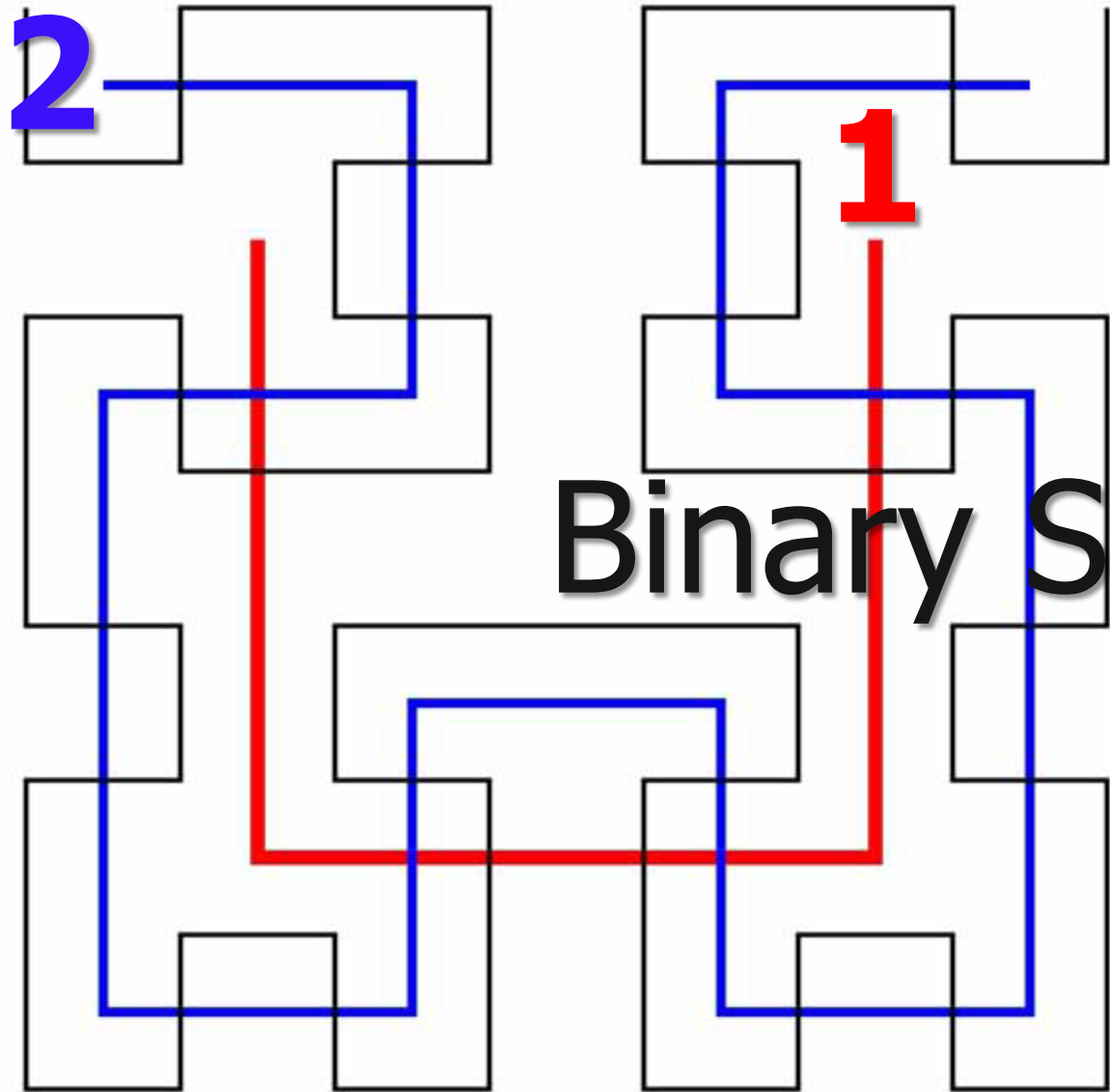


The citrate synthase protein self-assembles in a Sierpiński Triangle fractal pattern.
Credit: MPI f. Terrestrial Microbiology/ Hochberg.

