Visualisation @ iVEC

Paul Bourke

iVEC @UWA

Visualisation is the process of applying computer graphics

to data with the aim of providing insight into the underlying

structures, relationships and processes.

People

Andrew Squelch - Jonathan Knispel - Paul Bourke

[One vacant position]

Facilities: Locations with iVEC funded visualisation infrastructure

UWA - ECU - Murdoch - Curtin - ARRC

Partners: Locations receiving iVEC support or with relationships

Curtin (HIVE) - UWA, ARRC (NGL) - Pawsey

What we offer

Displays - workstations - software

Capture devices - human computer interfaces

Expertise

Visualisation

As the name suggests it (generally) employs
the sense of vision to convey information to the brain.

Might as well leverage the capabilities of our visual system.

Achieved through novel / advanced display devices.

Displays

Stereoscopic displays - Head mounted displays - Stereoscopic cameras

High resolution displays - High resolution capture

Immersive displays - Fisheye and 360 degree image/video capture

Other expertise / infrastructure

Volume visualisation

Advanced graphical & geometric algorithms

Laser scanning - 3D reconstruction from photographs

Haptics - Human Computer Interfaces

Serious gaming - Virtual environments

3D printing

A few examples …

Equations are the Devil's Sentences

(Stephen Colbert)

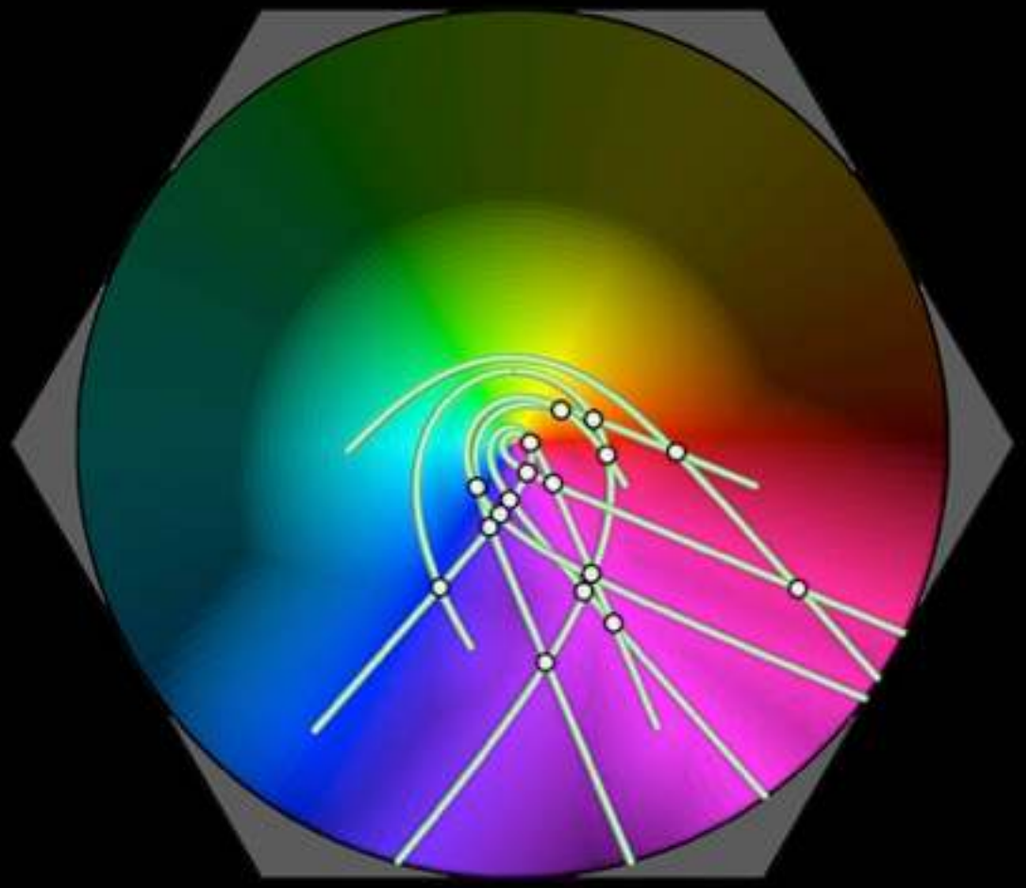
$$\varphi_p^{\mathbf{qr}'}(t) = f_p^{\mathbf{qr}'} \times Q_p\left(\mathbf{r}', t - \frac{|\mathbf{q} - \mathbf{r}'|}{\nu}\right)$$

