Carbon strands

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17 February 2004
http://homepage.mac.com/whitby/

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

Reference

1. Octahedron1stEd.pdf
2. William M. Shih, Joel D. Quispe, and Gerald F. Joyce, "A 1.7-kilobase single-stranded DNA that folds into a nanoscale octahedron", *Nature*, 12 Feb 2004
3. Nadrian C. Seeman et al., "New motifs in DNA nanotechnology", http://www.islandone.org/Foresight/Conferences/MNT05/Papers/Seeman/index.html

Introduction

Like DNA, the carbon strand of lipids is edgially-axised. This document shows how these edgially-axised carbon strands form triangular rings which join to form a framework octahedron [Figures 7 and 11] or square rings to form a framework cuboctahedron [Figure 16]. Carbon strands joined by H_2PO_4-groups can also form a framework octahedron [Figure 19].

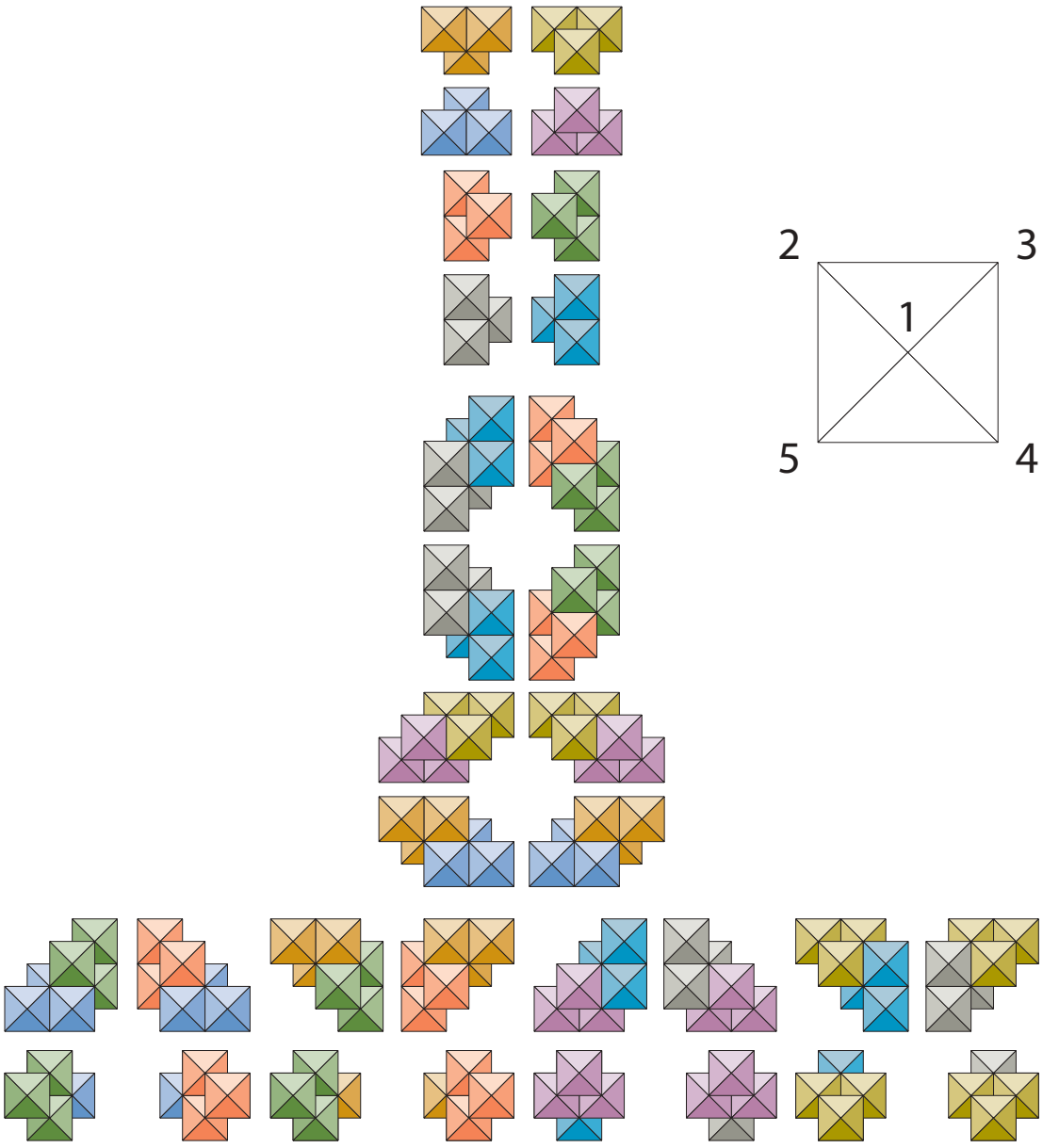
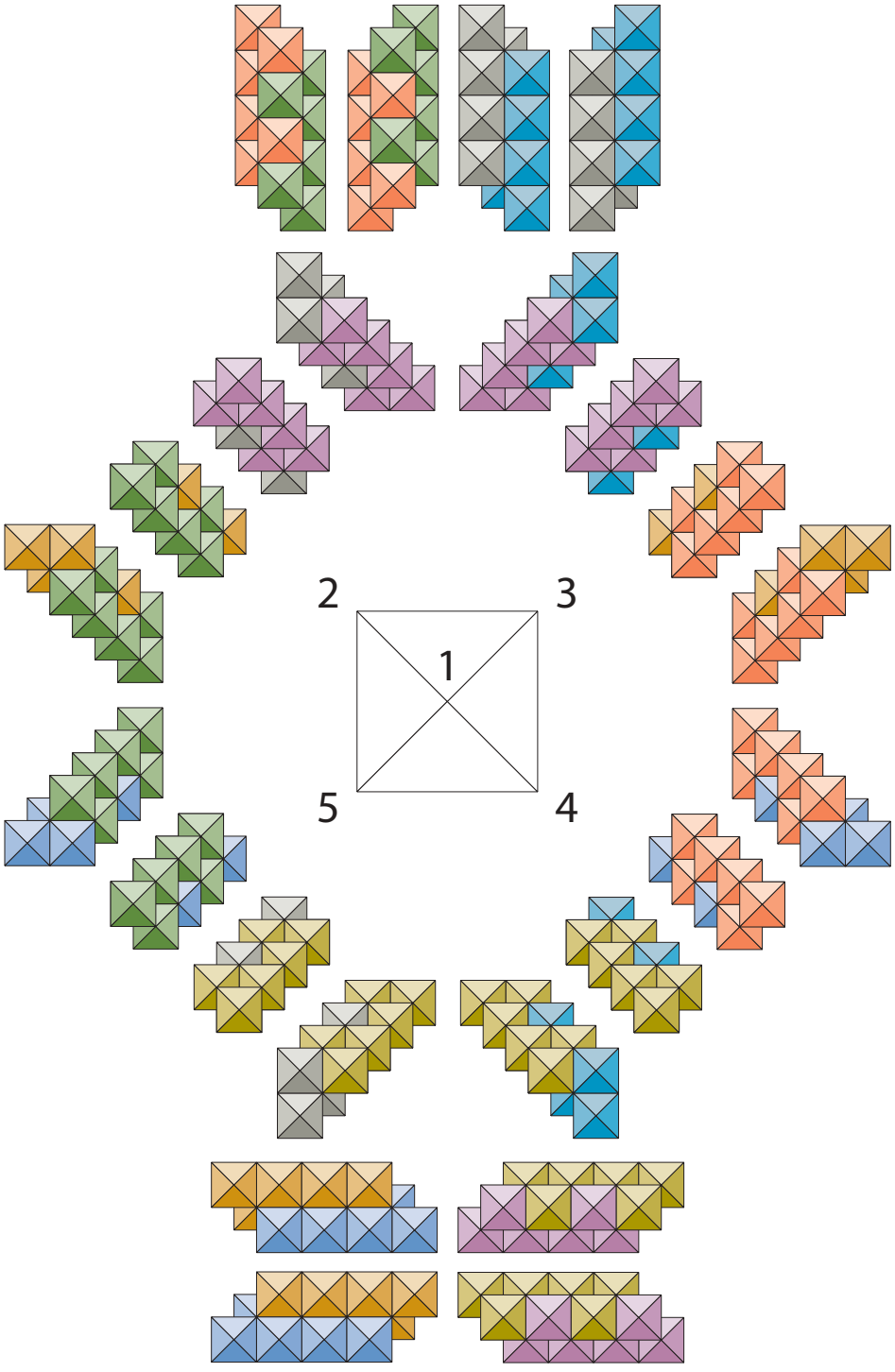


Fig. 1 Carbon pairs vertexial view

The figure shows the vertexial orientations of the C-atom. Each orientation is given an identifying color. Each combination of cleft join which can be effected between a pair of the depicted C-atom is shown. Each joined pair is adjacent to a mirror pair. The mirror pairs result from the two possible cleft joins–right hand and left hand. Repetitive joining of C-atoms so that each is a mirror of the alternate joins results in a twofold strand. This is the structural formation of the lipid chain. An octahedron with labeled vertexes is included for reference.

