ulrich niemeyer

from traditional to digital sculpture

Acknowledgments

Gratitude is due most of all to my niece, Dr. Hilke Spoerel, whose insistence, encouragement and help led to the realization of this book.

Bruce Papier patiently introduced me to many elements of visual considerations alien to this sculptor's preoccupation with the tactile.

Dumbarton Oaks publishers graciously gave permission to reproduce three graphics from their publication “Mesoamerican Writing Systems.”

The first edition of thirty copies was printed, when self publishing in color presented difficulties and high cost for limited quality. All copies went to family and friends I felt indebted to. Criticism and requests for more by others led to this revised version. May they in turn be challenged to do theirs.

sælde
Steenredder 16
24214 Gettorf
Germany
ISBN 3-000095039

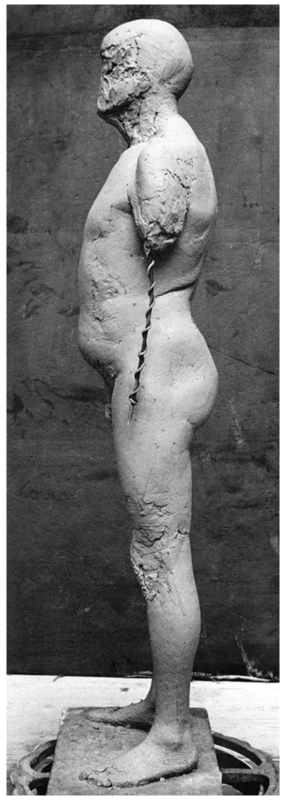
Preface

The finely crafted and elegant sculpture of Ulrich Niemeyer can too easily be misinterpreted as just fascinating arrangements of basic geometric elements. Certainly his work can be enjoyed at that level alone but at the great cost of a true understanding and appreciation for both this artist's passionate studies of pre-Columbian architecture and artifacts as well as his analytical and technical skills in generating extensive computer model permutations and renderings.

A second, and no less important, profession for Ulrich is his teaching. To the distinct advantage of his students, Uli has taken his academic approach to his own work and his computer graphics expertise into the classroom. He has developed a Visual Communication program, along with the latest technology computer graphics facilities, at a local community college that rivals many much larger schools in the country.

The following pages will give the reader a unique opportunity to look into the very complex thought processes and rationale of a talented and dedicated artist/teacher.

Bruce Papier
professor emeritus
design studies
New Mexico Highlands University



Search for Order

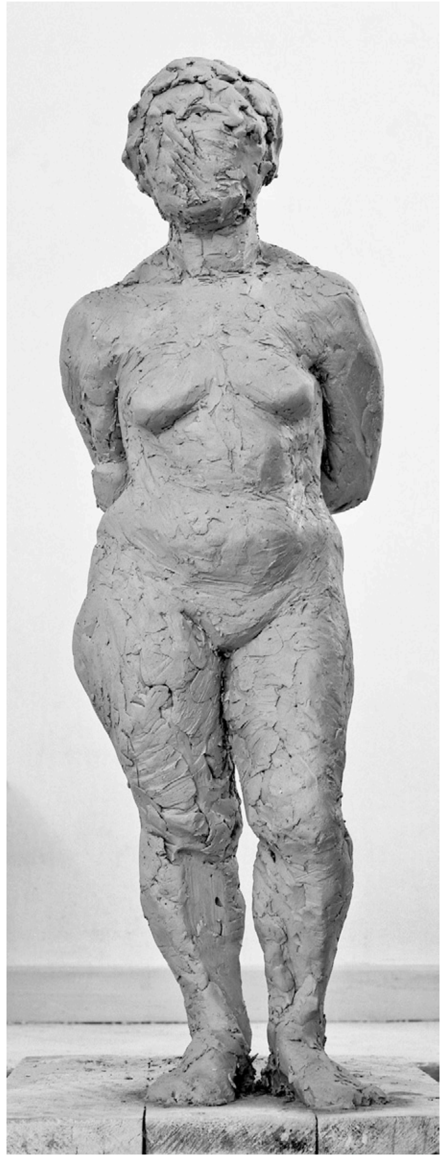
By the end of the Old Kingdom in Egypt (2150 BC) the convention in human representation required a standing figure to be subdivided into eighteen units, a seated figure into fourteen units.