Mathematical Space Filling Curves

- **Fills the space
most efficiently**
- **As you zoom in,
the same shape repeats**

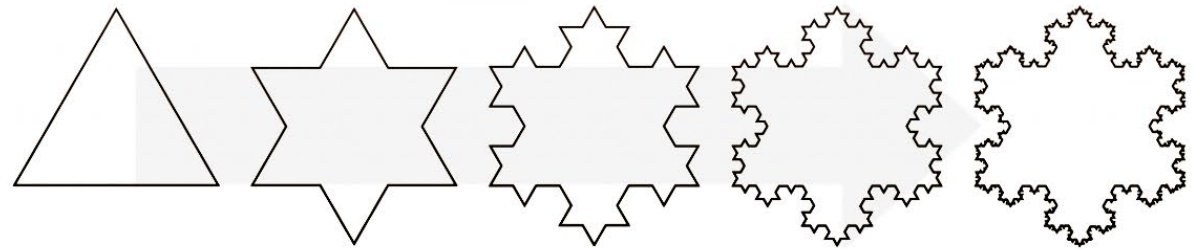
3 Hilbert Curves



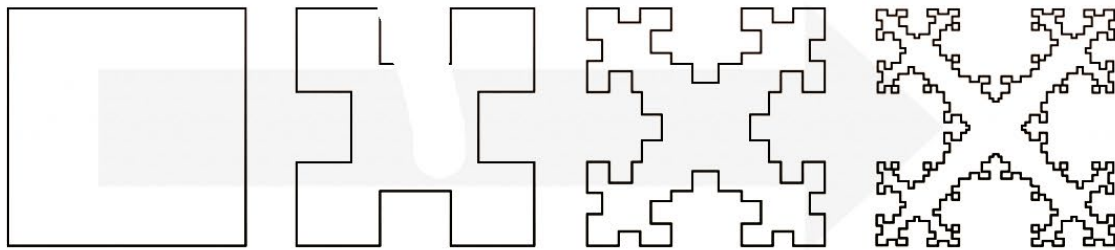
Other Fractal Patterns