Fig. 2 Carbon strand vertexial orientations

The figure shows each of the vertexial view orientations of carbon strands. Each group of four strands is axially parallel to a pair of octahedral edges. Each group consists of two pairs of strands. Each pair is composed of the same two C-atom orientations. Each strand in the pair is terminated by a different C-atom orientation. C-atoms of the same color have the same orientation.



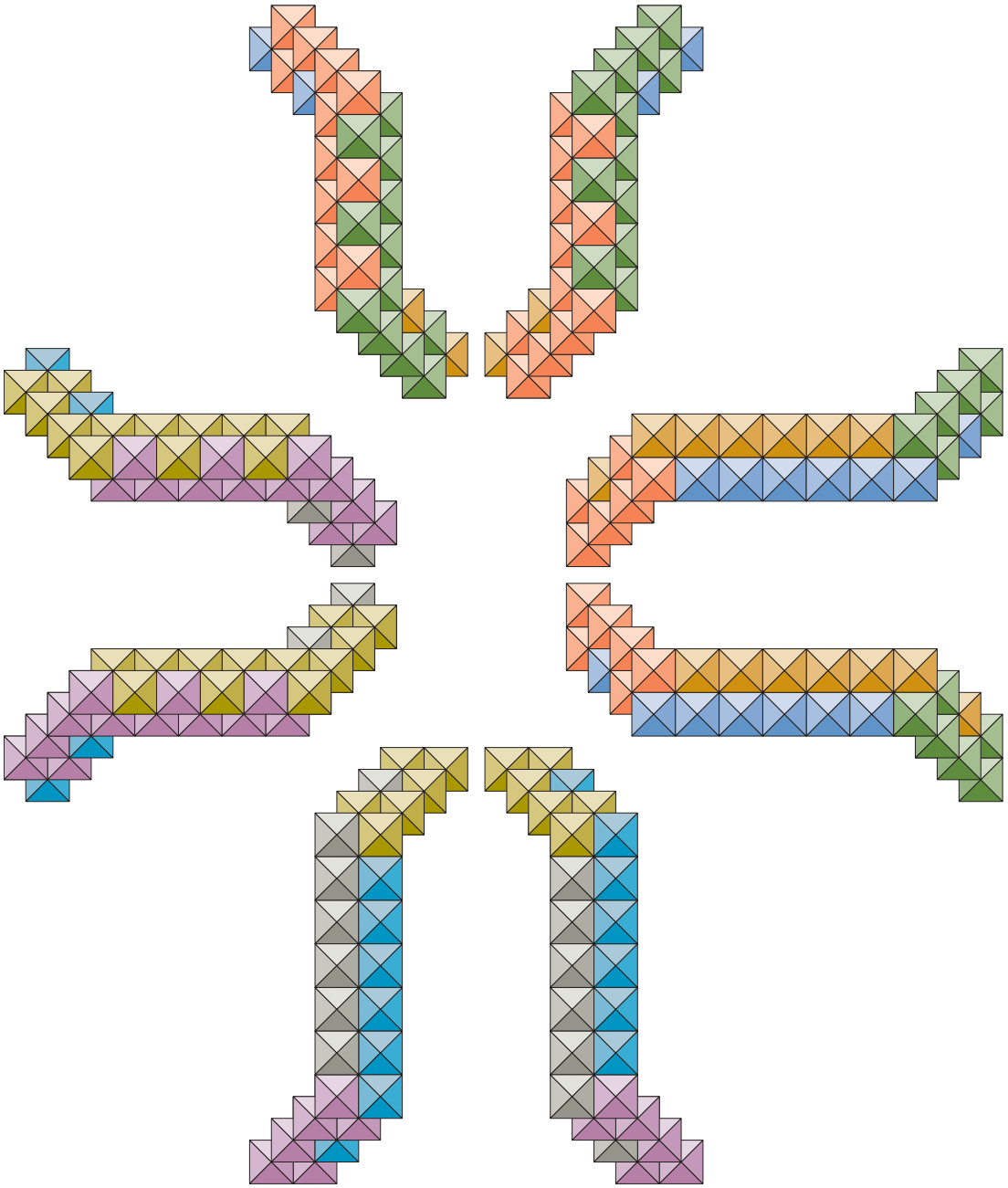


Fig. 3 Carbon strand joins
The figure shows the possible joins between the possible two pair linear C-strands.

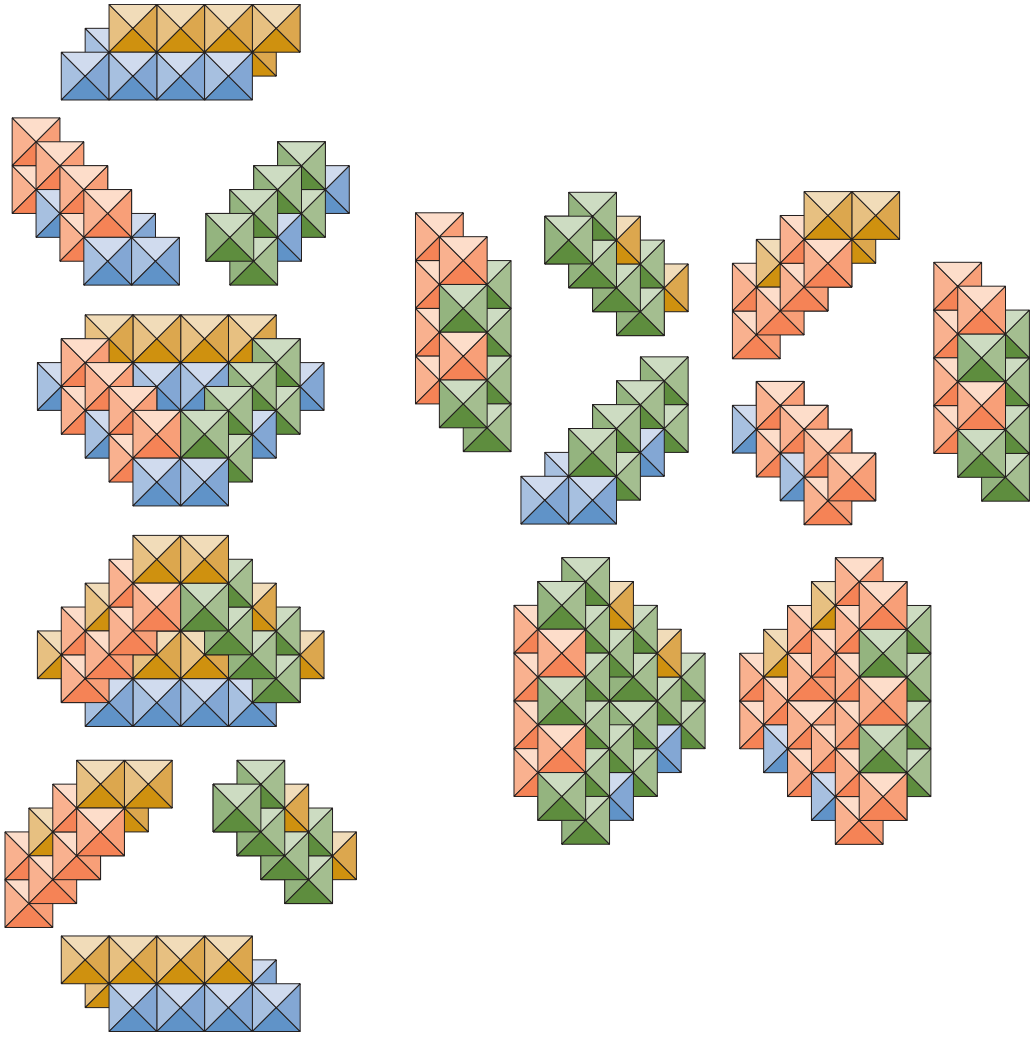


Fig. 4 Carbon strand panels, vertexial view

The figure shows how four triangular panels can be assembled from the two pair linear strands. The panels are parallel to the faces of a regular tetrahedron.