Modelling from life presents the challenge of proportioning, be it according to aesthetic judgement, convention or anatomical correctness. In 1958 at the Royal Academy in Stockholm, Sweden, the model was Greek, but the sculptural approach expressional. Two models would pose four hours each for two weeks, one session in the morning, another in the afternoon. The first week's figures were careful attempts to be true to pose and shape. The second week's work would be intuitive, drawing as much from memory as observation.

In 1959 at the Slade School in London, England, one life-size figure would be far from finished at the end of a trimester. Careful preparation went into the construction of a free-standing armature mapping out the figure from front, side and back. With the use of a plumb line, diagrams with measurements in x, y and z would set the position of head, shoulder girdle, pelvis, knees, ankles, elbows and hands. With the help of a diagram scratched into the base of the armature, the position of the model could be corrected. Once the position and basic dimensions of the figure were realized, the surface modelling would begin. After two years of exclusive figure modelling a sense of consequentiality set in. Assuming knowledge of growth, it seemed that one anatomical detail to contain the information of the whole figure. This sense of consequential growth rather than codified proportioning was the gain. Two more years of museum visits, dialogue and experimentation, till this period was understood to have ended. In 1963 an invitation to the USA was offered and accepted.

Stockholm 1958

Stockholm 1959



The model would take a pose, corrected according to the previous days position and at intervals turn clockwise allowing students over a four hour period a 360° view to work from. The one hour lunch break in the cafeteria of the museum of modern art, paid for by the city of Stockholm, would follow a second four hour session, a different model posing, taking a different position.

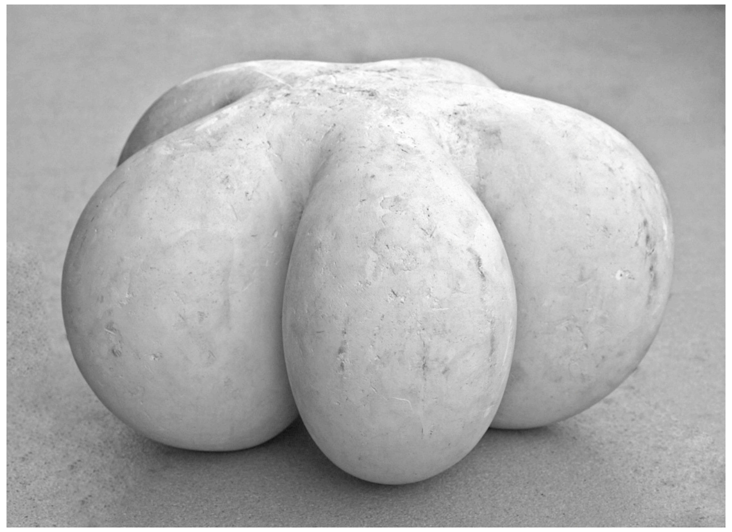
Stockholm 1959

Integrating three shapes into an organic whole was a first attempt to break with figure sculpture. In this the work of Brancusi and Arp was most influential. The piece was modelled in clay and cast in plaster.

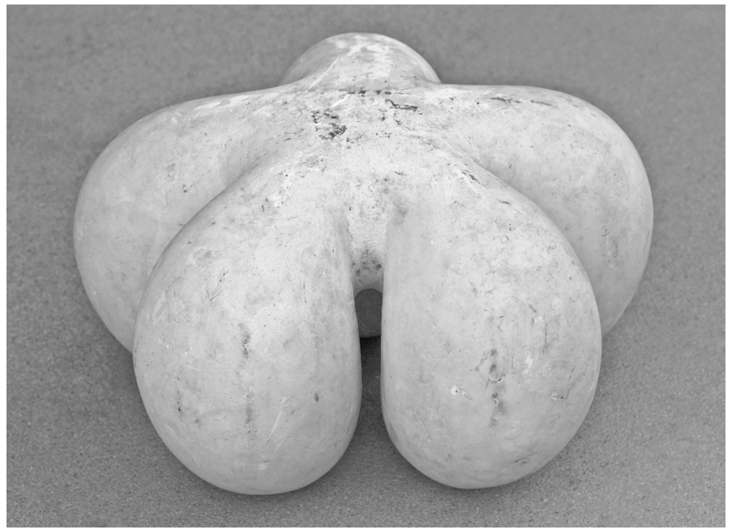
London 1962

A small golden ornament in the collection of the British Museum in London, from the royal tomb in Ur, dated to 2500 BC, inspired this work. The piece would be reworked in 1968 as No.10.

