

# Immunoglobulin<sup>1</sup>

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<http://homepage.mac.com/whitby/>

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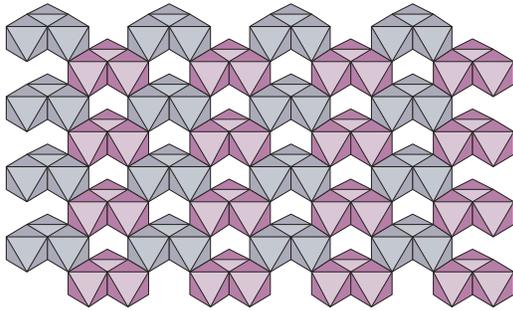
<http://web.me.com/whitby/Octahedron/Welcome.html>

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1. Excerpted from Octahedron1stEd.pdf—bookmark: IMMUNOGLOBULIN—pages 391-392

# IMMUNOGLOBULIN

## Crystalline associations

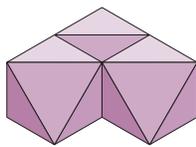
### Crystal form A



#### Immunoglobulin: crystalline array.

Planar array of triplet octahedra in crystalline order suggested by an electron micrograph of a crystal of antibody molecules.

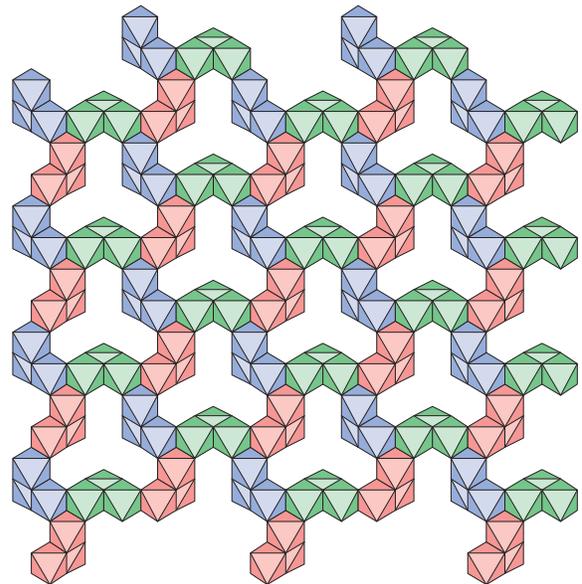
The above figure shows a planar array of octa triplets which is suggested by an electron micrograph of a crystal of antibody molecules.<sup>1</sup> The CFU of the above figure is shown below.



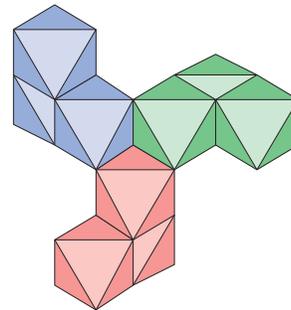
### Crystal form B

A planar array of octahedral triplets in crystalline order suggested by a two dimensional

crystallization of antibodies<sup>2</sup> is shown below.



The CFU is a triplet of triplets and confirms the conformation of the immunoglobulin molecule as an octahedral triplet.



## The antibody molecule

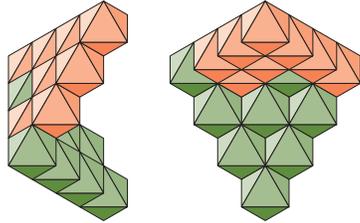
The antibody molecule is described<sup>3</sup> as having twelve homologous domains which are divided into three groups of four each. The crystalline arrays show the molecule to be

1. Lubert Stryer *Biochemistry* 2d ed., W.H. Freeman, 1981, Fig. 33-1, attributed to <L. W. Labaw and D. R. Davies. *J. Ultrastruct. Res.* 40(1972):349.>, p. 789

2. Egidijus E. Uzgiris, Roger D. Kornberg, *Nature* v. 301, January 13, 1983, pp. 125-129

3. Alberts *et al.*, *Molecular Biology of the Cell*, Garland, 1983, p. 965

equivalent to an octahedral triplet. Schematic drawings<sup>1</sup> and the description of the molecule indicate that each domain could act as a facial panel for an octahedral assembly. The two domains in each of the three octahedral areas which belong to the same chain share an edge.

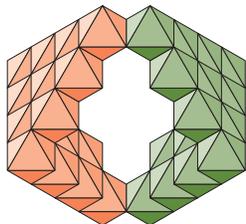


**IgG molecule: Domain pairing.**

The figure shows two views of an octahedral assembly which represents the pairing of two homologous domains of the IgG molecule. The red colored octahedra represent one domain and the green octahedra represent another domain. The groups are identical.

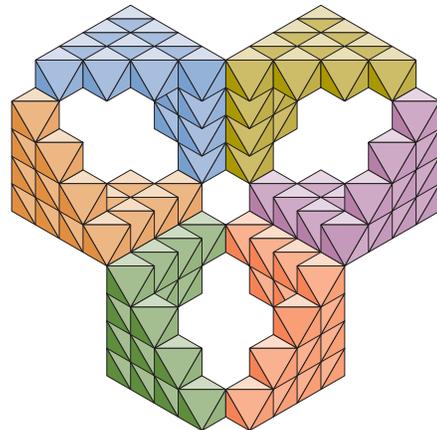
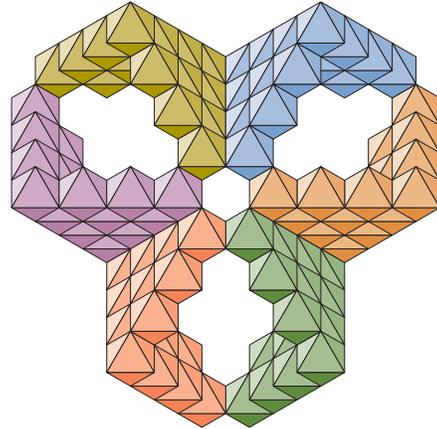
Two views a representative assembly are shown. The assembly is composed of two identical units of eight octahedra each which are colored red or green. Each group of eight octahedra represents a domain of a chain. Each is an assembly which is facially planar.

The two paired domains in each octahedral area join so that the edgial join of one pair is be



opposed to that of the other pair. The opposed pairs define the eight faces of the octahedron.

Four faces are defined by the faces of the octahedra in each domain. The other four faces are defined by the faces of the octahedra along the edges of the assembly. Three such assemblies join to form an octahedral triplet which is seen below in two views which differ by a half turn about an axis normal to the top of the page.



**IgG molecule: octahedral structure**

The figure shows two views of the IgG molecule which differ by a rotation of one half turn about an axis parallel to the edge of the page.

1. Lubert Stryer *Biochemistry* 2d ed., W. H. Freeman, 1981, Fig. 33-19 <schematic drawing of an IgG molecule>, p. 801