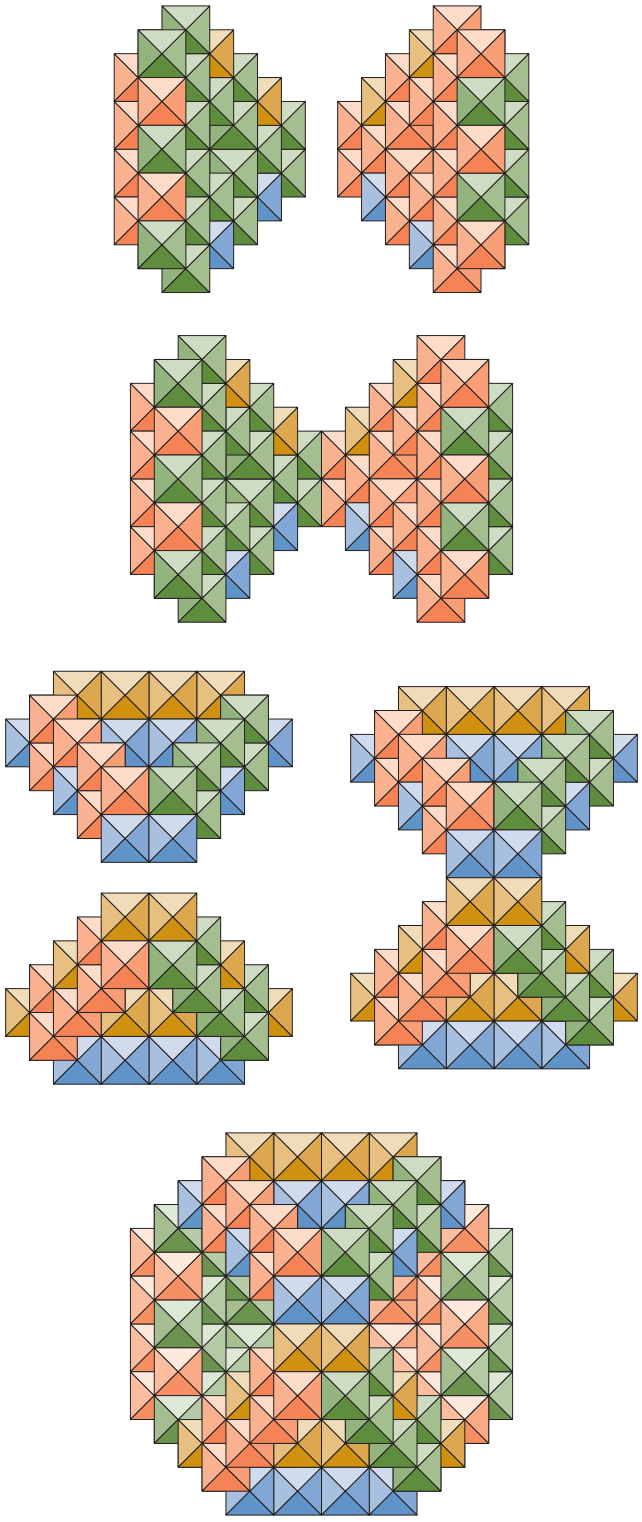


Fig. 5 Carbon strand octahedron

The four panels which were assembled from carbon strands in the previous figure are assembled in a regular octahedral assembly. Each panel provides a face of the octahedron. Four additional octahedral faces are defined by a strand of each of three bordering panels.

The two panels in the top row are shown in the second row joined by the edges of a pair of He-octas. Each pair of He-octas belongs to a single C-atom.

Two additional panels are shown on the left side of the figure. Just to the right, the same panels are shown joined in an identical manner to the first pair of panels.

At the bottom, the two pairs of panels are joined in a single octahedral structure. Each panel is joined to the other three panels in the same manner as that shown for the previous pairings. above it.

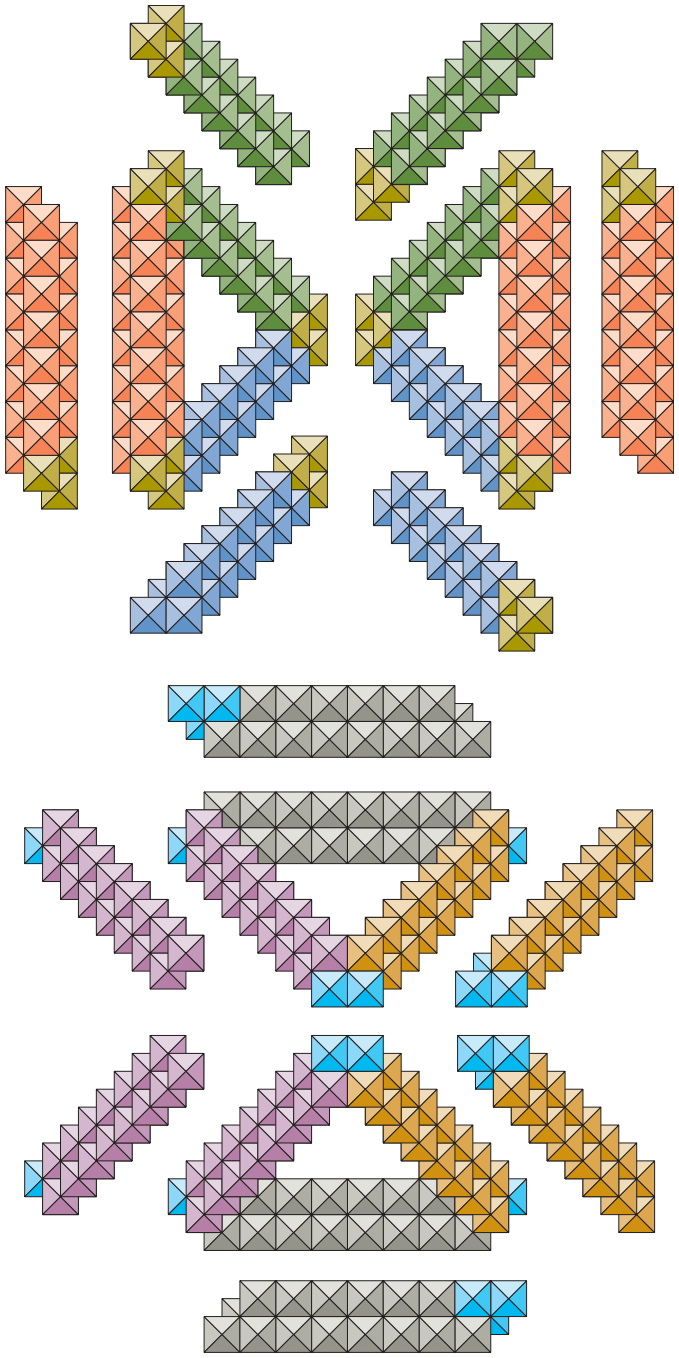


Fig. 6 Carbon strands and the facial panels they form, vertexial view

Four triangular panels consisting of three identical strands of eight C-atoms each are shown with the strands which form them. Each strand is given a color so that it might be identified in the assembly which follows. A terminal C-atom of each strand has been given a contrasting color so that the strands are seen to have a direction. The joins between panels are effected with edges of these C-atoms of contrasting colors.

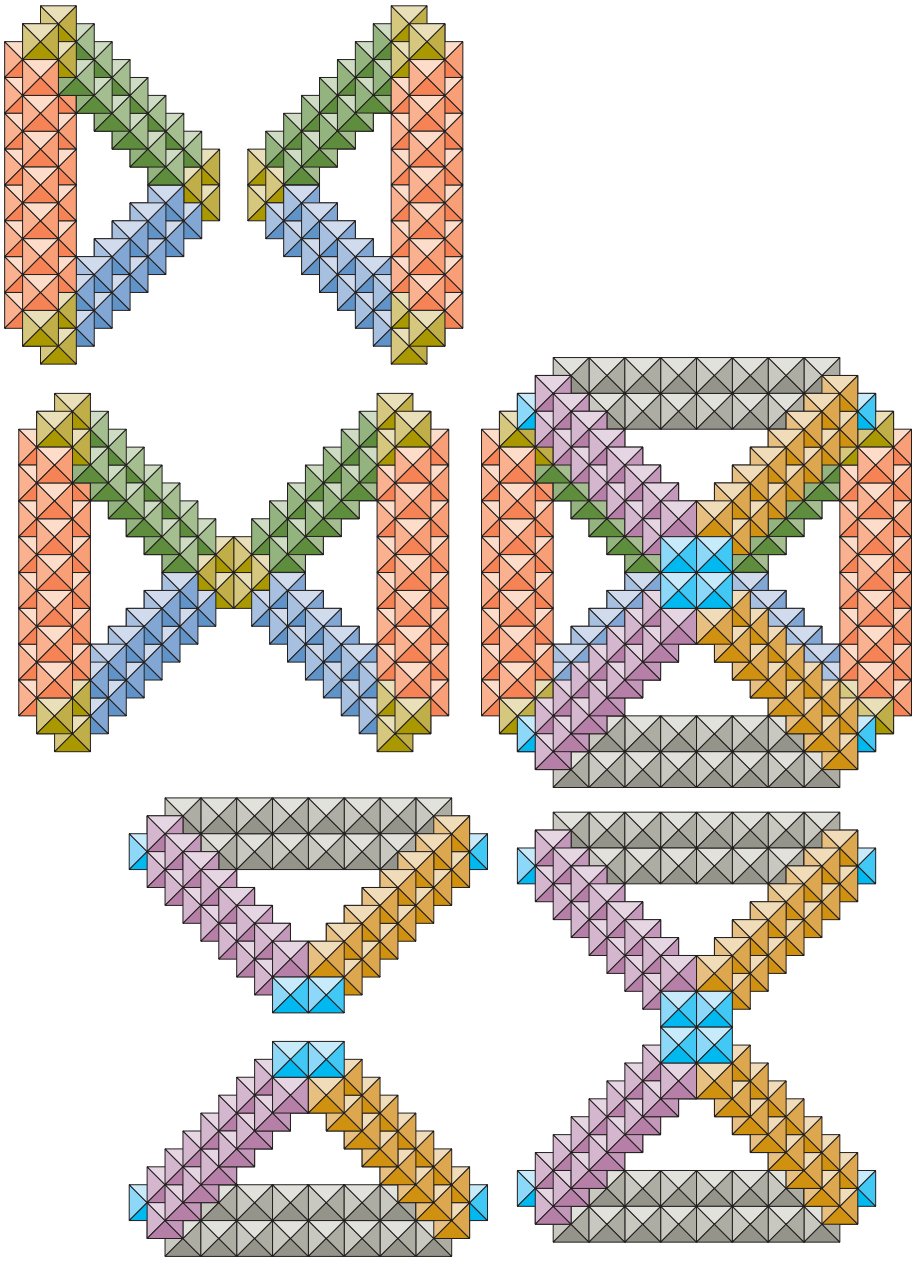


Fig. 7 Carbon strand framework octahedron, vertexial view.
The panels which were assembled in the previous figure are joined here to form a regular octahedron. Each strand of each panel defines one of the twelve edges of the regular octahedron. Each strand is like a girder or strut in the resulting structure. This open structure is a framework octahedron. Its edgially-axised carbon strands are identical to the strands which form the lipids. This type of arrangement has been found to occur using the edgially-axised strands of DNA. [Ref. 2]