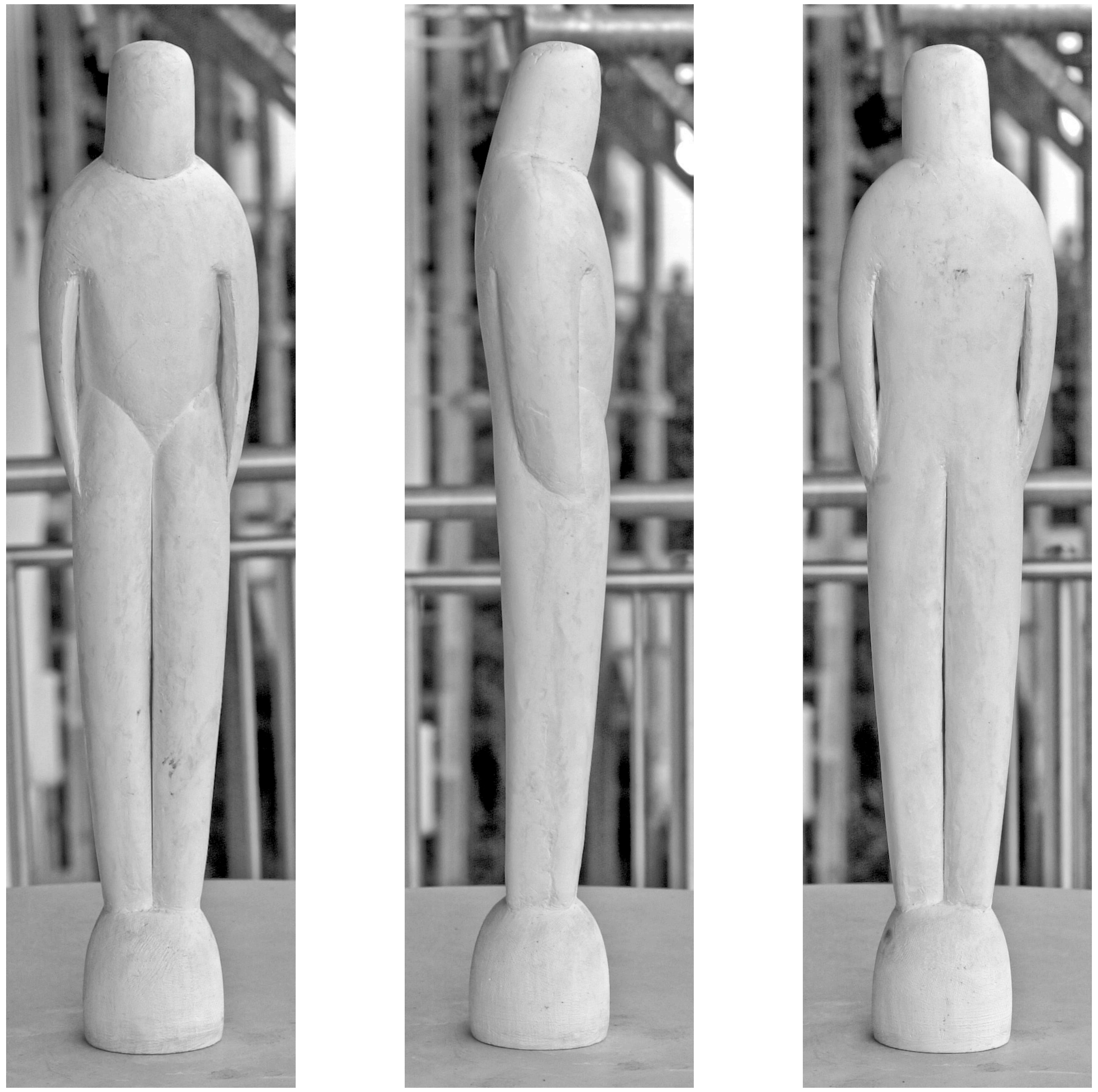
London 1962



The idea of a first multitude is assumed by the number five. An even distribution of five symetrical organic shapes in circular form resulted in an inside and outside, with no discernible front or back.

