

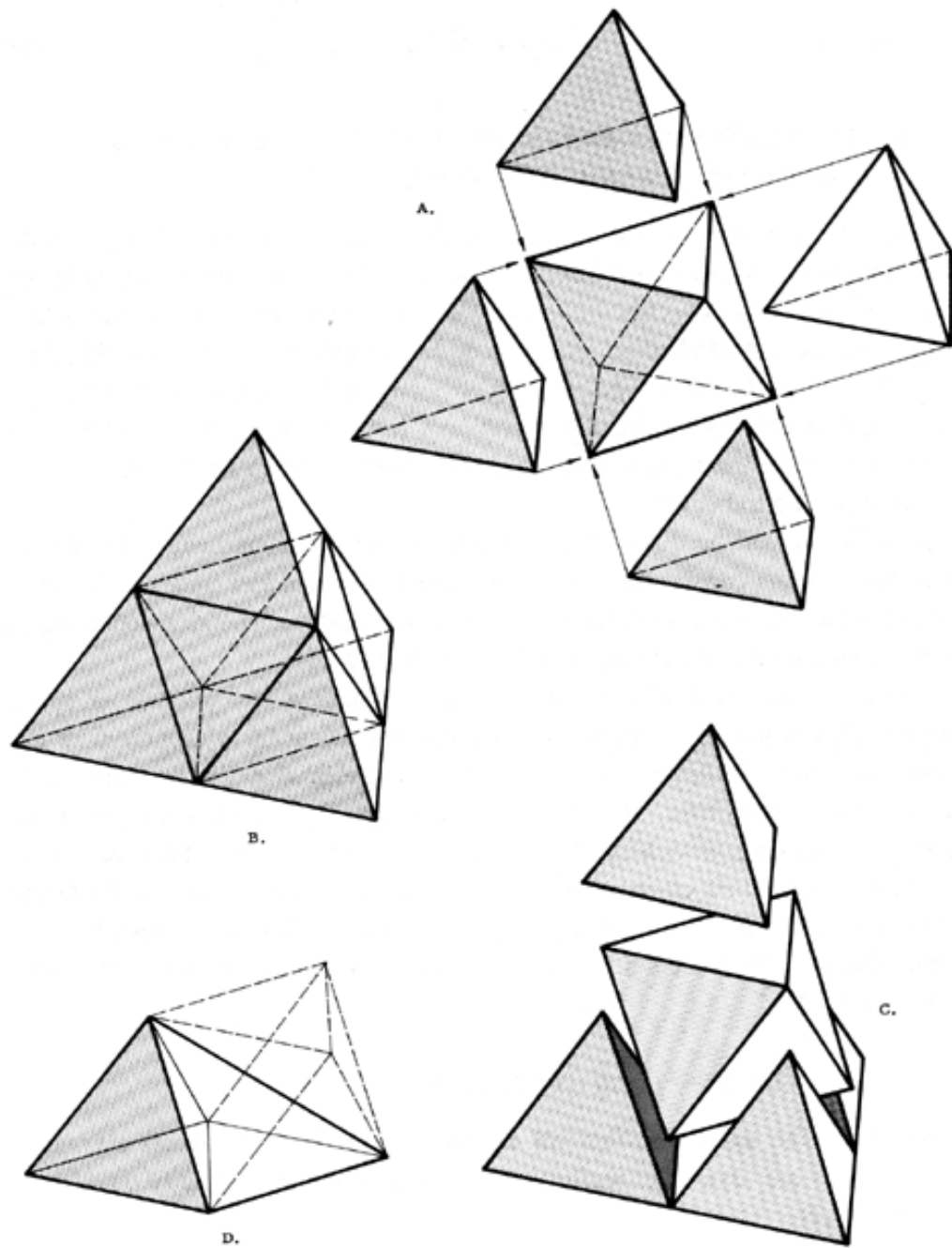


Fig. 950.31 Tetrahedra and Octahedra Combine to Fill Space: Regular tetrahedra alone will not fill space, but when four tetrahedra (A) are grouped to define a larger tetrahedron (B), the resulting central space is an octahedron (C). Therefore tetrahedra and octahedra will combine to fill all the space. If the volume of the smaller tetrahedron is equal to one then the volume of the larger tetrahedron is eight, i.e. edge length two to the third power ($2 \times 2 \times 2$). When we double the linear dimension of a figure we always increase its volume eight-fold.) If the volume of the large tetrahedron is eight the central octahedron must have a volume of exactly four, while the small tetrahedra each equal one. The volume of a pyramid is $\frac{1}{3}$ the base area times the height. Therefore the $\frac{1}{4}$ -octahedron (D) has exactly the same volume as its corresponding tetrahedron, further proof that the regular octahedron has exactly four times the volume of a regular tetrahedron of the same edge length.