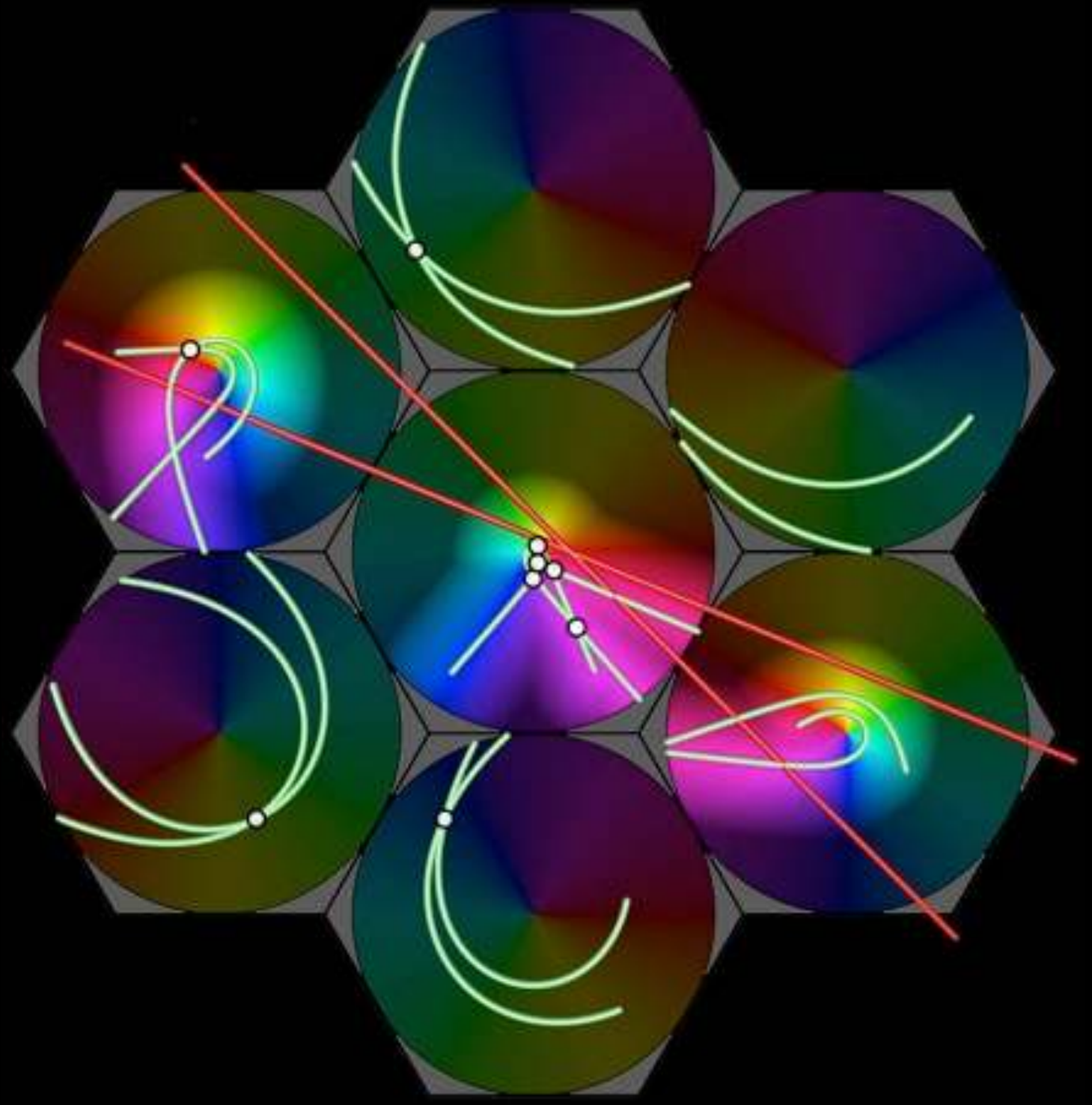
$$\psi_p^{\mathbf{qr}'}(t) = M_p^{\mathbf{qr}'} * \varphi_p^{\mathbf{qr}'}(t)$$