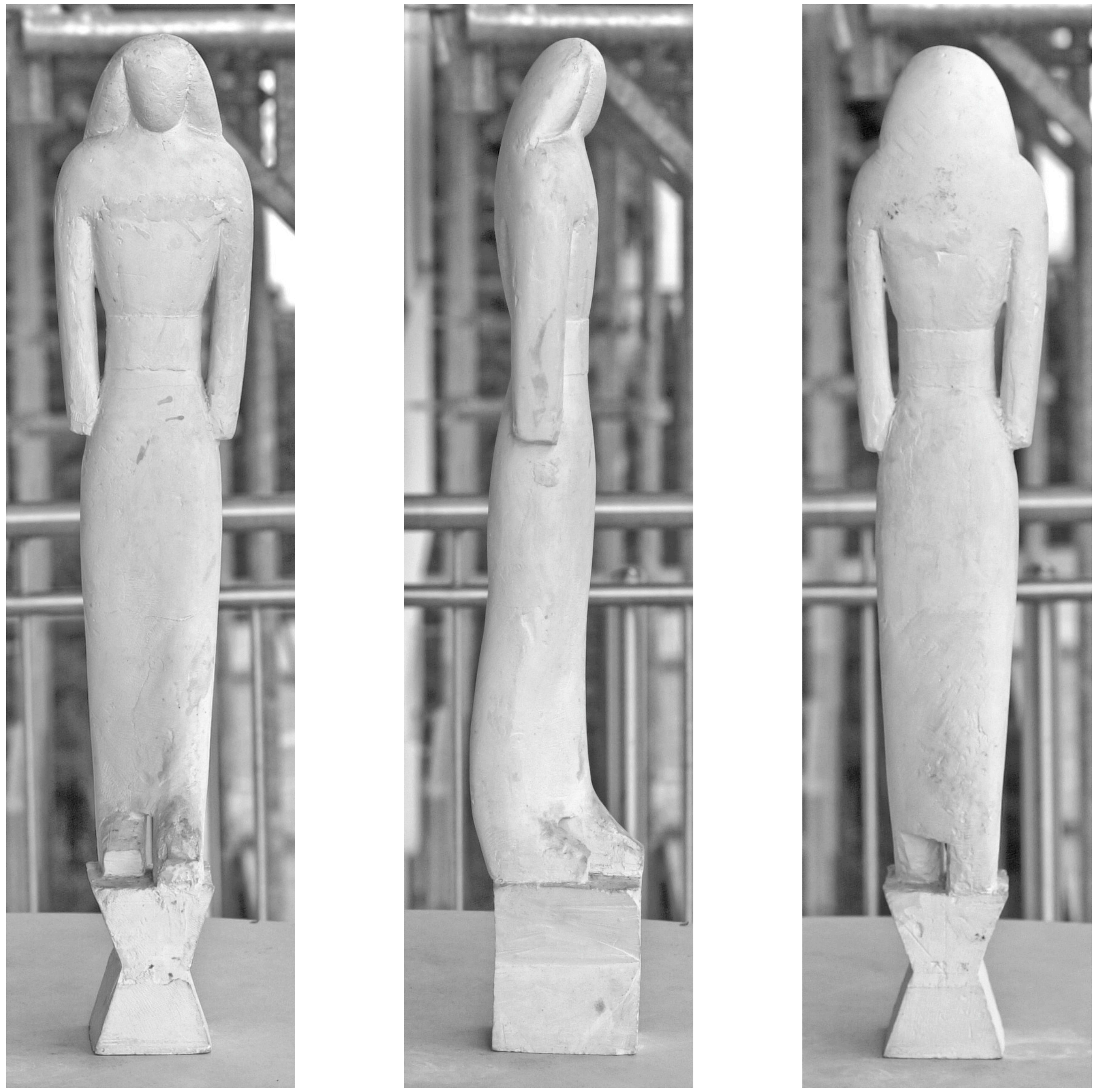


London 1962



While the experience of figure modelling in Stockholm and London from 1958 through 1961 was an exercise in discipline as well as a process of analytical discovering, it felt important to reconnect with first attempts at the figure begun 1956 in Mainz, Germany.

London 1962-63

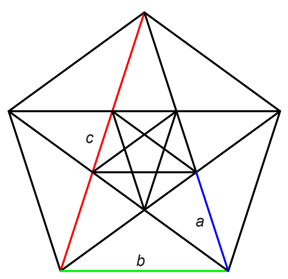


The figure reinterprets a Kore statue, the fragment of which is in the museum in Delos. The original is broken off at the waist. The fragment shows a composition delineating schematically hair, face, shoulders, torso and waist. Mid 7th. century Kore figures still recall an Egyptian sculpting tradition. Modelling in clay for the purpose of bronze casting would allow the Greeks to rely on what they saw. That realism in turn would change the canon of stone carving.