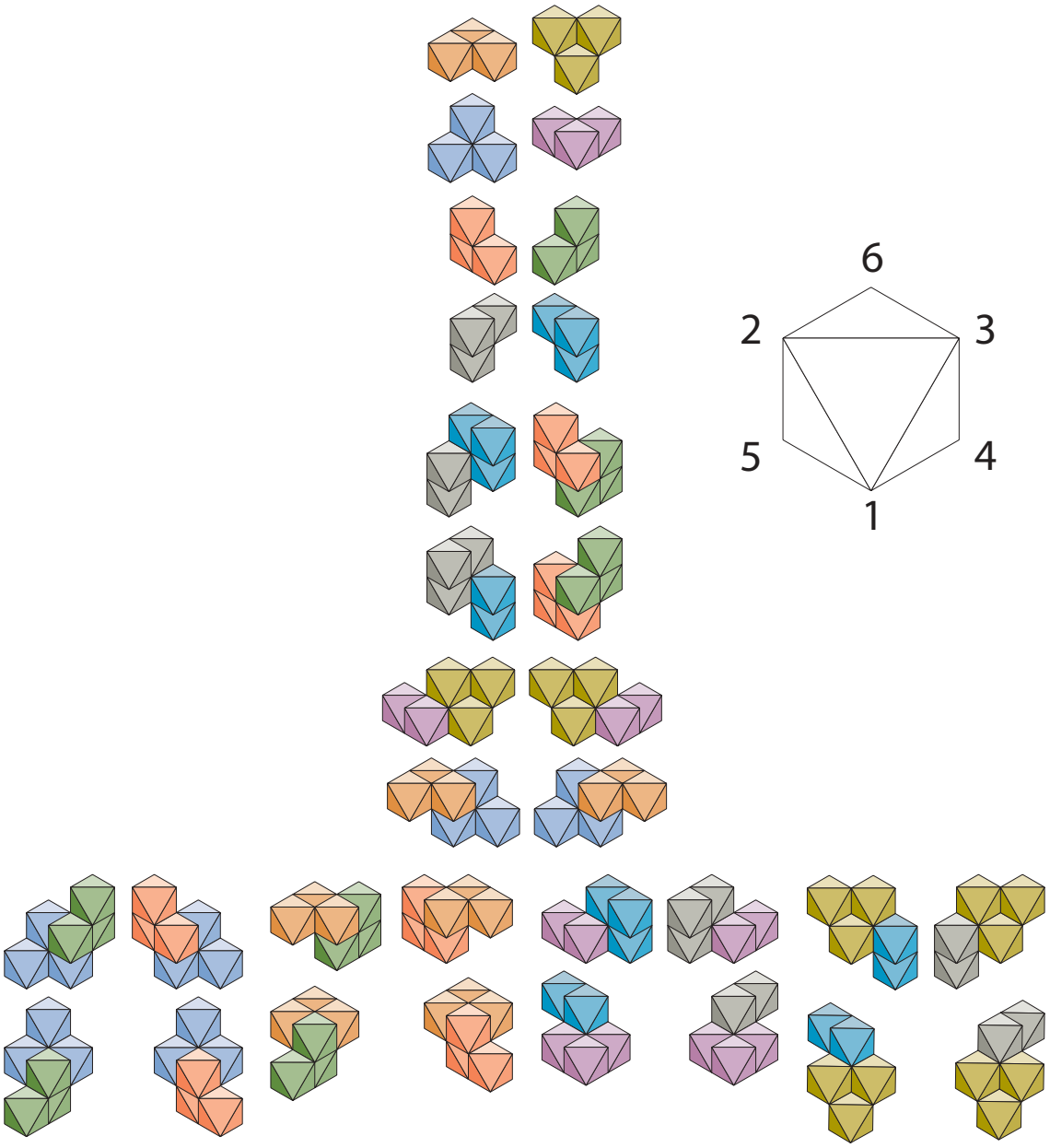


Fig. 8 Carbon pairs facial view

Each of the eight facial views of the C-atom is shown at the top of the figure.The orientational color coding used in the vertexial views is followed here. The labeling of the vertexes of the octahedron shown here is consistent with the one shown in the vertexial views. The twenty-four possible pairings between the various orientations is shown in the lower part of the figure.

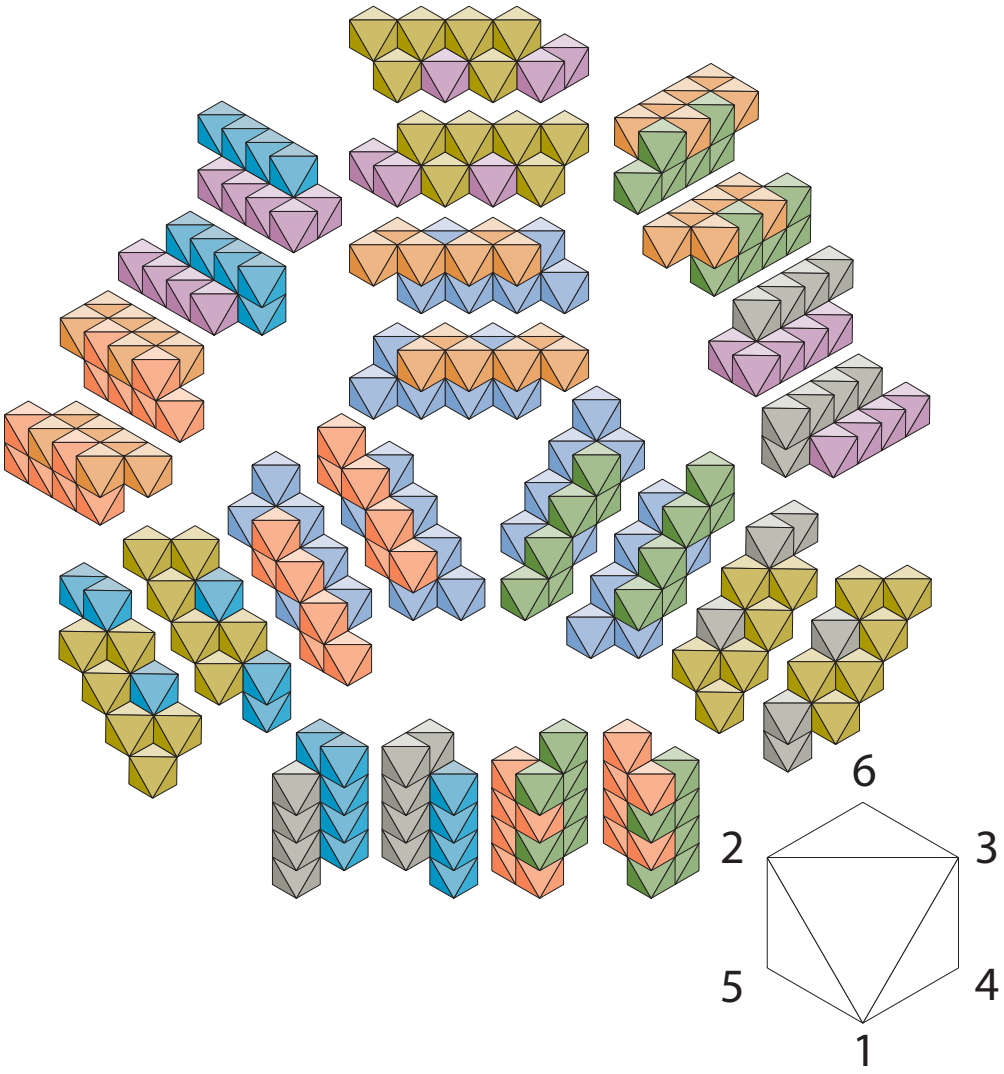


Fig. 9 Carbon strands, facial orientations

Twenty-four strands of four C-atoms each are shown in the figure. The strands are grouped according to which pair of edges of the octahedron it is parallel. Moving clockwise and beginning with he top central strands which are parallel to the 23 and 54 edges, the next group parallels the 26 and 14 edges, the next are parallel to the 31 and 65 edges, then comes the group which parallels the 34 and 25 edges, then the 12 and 46 edges, and lastly the 15 and 36 edges.