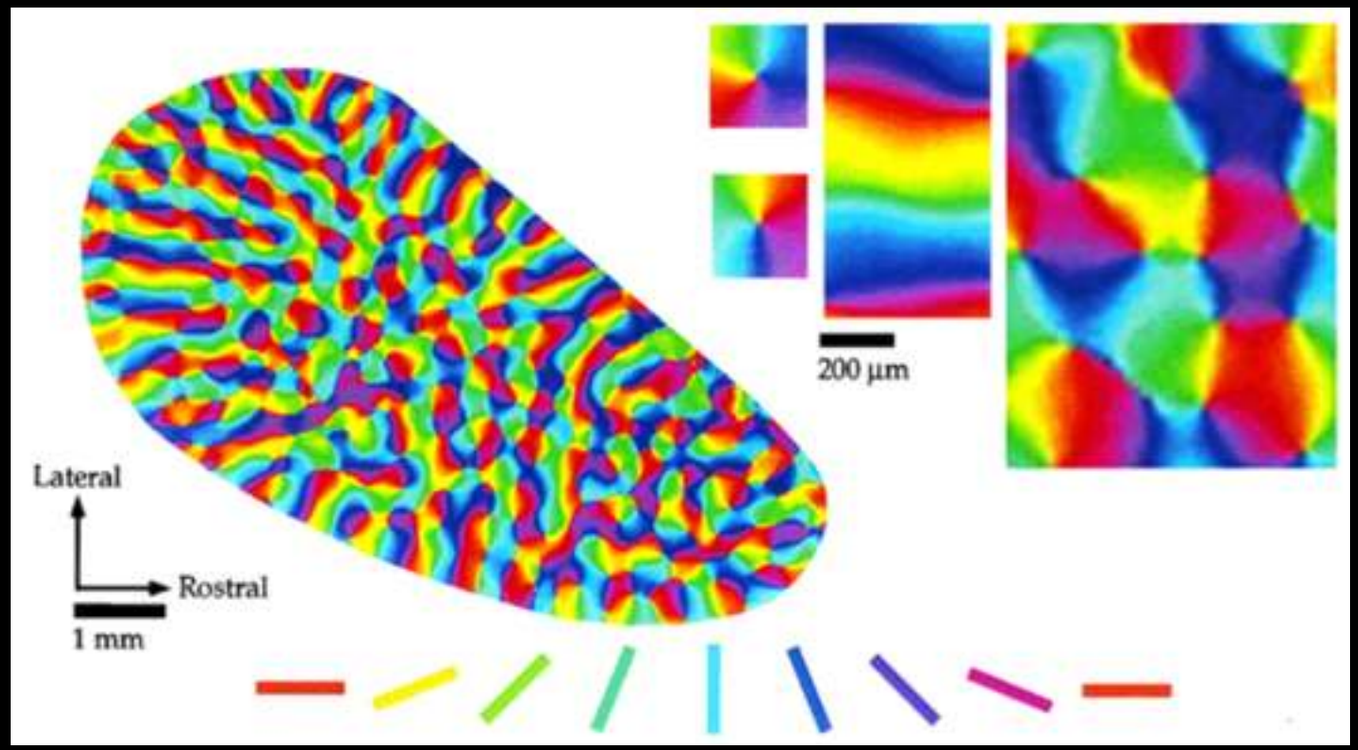
$$\Psi_p(\mathbf{q}, t) = \int_{\mathbf{r}'} \psi_p^{\mathbf{qr}'}(t) d\mathbf{r}'$$

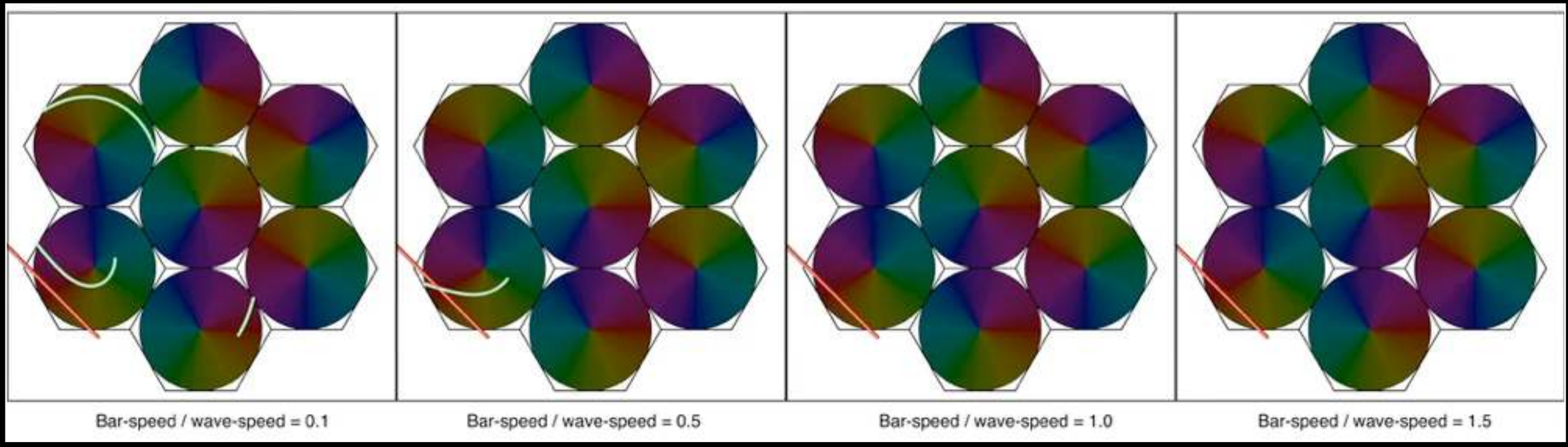
$$V_p(\mathbf{q}, t) = \sum_{p=e \wedge p=i} G_p * \Psi_p(\mathbf{q}, t)$$