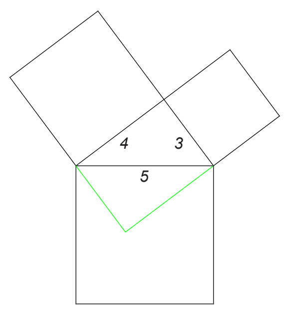
London 1962-63

The Golden Section

The origin of the golden section is not known. The Greeks of the 4th. century BC referred to the division of a line in extreme and mean ratio as the “section”. Luca Pacioli published his book “Divina Proportione” in 1509. The term “goldener Schnitt” appears first in “Die reine Elementar Mathematik” by Martin Ohm, published in 1835. A comprehensive history of PHI, “The Golden Ratio” by Mario Livio, was published in 2002.



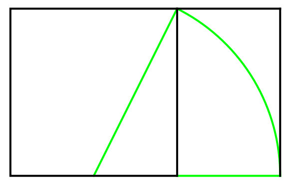
Geometrically the “section” is linked to the pentagram as shown in the pentagon: *a* relates to *b* as *b* to *c,* or: *c = a+b.* An early representation of a pentagram from Uruk (Mesopotamia) is dated to about 3200 BC. Pythagoras, one of the first to discuss the irrational number Φ (phi), developed his theory of musical harmony on such proportional divisions of a string. This suggests an arithmetic approach rather than a geometric. The Fibonacci series 1,1,2,3,5,8,13,21 ~ where a number constitutes the sum of the two previous numbers, does this well. (Leonardo of Pisa, book of the abacus, 1202 AD)



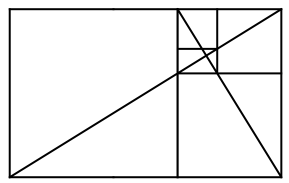
Geometry may have its origin in the necessary re-measuring of land parcels after seasonal flooding in the fertile river valleys of the old world. A Babylonian clay tablet, believed to date from between 1900 to 1600 BC, represents the oldest known documented number theory, anticipating the Pythagorean theorem $a^2 + b^2 = c^2$. On the tablet the question is asked, what is the breadth if ”*4 is the length and 5 the diagonal? Its size is not known. 4 times 4 is 16 and 5 times 5 is 25. If you take 16 from 25 there remains 9. What times what shall I take in order to get 9? 3 times 3 is 9. 3 is the breadth.*”

The rope-stretchers of ancient Egypt, laying out three units of rope in one direction, four in an other, with five units needed to reconnect to the beginning, knew to have laid out a right triangle.

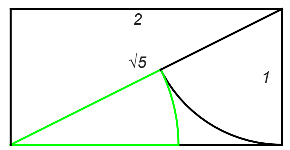
Pythagoras, assimilating old world knowledge in Egypt and Babylon from 535 to 520 BC, seems to have been the first to formulate proof of these applications of geometry.



One realization of the golden section different from the pentagram requires drawing a line from the midpoint of the base of a square to an opposite corner. Drawing an arc with this line as radius on to the extension of the base, adds a distance, which relates to the base, as the base relates to their sum.



According to Euclid, proportion means the equality of two ratios. The reciprocal of a golden rectangle requires drawing a perpendicular to the diagonal from one corner of the rectangle, thereby dividing the rectangle proportionally. Using a computer aided design program, this geometric method of proportioning is precise and preferable to calculations with Φ or $(1+\sqrt{5}):2 = 1{,}618...$ an irrational number.

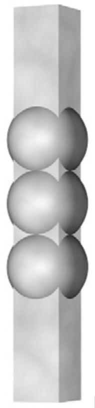


Art and geometry, not unlike religion, are human inventions serving a need for meaning and order in the process of living. As long as this need does not vanish, neither will the drive to invent.

It is the temptation to control that leads to dogma, in religion as well as in art. While the concept of Φ finds expression in a multitude of applications, it is not a recipe for beauty, harmony and truth. Nor is Φ a divine unifier in human aesthetic.

The geometric construction of the golden section is unambiguous. It is not subject to approximation. If, as is suggested even in reference to the classic Maya, any architectural tradition applied the ratio of the golden section, evidence of such knowledge should be more obviously recognizable, since the respective diagrams for the construction of these proportions are simple, elegant and easily applied as signature or graffiti.

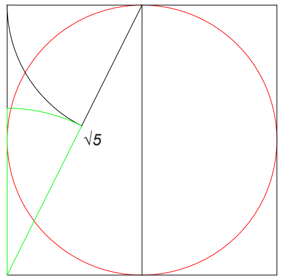
Curiosity precedes creativity and knowledge. Communication precedes culture.