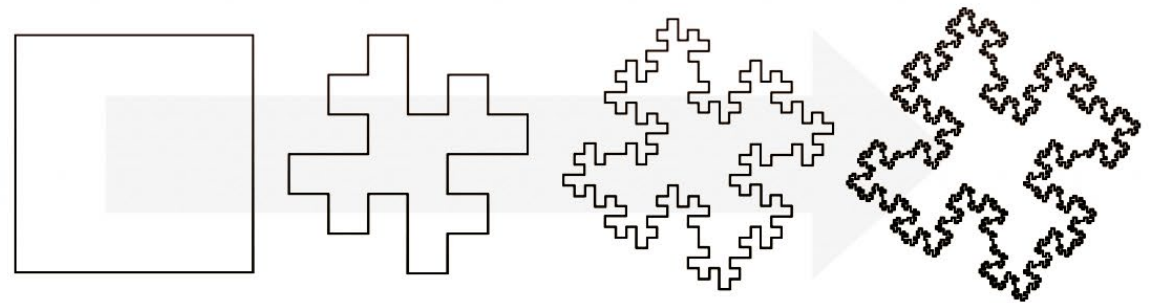
SIERPINSKI GASKET/TRIANGLE FRACTAL



KOCH SNOWFLAKE FRACTAL



MINKOWSKI ISLAND FRACTAL



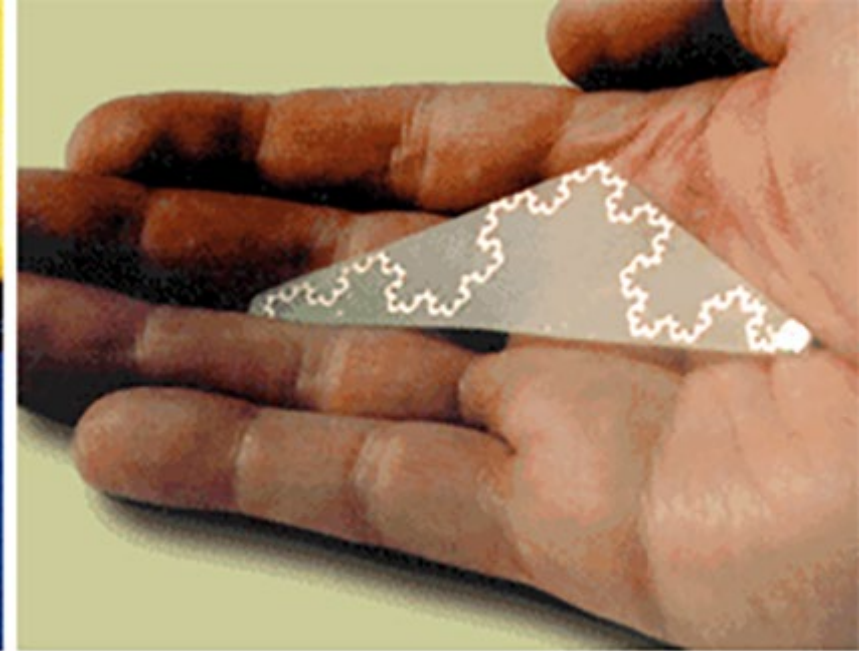
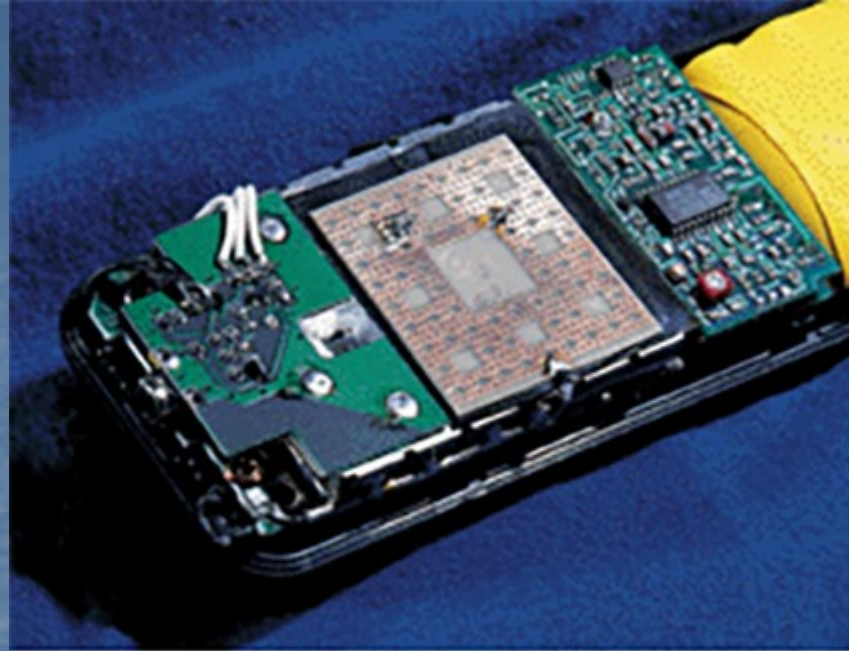
QUADRATIC KOCH ISLAND/MINKOWSKI FRACTAL