$$Q_p(\mathbf{q}, t) = f_\Sigma(V_p(\mathbf{q}, t)) + E_p(\mathbf{q}, t)$$









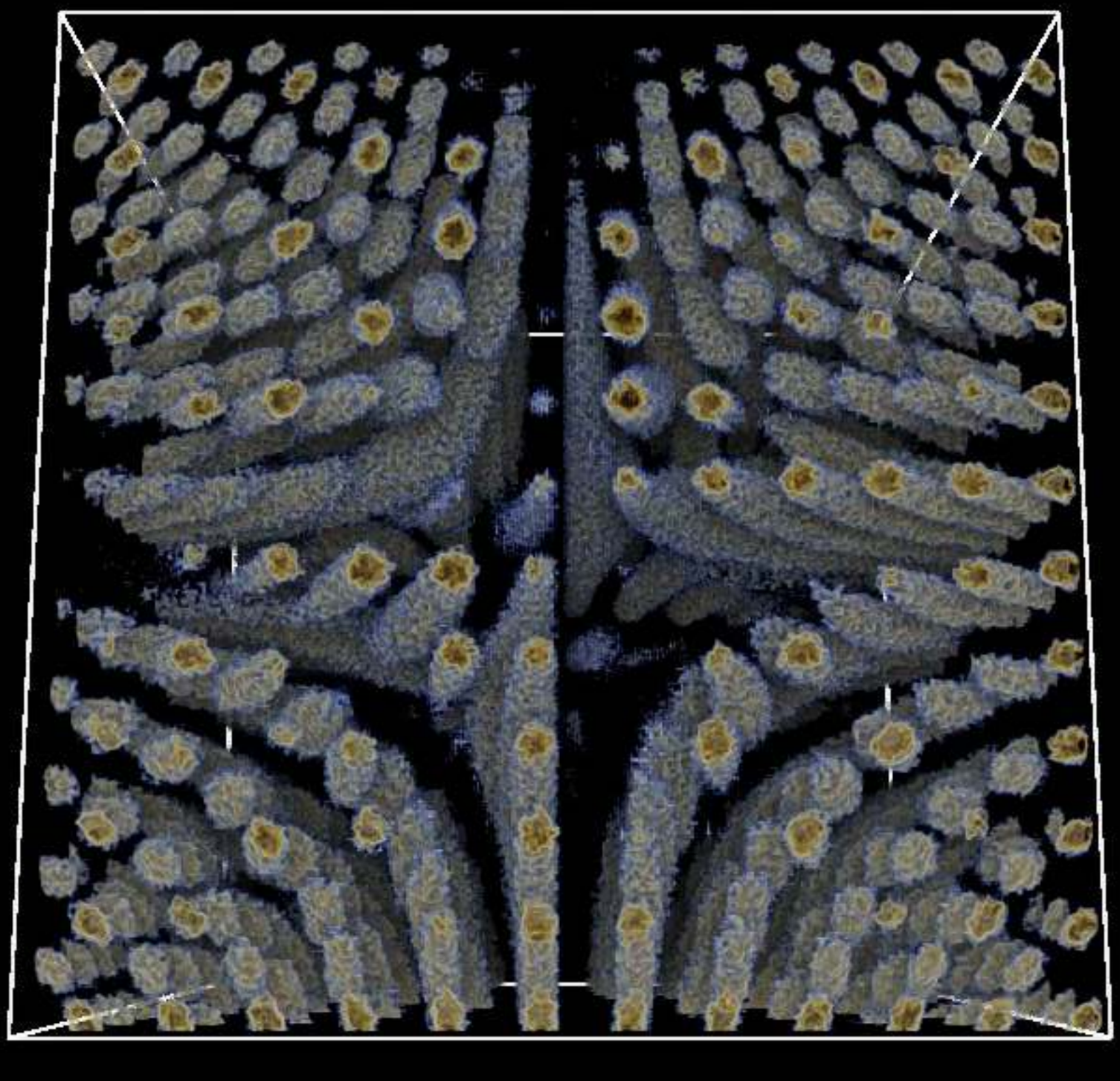
On the dynamics of cortical development: synchrony and synaptic self-organisation.

Frontiers in Computational Neuroscience, doi: 10.3389/fncom.2013.00004

J.J. Wright, P.D. Bourke.

Time varying volumes: A challenge

Pausiris, Museum of New and Old Art (2012)



...and here's a chart that shows what you might see if you looked at a mountain range through a tennis racket.