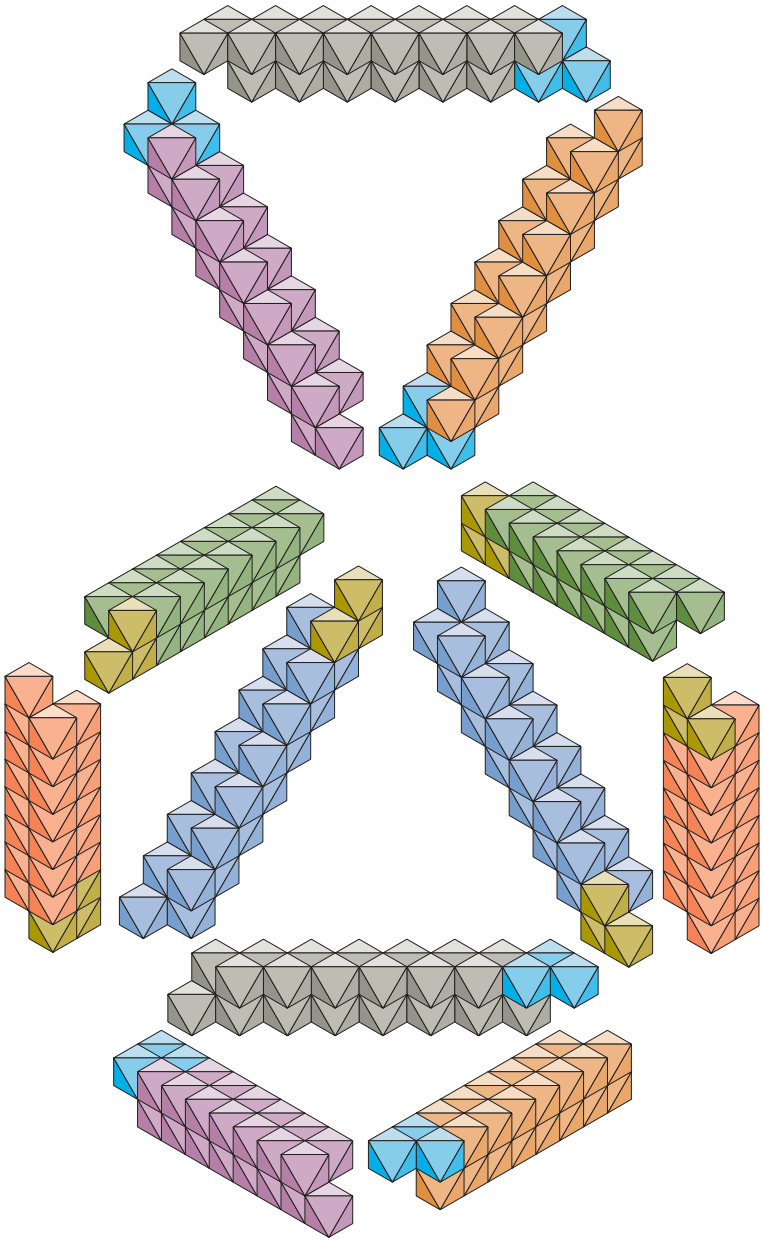


Fig. 10 Carbon strands for building a framework octahedron

The figure shows the twelve strands of eight C-atoms each. Each of the four groups of three will be assembled as a triangular ring. The rings will be used to build the same framework octahedron which was shown vertexially in a previous figure.

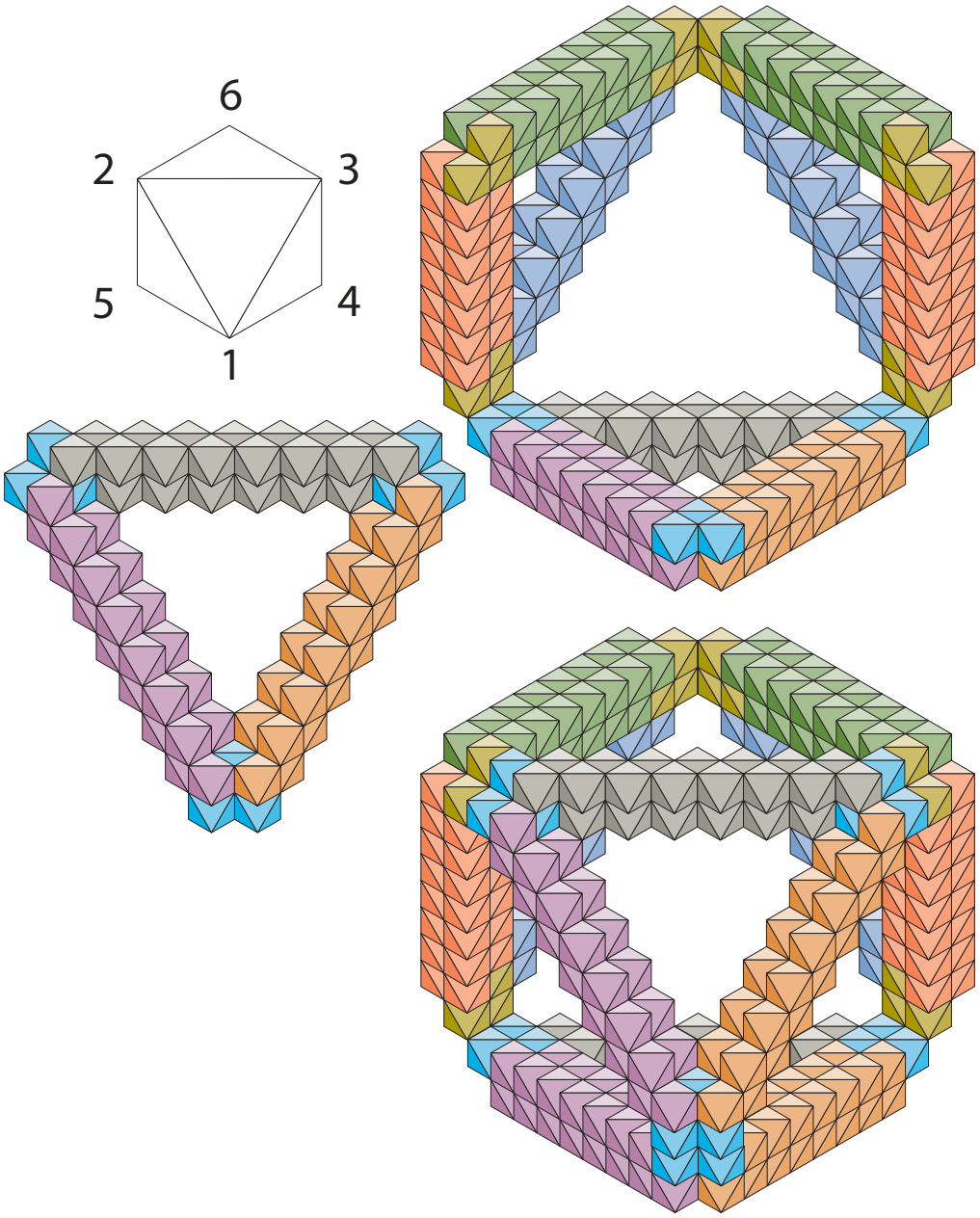


Fig. 11 Carbon strand octahedron

The figure shows a framework octahedron composed of four triangular panels. Each panel consists of three carbon strands of eight C-atoms each. The triangular panels are related to one another as the faces of a regular tetrahedron. The join at each panel-to-panel contact is between two He-octa edges. The two He-octas belong to the same C-atom. The C-atoms which effectuate the join are colored either yellow or aqua. This edge-to-edge contact is the only interpanel contact. The structure is identical to the structure of the four C-atom CFU of diamond. The next figure shows ever larger C-atom rings which form a series 1, 6, 12, 18, 24....