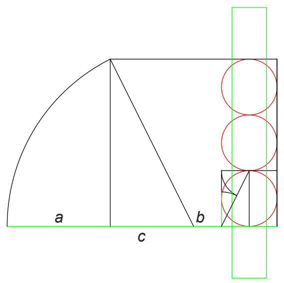
No.6

Placing three spheres over an extruded square suggests, in one extreme, for the column a string-like thinness, showing a maximum of spheres and a minimum of column. An alternative implies a column at least as wide as the spheres, making them invisible, except if the column is transparent. Searching for a mean in the relationship of spheres and column, the length and thickness of the column in relation to the diameter of the spheres determines the aesthetic validity of the composition.

The proportions for composition No.6 were originally arrived at by trial and error. Based on a discussion of the golden section in Corbusier's diaries (Le Corbusier, Swiss-French architect, 1887-1965), these proportions were rationalized in 1965 by applying the ratio of the golden section, 1.618... or Φ (phi).

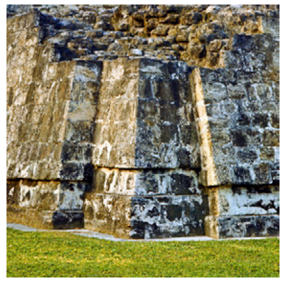


A square over a circle is divided into two equal rectangles. A diagonal is drawn through one of the rectangles. Since the short side of the rectangle relates to the long side one to two, following Pythagoras, the sum of the squares over two sides of a right triangle equals the square over its base. The length of the diagonal is √5. The diagonal is divided by an arc drawn over the short side of the rectangle. An arc over the larger section of the diagonal divides the long side of the rectangle by the ratio of Φ. The shorter distance relates to the larger distance, as the larger distance relates to their sum, the diagonal of the sphere.

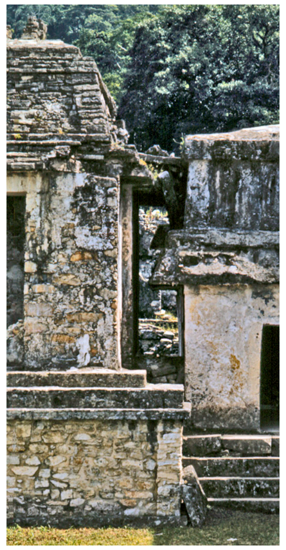


The larger distance is taken as the width of the column, which relates to the diameter of the sphere by Φ. Over the combined diameters of all three spheres a second square is divided into two equal rectangles. Throwing an arc over the diagonal onto the extension of the base of the square adds *a* to *b*, the sum of which is *c*, which becomes the height of the column (green). The spheres are cut vertically when placed over the column, which causes their combined height to compress.

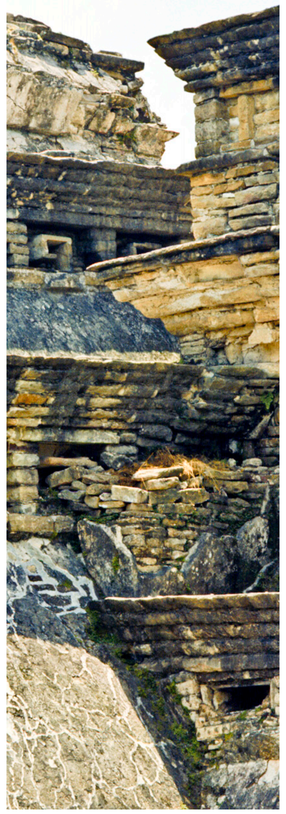
During the work that followed it became quite apparent that similar applications did not guarantee aesthetic satisfaction, but constituted one methodology among many.



Tikal



Palenque



El Tajin

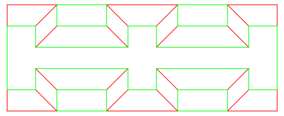
Articulation

Experiencing pre-Columbian architecture, the visitor is bound to be fascinated by the interplay of proportions, repetitions and economical variations of design elements, all within a strict adherence to an iconographic convention. As the visitor explores an archaeological site, exposed to ever-changing perspectives from alternating altitudes and angles - at one time in a commanding sight - at others within an intimate enclosure - the architectural environment becomes a sculptural experience.