BIZARROCOMIC.BLOGSPOT.COM

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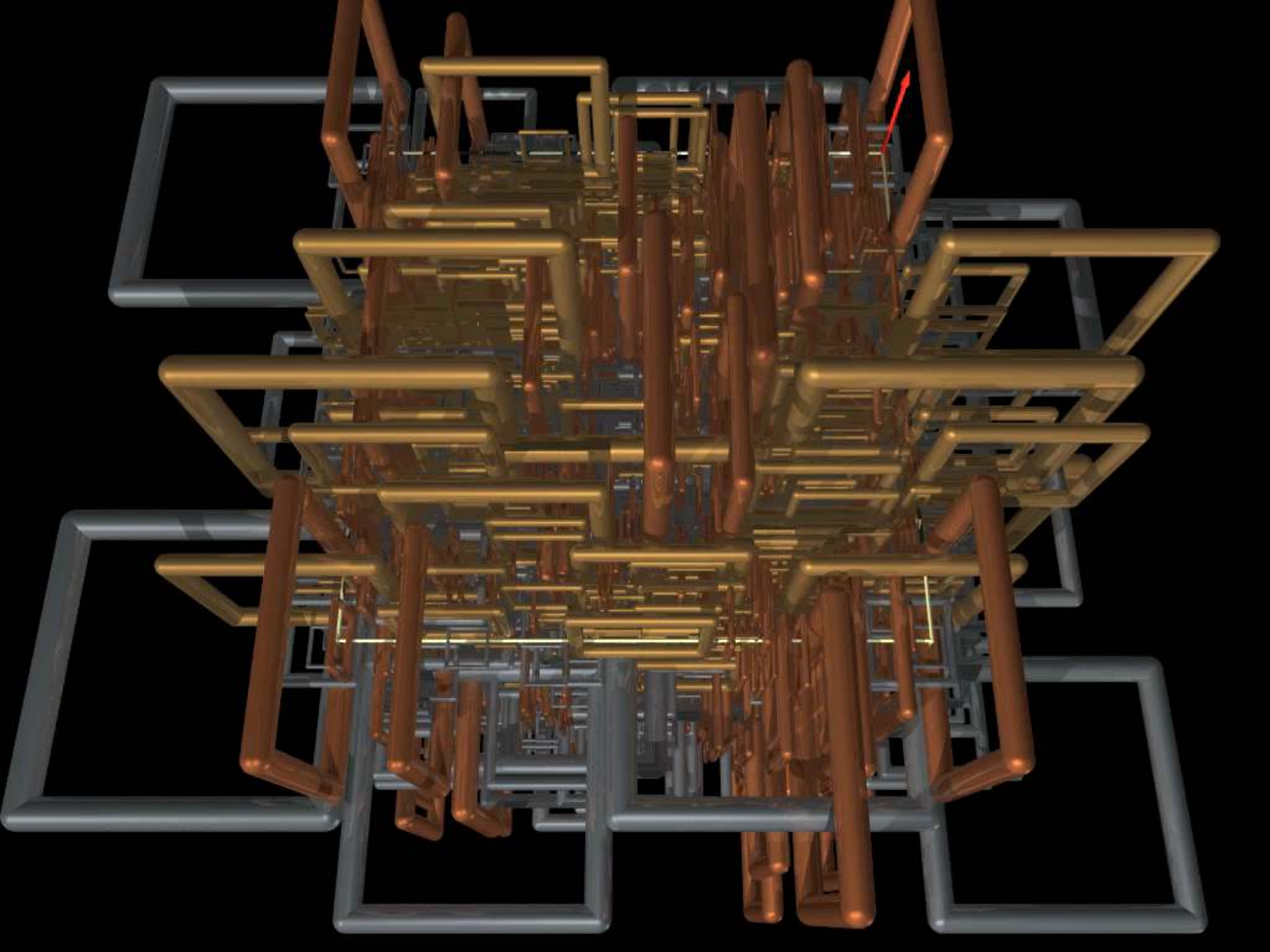
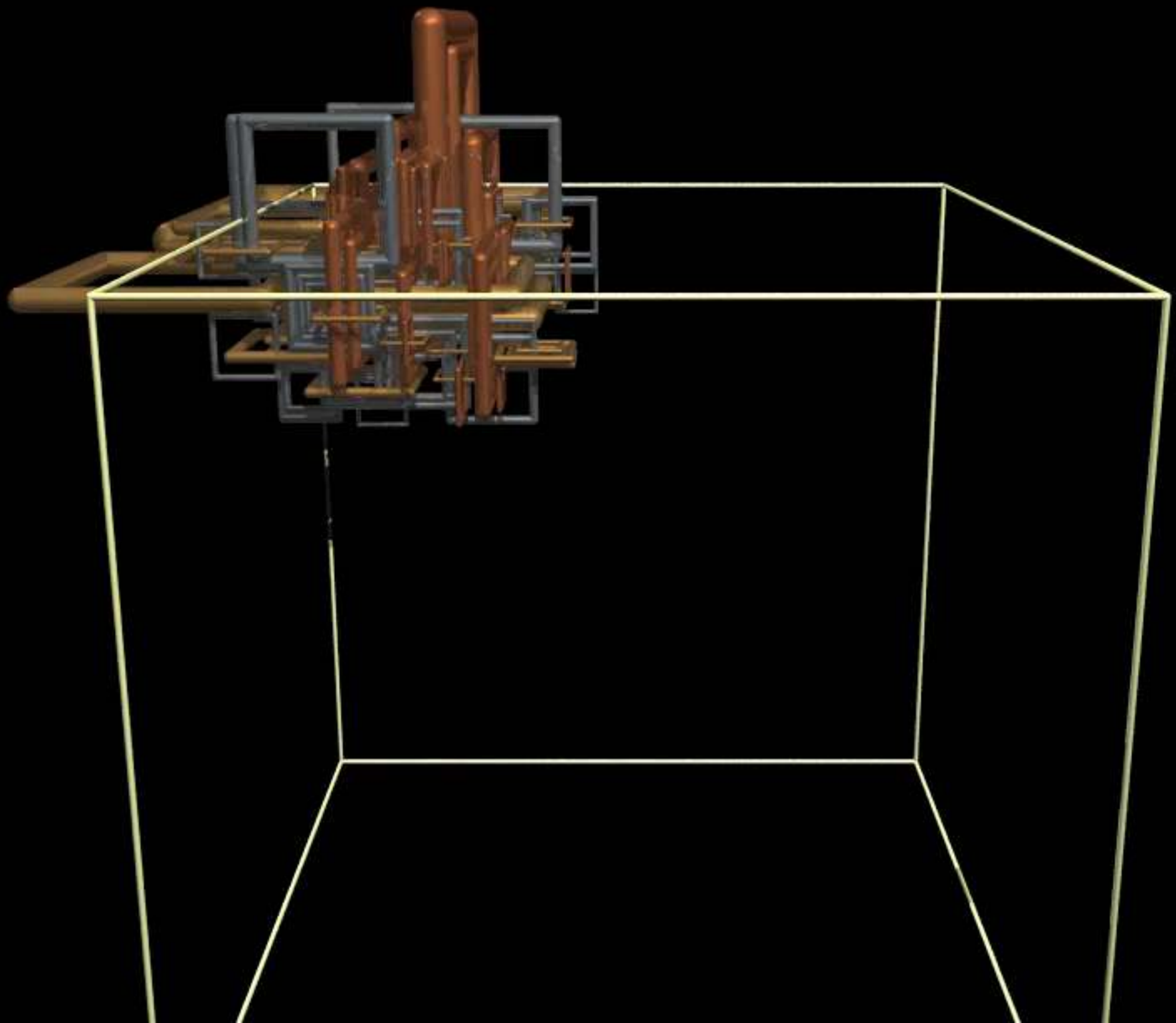
	A	B	C	D	E
1	**X**	**Y**	**Z**	**R**	**Axis**
2	3.094771	-2.206173	5.097041	2.910621	0
3	3.094771	7.793827	5.097041	2.910621	0
4	9.114162	2.697415	0.180805	2.828702	1
5	9.114162	12.697415	0.180805	2.828702	1
6	9.114162	2.697415	10.180805	2.828702	1
7	9.114162	12.697415	10.180805	2.828702	1
8	0.118114	2.967826	3.442576	2.754914	2
9	10.118114	2.967826	3.442576	2.754914	2
10	0.427236	-0.258223	6.412867	2.68795	0
11	10.427237	-0.258223	6.412867	2.68795	0
12	0.427236	9.741777	6.412867	2.68795	0
13	10.427237	9.741777	6.412867	2.68795	0
14	1.846255	6.221668	5.500492	2.626783	1
15	5.560567	3.806308	5.693708	2.570595	2
16	5.401607	4.61849	8.86958	2.51872	0
17	4.74108	3.939676	3.870554	2.470614	1
18	-0.058313	1.966198	2.037181	2.425826	2
19	9.941687	1.966198	2.037181	2.425826	2
20	-0.058313	1.966198	12.037182	2.425826	2
21	9.941687	1.966198	12.037182	2.425826	2
22	-0.916052	5.077406	7.016881	2.383977	0
23	9.083948	5.077406	7.016881	2.383977	0
24	8.261508	-2.266257	2.234689	2.344748	1
25	8.261508	7.733743	2.234689	2.344748	1
4978	0.036635	5.538867	6.293864	0.36667	1
4979	6.363881	5.627172	3.737942	0.366637	2
4980	2.976083	2.336567	9.22129	0.366604	0
4981	7.289498	2.35672	2.288495	0.366572	1
4982	8.17908	4.514182	6.687099	0.366539	2
4983	6.795975	5.465027	6.440717	0.366506	0
4984	2.330369	4.633094	9.5849	0.366474	1
4985	9.152864	2.912539	2.763119	0.366441	2
4986	4.295763	5.213909	0.333169	0.366408	0
4987	7.368822	4.872445	1.572595	0.366376	1
4988	2.326575	8.539257	9.341913	0.366343	2
4989	9.448618	3.542957	8.154446	0.366311	0
4990	1.356728	6.729697	4.519018	0.366278	1
4991	5.096654	3.247994	3.586767	0.366245	2
4992	-0.250326	5.085708	2.532254	0.366213	0
4993	9.749675	5.085708	2.532254	0.366213	0
4994	2.13282	4.316009	4.919343	0.36618	1