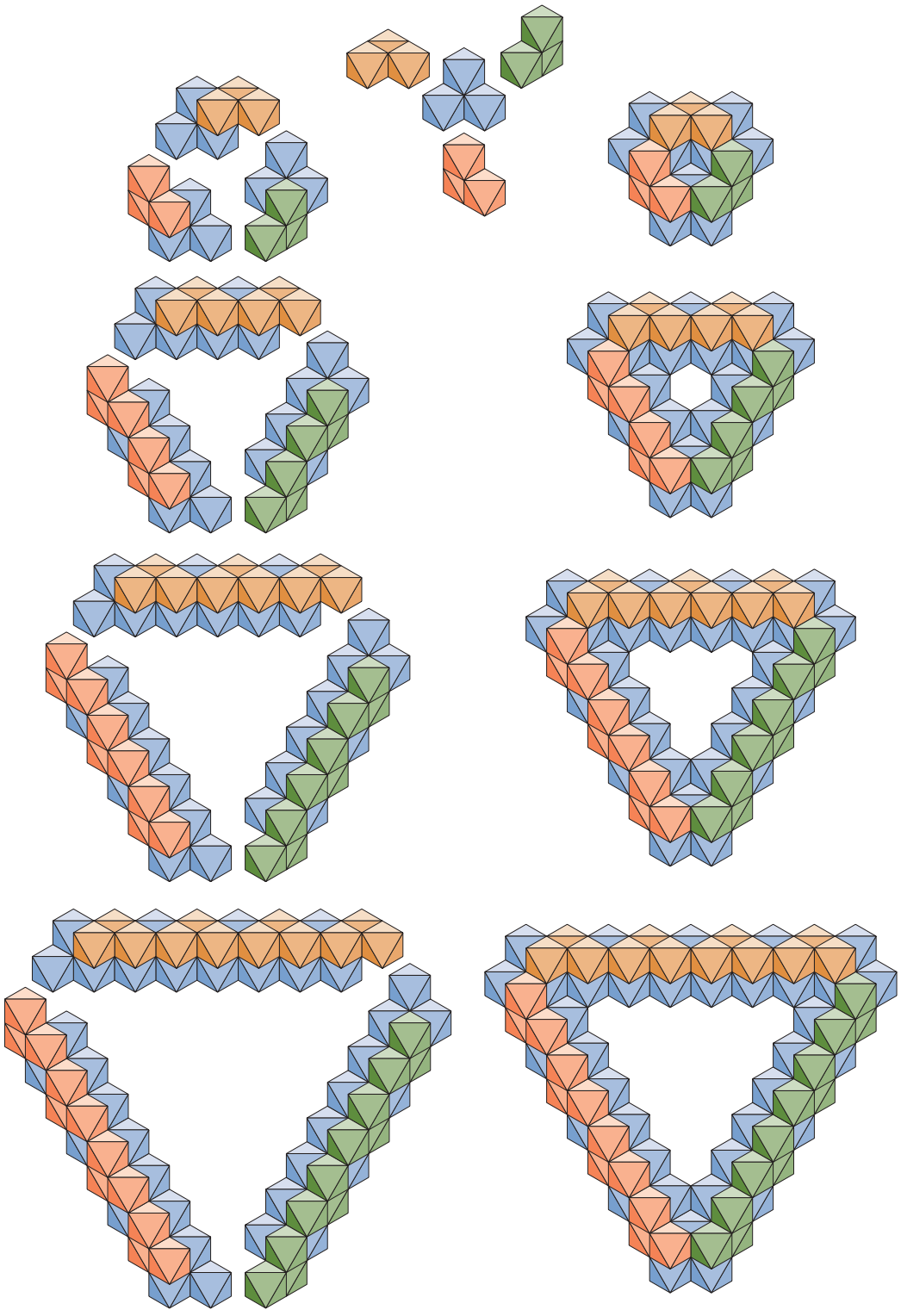
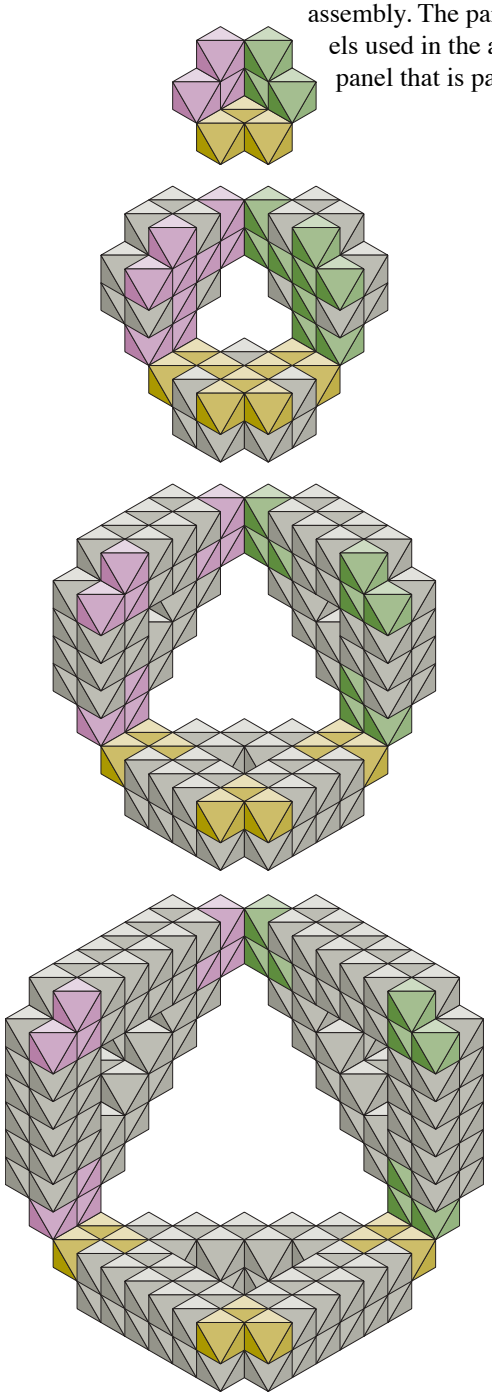


Fig. 12 Carbon strands and the facial panels formed by them.

Fig. 13 Tetrahedral joining of carbon strand panels.

Each of the assemblies shown below is composed of three identical carbon-strand panels. The join between the panels in one assembly is identical to that in each of the other assemblies. Each panel of the topmost assembly consists of a single C-atom. This arrangement is found in the CFUs of graphite and diamond. The next assembly down is composed of C_6-rings. The C-atoms which participate in the joins between the panels are colored according to their relationship to the C-atoms of the topmost assembly. The panels shown in the previous figure correlate to the panels used in the assemblies shown here. They provide a view of each panel that is parallel to its axis of symmetry.



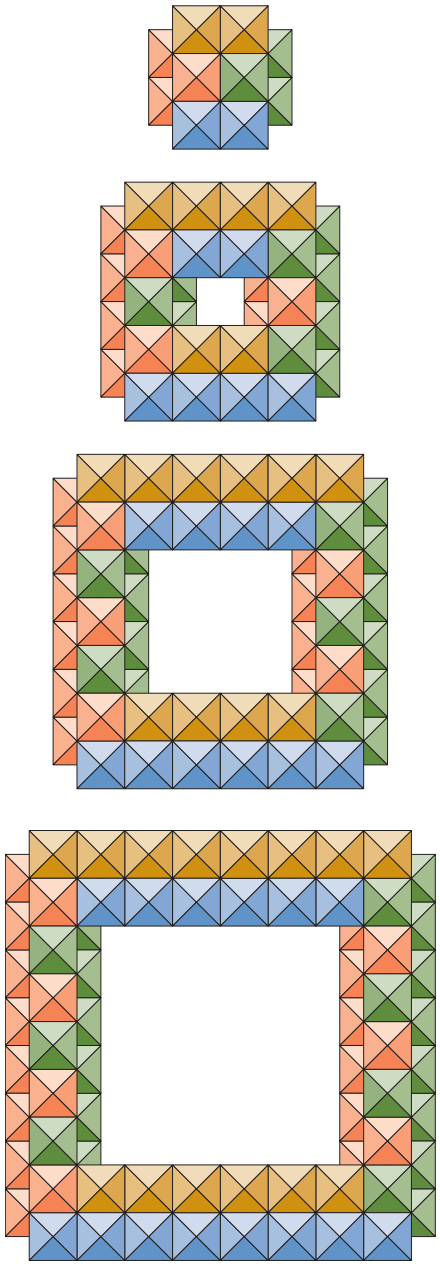


Fig. 14 Square carbon strand rings

Each of the square rings is composed of strands which have an odd-number of C-atoms. The topmost has just one C-atom per strand. The second ring has three C-atoms per strand, the third ring has five, and the fourth ring has seven.