Value of Fractals in Antennas

Advantages

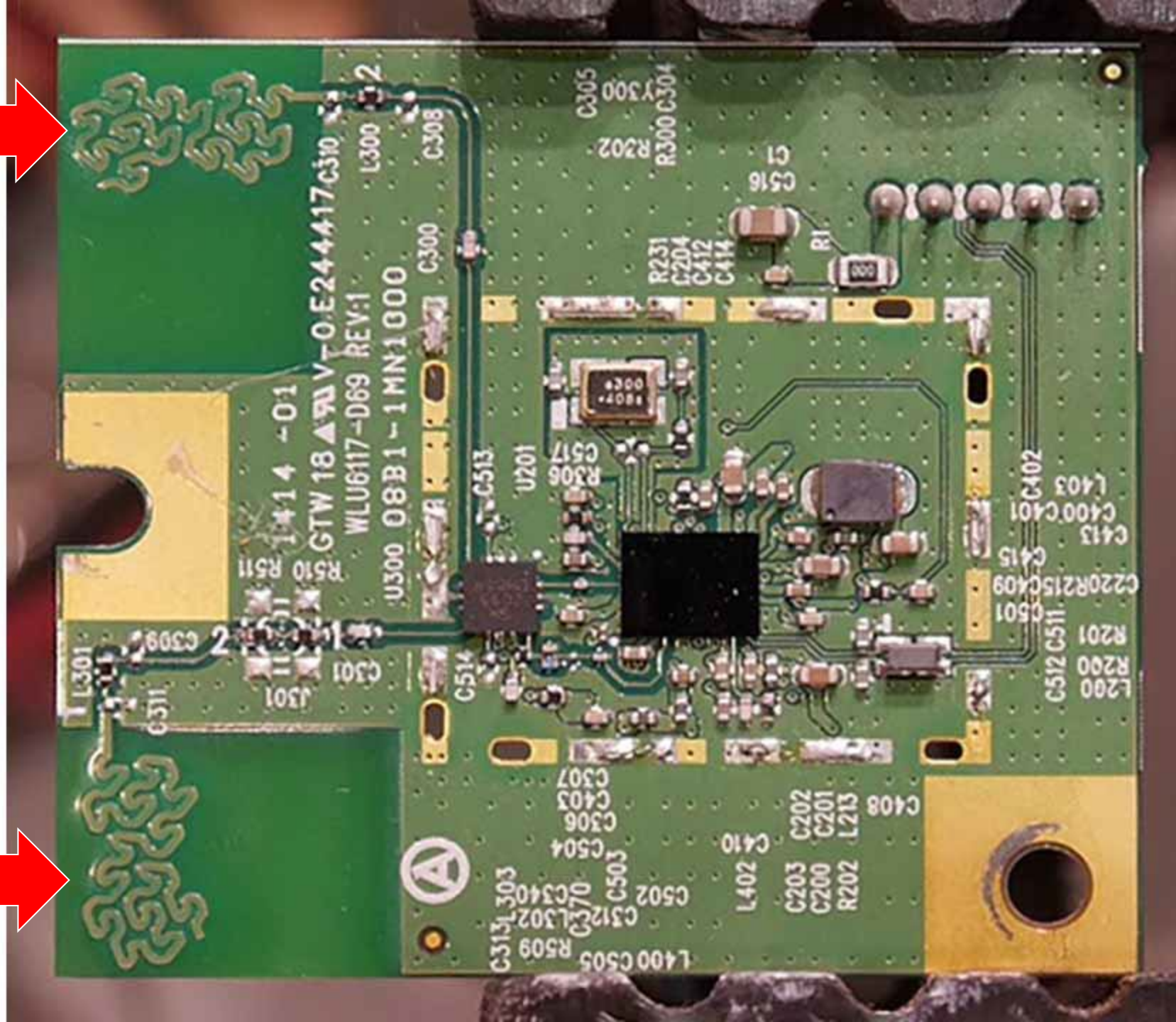
- **Smaller Size**
- **Greater Bandwidth**