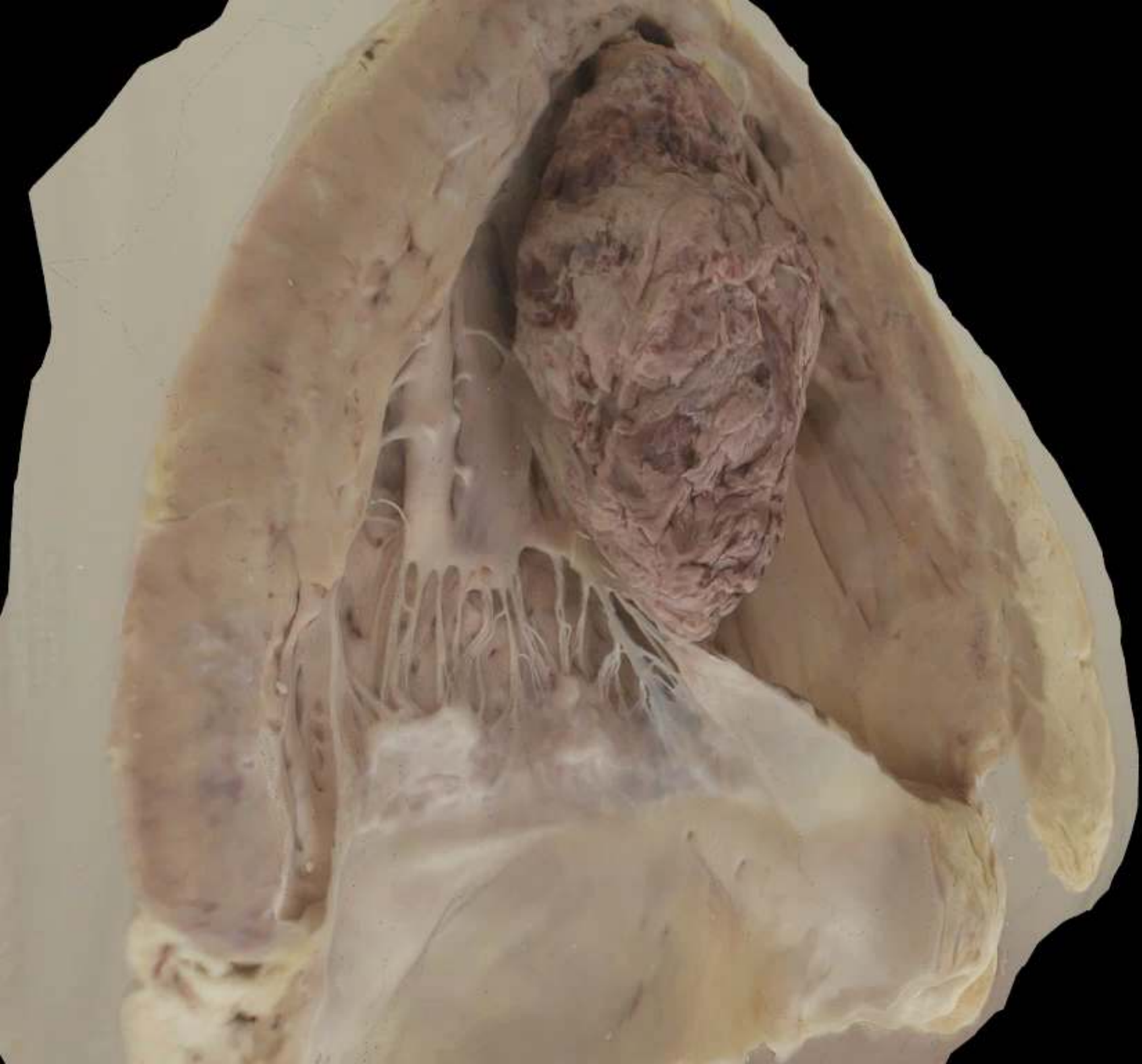
An Algorithm for Random Fractal Filling of Space. Computer Graphics Forum. John Shier, Paul Bourke