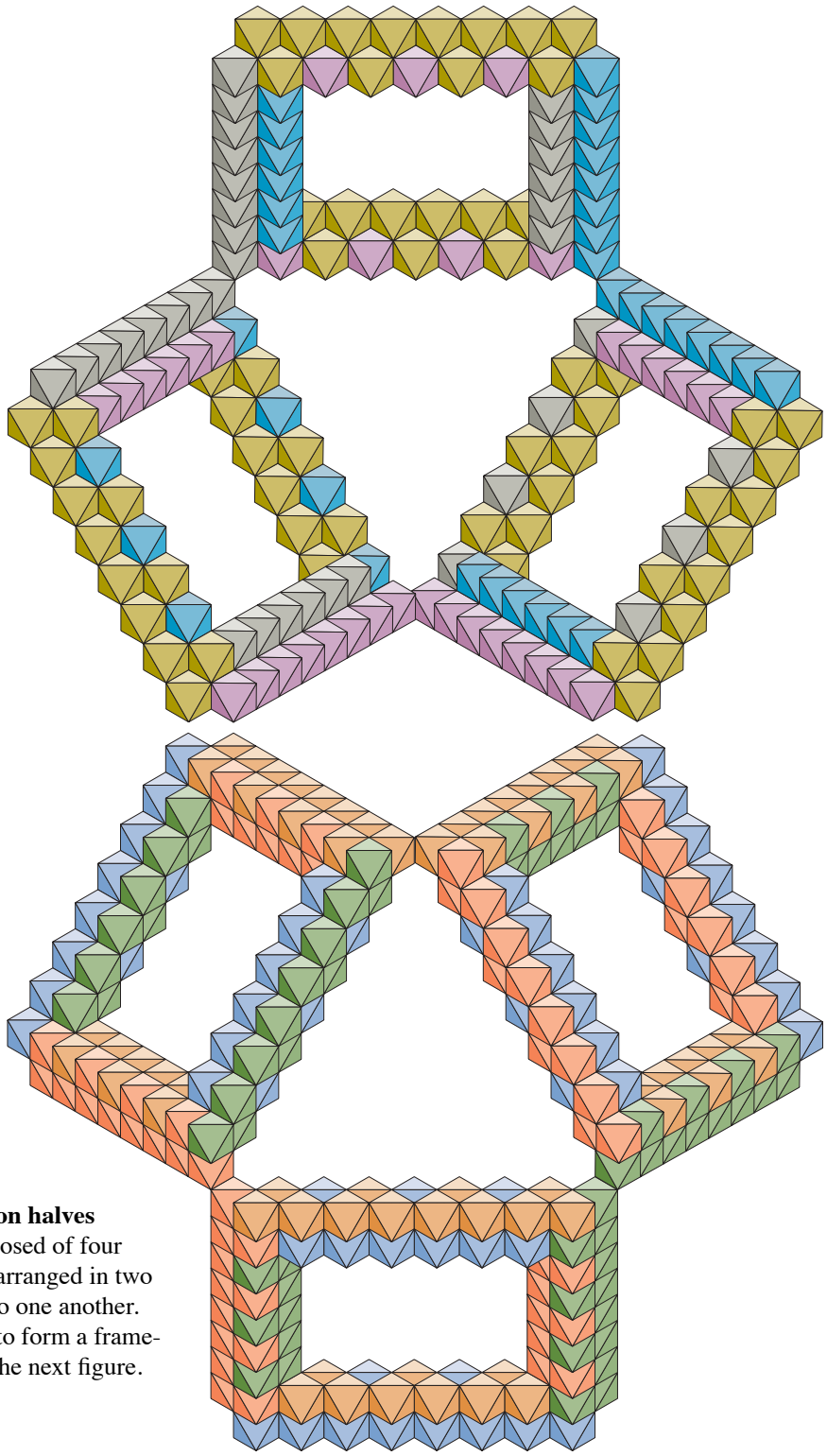


Fig. 15 Cuboctahedron halves
Six square rings composed of four carbon strands each are arranged in two identical rings inverted to one another. These halves are joined to form a framework cuboctahedron in the next figure.

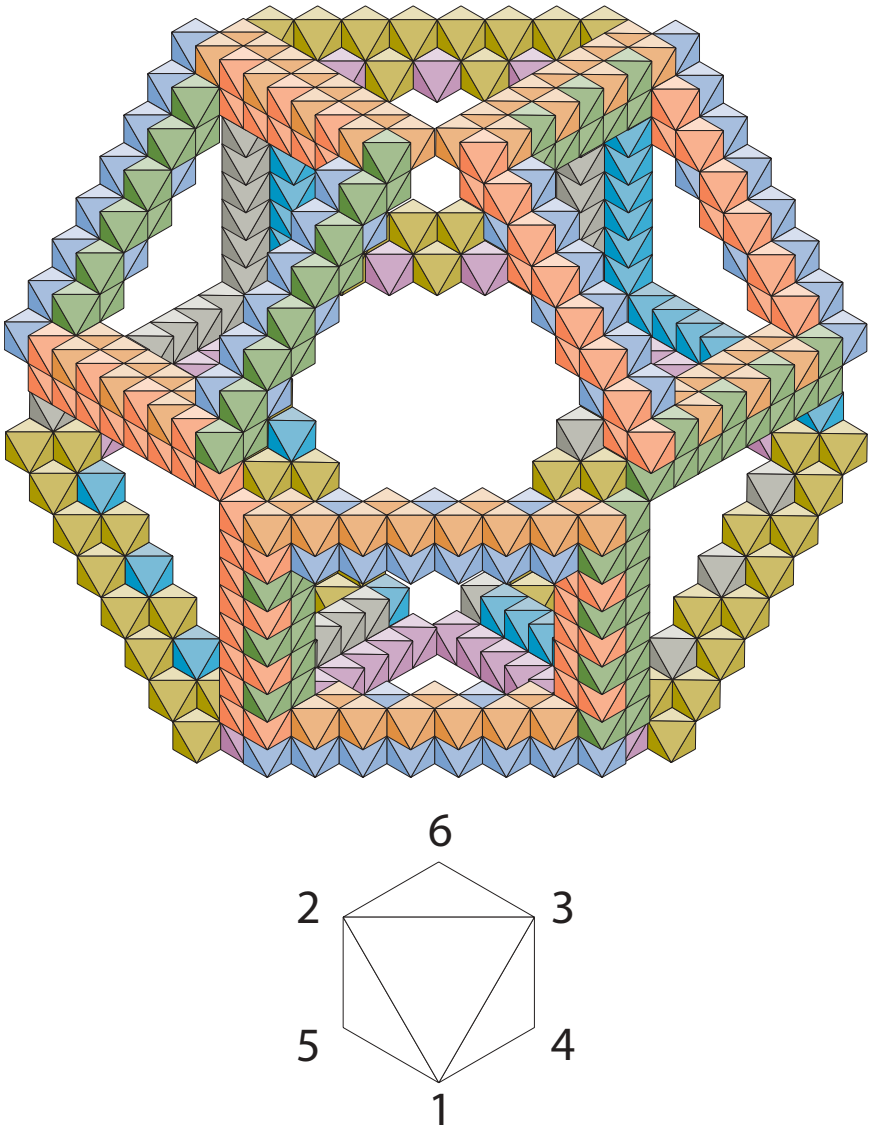


Fig. 16 Carbon strand cuboctahedron

The figure shows a cuboctahedron composed of six square rings.Each ring is formed by four carbon strands of seven C-atoms each. Each strand defines an edge of the cuboctahedron. The C-atoms of the strands are colored according to their orientations. Each ring is joined to four other rings. The join consists of an edge-to-edge join between a He-octa of a C-atom of each ring. This structure of edgially-axised strands has been formed using DNA-strands [Ref. 3].

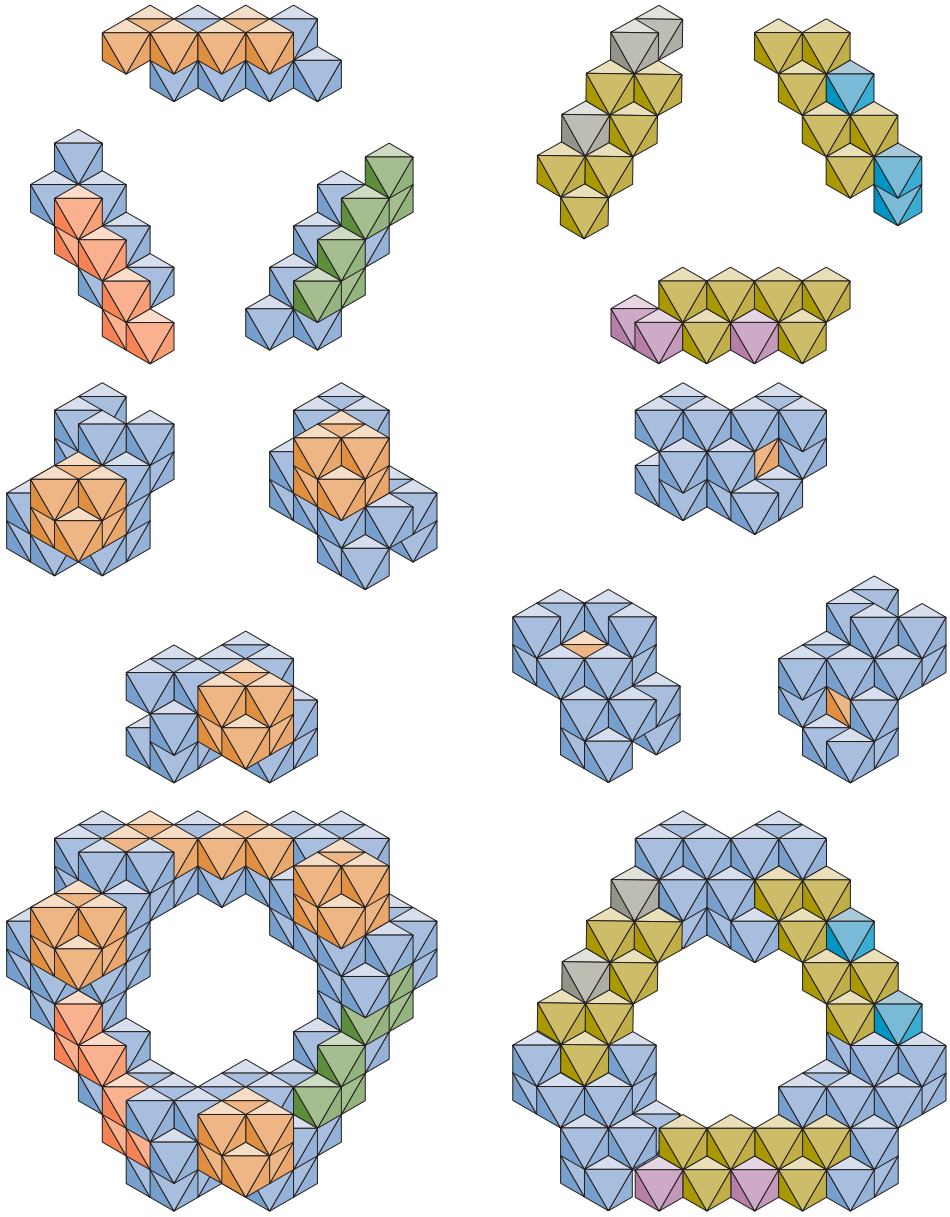


Fig. 17 Triangular ring of carbon strands connected by H_2PO_4-groups

The figure shows the assembly of a triangular ring from opposite directions which are parallel to its axis of symmetry. The assembly takes place in two columns, one for each viewing direction. At the top of each column is a group of three carbon strands of four C-atoms each. Below each group of strands is a group of three H_2PO_4-groups. At the bottom of each column is a ring which has been assembled from the carbon strands and H_2PO_4-groups.