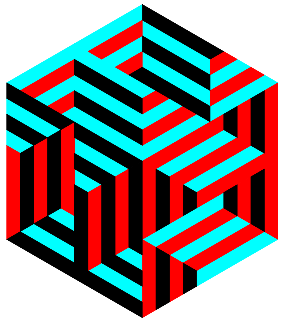
Obviously numbers and geometric alignments were essential within the conceptual aspect of the architecture as well as the site planning. Their function may have been esoteric. However, the aesthetic impact is universal and does not require initiation. Though we do not know of any geometric method applied, even if some system of triangulation may be assumed, the high degree of aesthetic articulation implies a cultural discipline beyond the individualistic.

Yet it often is precisely what appears to us as a singular variation, or "local architectural dialect," that adds vibrancy to what otherwise would seem just a stylistic convention. It is, however, not a specific method applied, which makes for any aesthetic experience or guarantees one. It is, rather, the viewer's expectation of order, which is being challenged, if not satisfied. A search for order and its articulation, however questioned, underlies our creative impulse as well as our curiosity. Caught within limitations imposed on us, be it by nature or convention, an insuppressible urge arises to search beyond these limitations. By degree of articulation or elegance of formulation we are able to achieve an economy of means in our expression, by which we can be understood universally. In that, we are children of all cultures.

Computer Aided Design



In early March of 1987 at Rockland Community College, NY, a friend surprised me with a computer plotting of Pyramids #1, which we were at that time executing as a painted wood mosaic. The same day he introduced me to the Electrical Technology Department. The main frame computer in use there, named “the ugly bride”, since she had been inherited instead of chosen, became my obsession. A year later I too had enough of her. March 23, 1988, I was called to the lab on the promise of doughnuts and coffee and saw the pride of the department, a new PC lab running AutoCAD. The director of the department introduced me to a man called Charlie, who for the next year patiently suffered troubleshooting my problems with hardware and software. Living in a VW Camper, parked inconspicuously, so I thought, behind the department building, I was granted unconditional access to the lab, day or night, with Charlie never hard to reach by telephone.

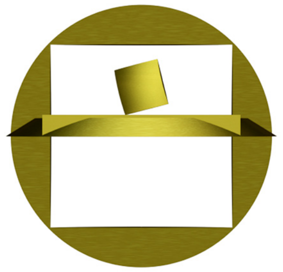


AutoCAD was, at that time, a two dimensional drafting program, and the challenge to achieve three-dimensional visual illusions were similar to my work in progress, painted plywood mosaics.

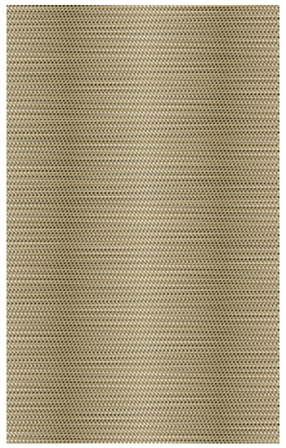
My attempts to promote an interdisciplinary Digital Foundation program had the support of the Electrical Technology Department but not Fine Art, where I was teaching Sculpture and Basic Design.

With no prospect of achieving support from the administration as well as realizing the end of a twenty five-year existence in Manhattan, in the spring of 1989 I thought it advantageous and promising to follow a long-extended invitation to Cuernavaca, Mexico. The prospect of affordable bronze casting in Mexico seemed to offset the abandoning of computer aided design.

Animation: UN #42



Animation: Pattern 3



NNMCC

On March 30. 1993, while I was visiting the facilities of the Design Studies program at New Mexico Highlands University in Las Vegas, Bruce Papier, director and founder of the program, provided me with an update of digital visualization technology. Even though some of my work at that time was being executed using CNC (computer numerical control) technology, the extent of the evolution of digital imaging came as a shock. That year my sole effort was to catch up. During this time some of the pages represented here first took shape as supplementary material to an exhibition sponsored by Design Studies at Highlands.

In the spring semester of 1994, Northern New Mexico Community College in Española provided me with the opportunity to introduce an experimental Computer Aided Foundation course under Drafting. By the fall semester of 1995 Design Foundation had grown, thanks to the support of the science department, into a two-year degree curriculum. In 2002 the program changed into Visual Communication with an emphasis on 2D pre-publication design and 3D animation and digital production for film. However, attempts to introduce and develop digital sculpture as a Fine Art discipline did not materialize.