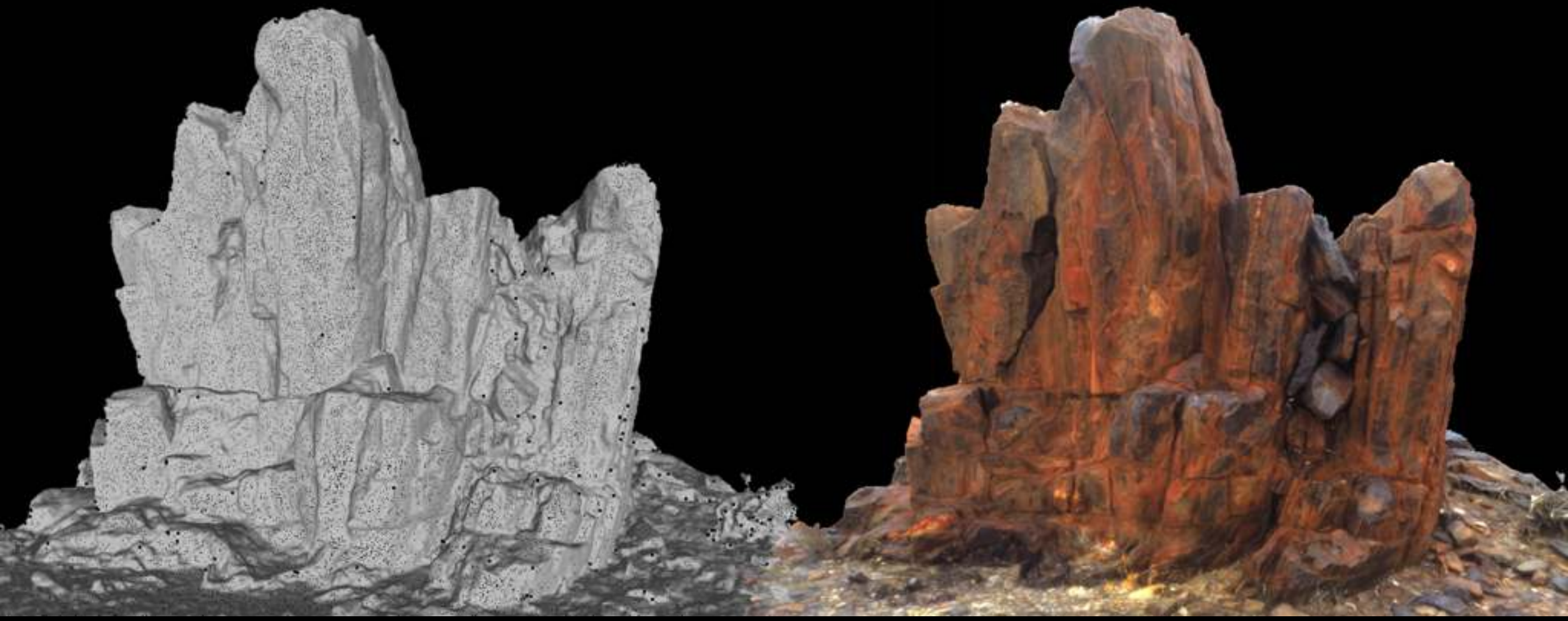
The Eurographics Association and John Wiley & Sons Ltd. doi: 10.1111/cgf.12163