*Hilbert
Sierpinski
Mandelbrot
Fractal
Antennas
for
Cell Phones
Laptops*



PCB

Fractal Cell Phone Antennas

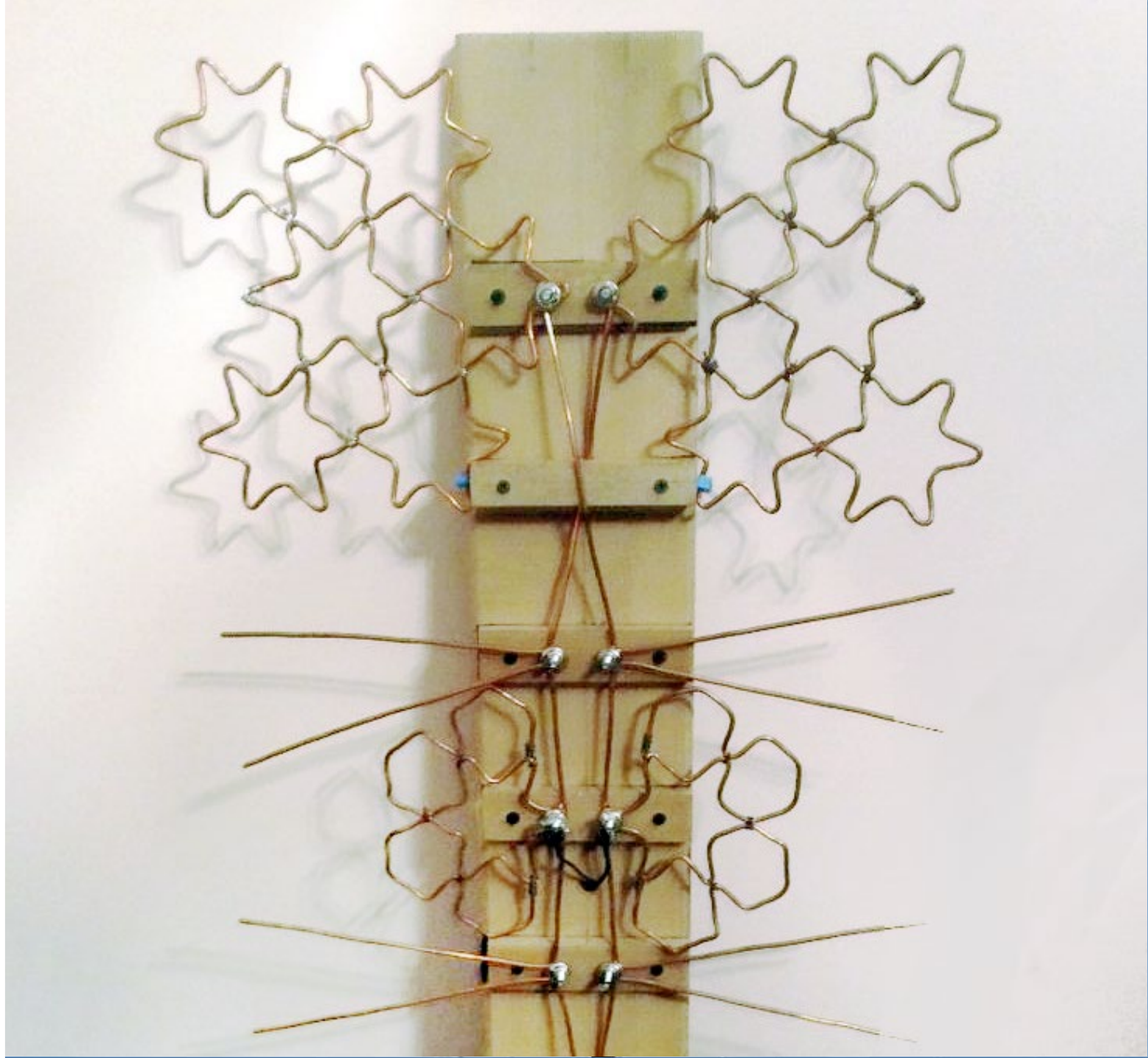


**BUT are Fractals
Useful for
Ham Antennas ?**

**Many have
tried**

**So why
haven't we
heard?**

**My feeling
WHY NOT?**



Reason One

Fractal antennas are
mechanically
difficult to build
(except on PC board)



**Is
Mother Nature
always the
best way?**

**Who wants
a bouncing fuselage?**

Ornithopters Are Impractical





My Attempt 1 Fractal Garden Trellis

**Aluminum tape,
wire woven in,
nails, screws?**

IMPRACTICAL

A wooden pegboard with a grid of holes. Several metal pins are inserted into the holes. The pins are of different lengths and are inserted at various angles. The text "My Attempt 2 Pegboard" is written in red in the upper right corner.

My Attempt 2 Pegboard

SAME — IMPRACTICAL

Reason Two

ONLY SLIGHTLY MORE
EFFICIENT than loading coils
or other size reducing methods

On the order of 14%

For Ham Radio

Leave fractals
to the
cellphone
designers



w6nbcmail
@gmail.com

w6nbc.com/
slides



DØGGY



"That's all Folks!"