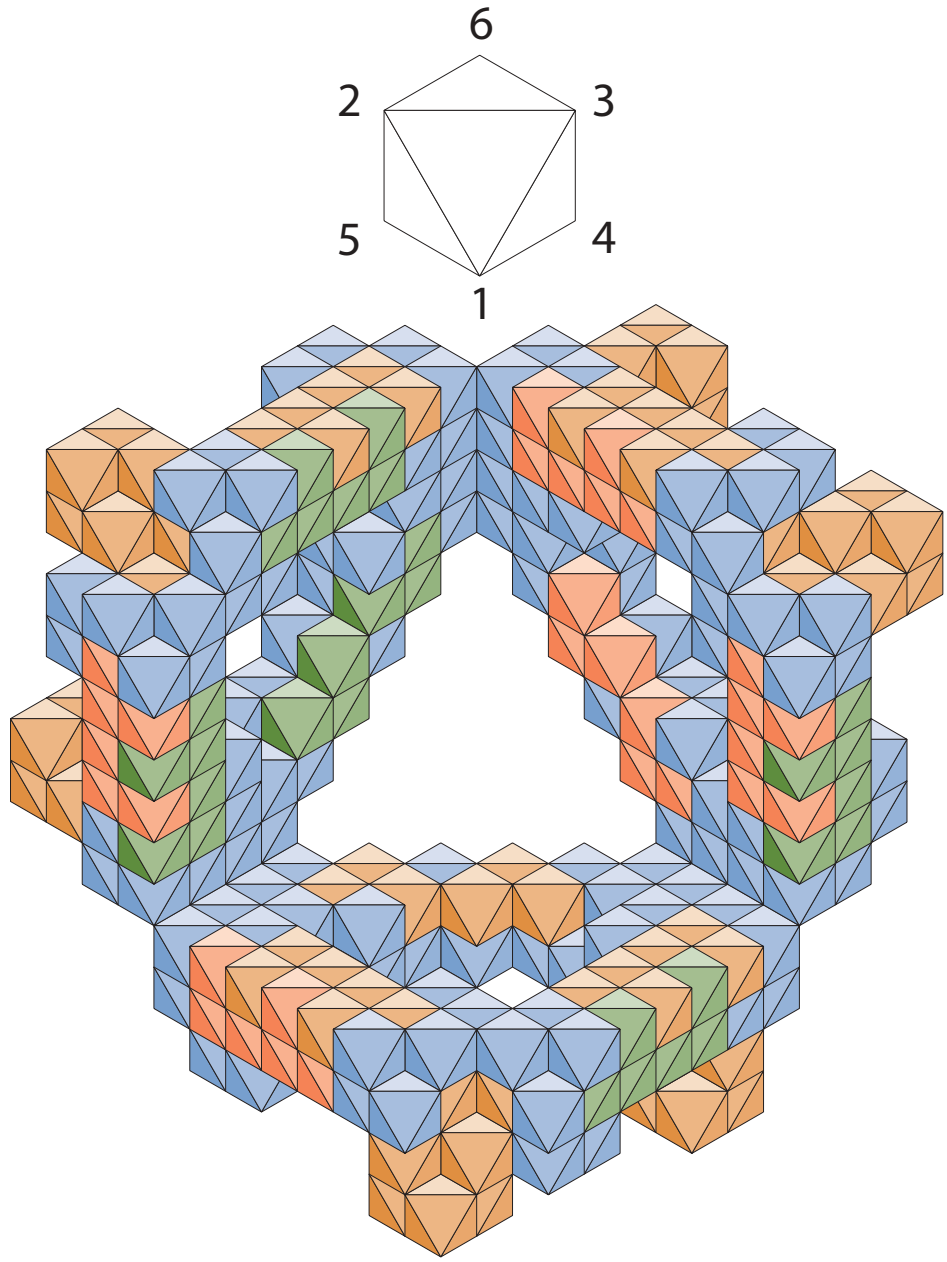


Fig. 18 Ring of three identical rings composed of carbon strands and H_2PO_4-group

Three rings identical to the one whose assembly was shown in the previous figure form the ring shown above. The ring-to-ring join is between four He-octa edges of each ring. The He-octas belong to the O_2-groups of the H_2PO_4-group. Each ring parallels the face of a regular octahedron.

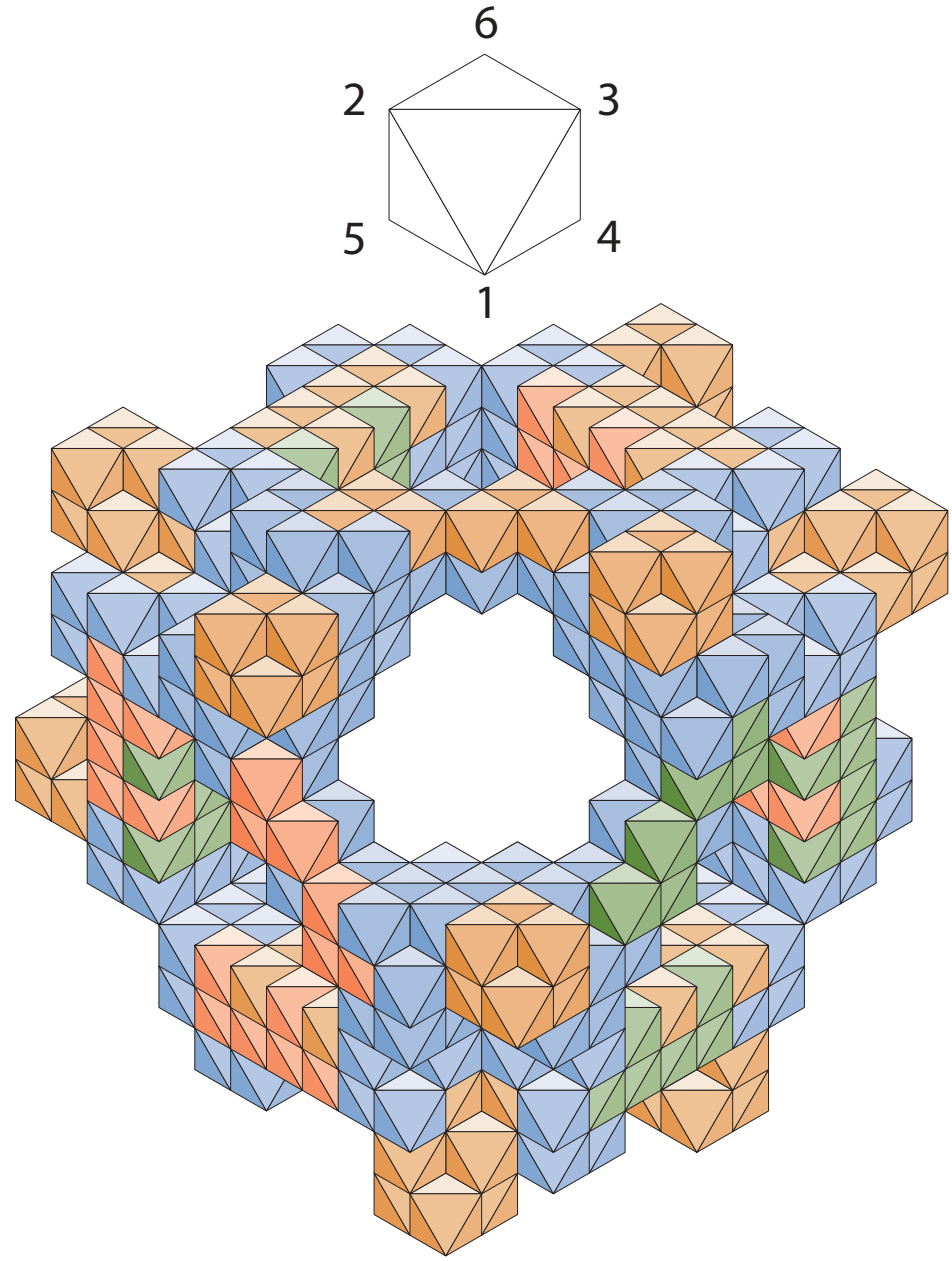


Fig. 19 Framework octahedron consisting of carbon strands and H_2PO_4-groups

Four identical rings combine to form the framework octahedron shown in the figure. The girders of the assembly consist of carbon strands connected by H_2PO_4-groups.