Magic

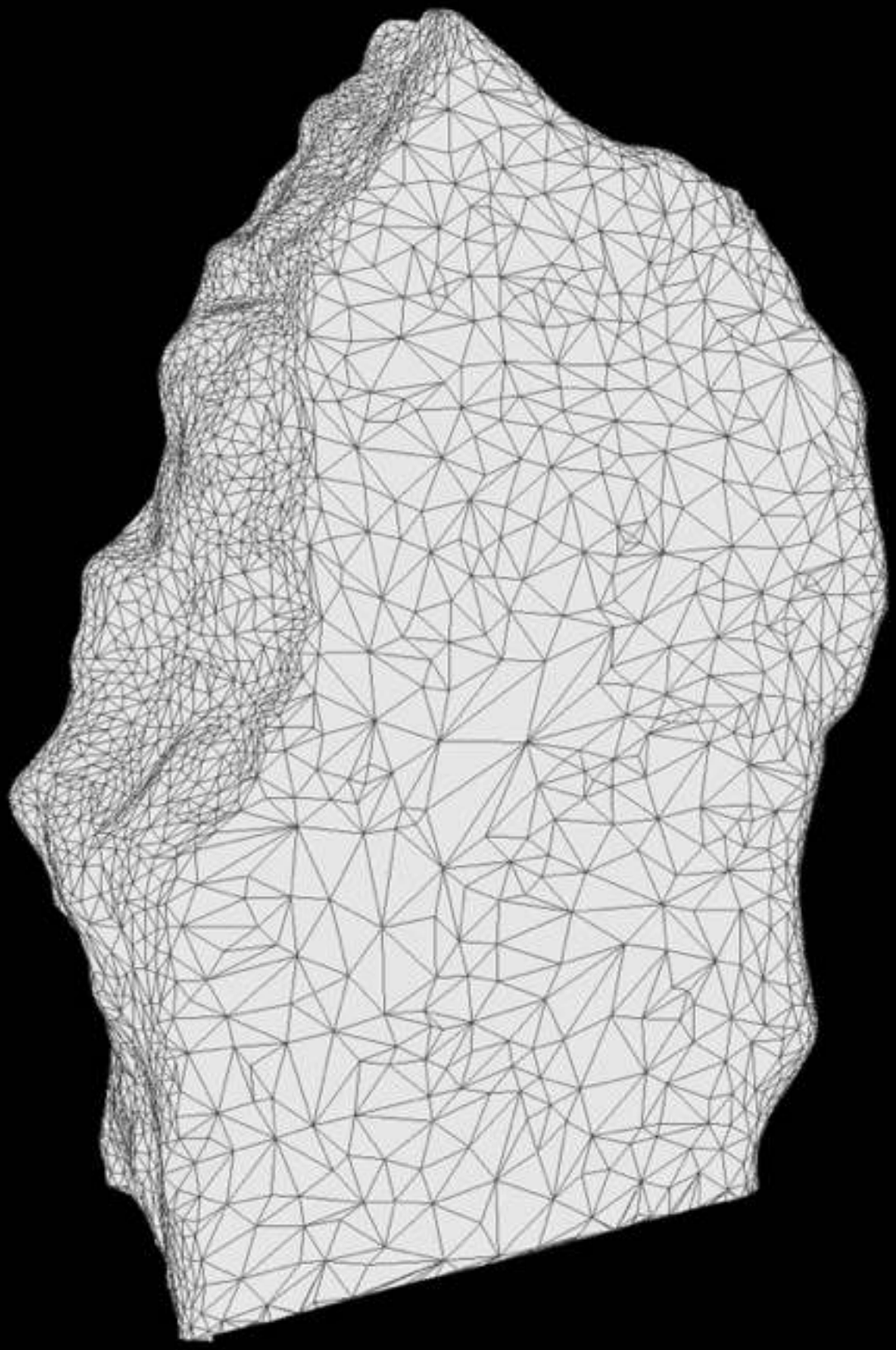
3D models from photographs

School of Pathology and Laboratory Medicine, UWA





Department of Mines and Petroleum



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