Computer generated design as well as CNC capabilities undoubtedly will be increasingly applied in the creative process, allowing the possibility for personal expression as any tool-use does, subject to articulation, vision and accessibility. It may take another generation of students familiar with digital as well as tactile media to continue this dialogue called art. The result, where and whenever it may materialize, will not be a substitute for existing modes of expression, but rather, an expansion into new ones, for the process will not stop.

Idol #1 was modeled while living in Dobbs Ferry, New York. The bronze was executed 1989 in Cuernavaca, Mexico. The design of the upper part is in reference to a Kore fragment in Delos, Greece. The idol followes a series of figures based on that fragment, left unfinished in London.

Idol #1 / 1964

In Idol #2 the previous composition is transformed in reference to the Venus of Willendorf. A geometric primitive was incorporated in the form of two hemispheres.

Idol #2 / 1964

Idol #3 evolved from its predecessors Idol #1 and #2, flattened, with the front identical to the back.

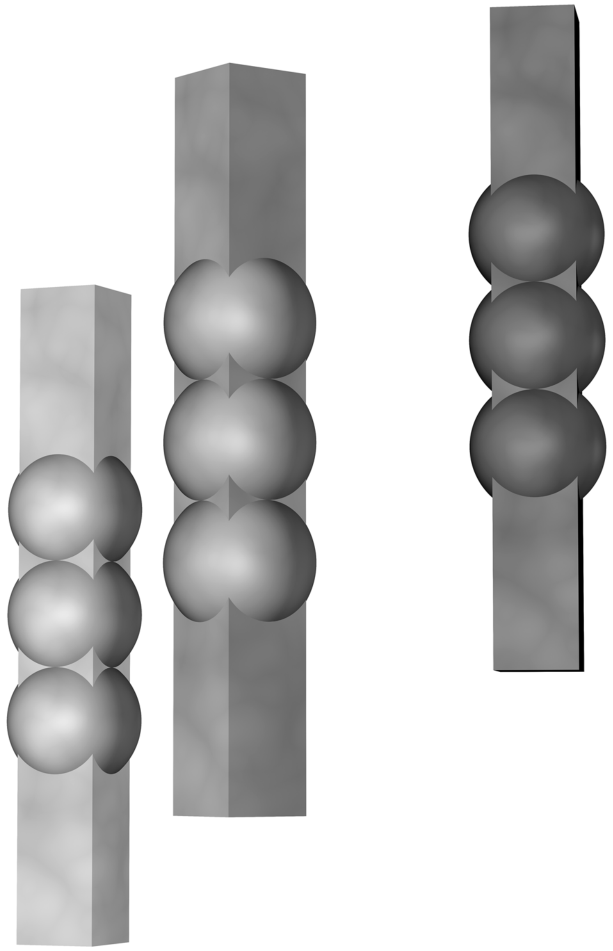
Idol #3 / 1964

Idol #4 incorporates a primitive in the form of a cylinder. Modeled in clay, it was cast in fiberglass.

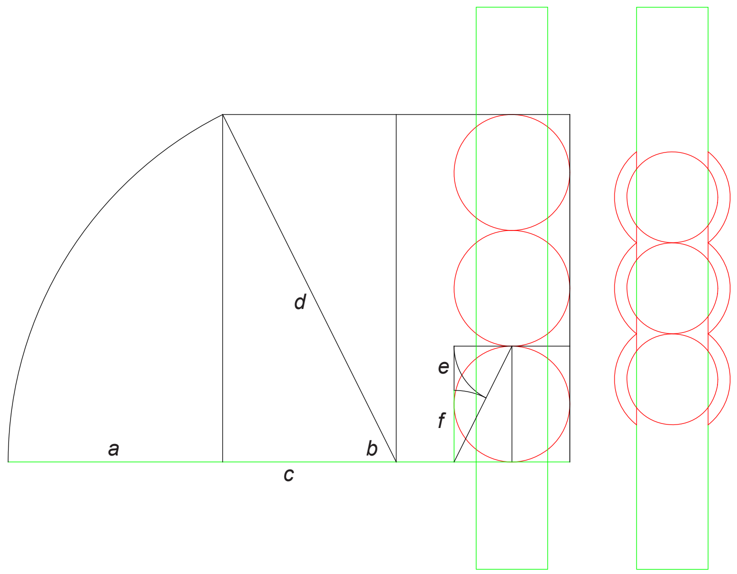
Idol #4 / 1964

Idol #5 incorporates a sphere, cylinder and an extruded square for base. The sculpture was modeled in clay and finalized in plaster. The bronze was cast in Santa Fe, New Mexico, 1991.

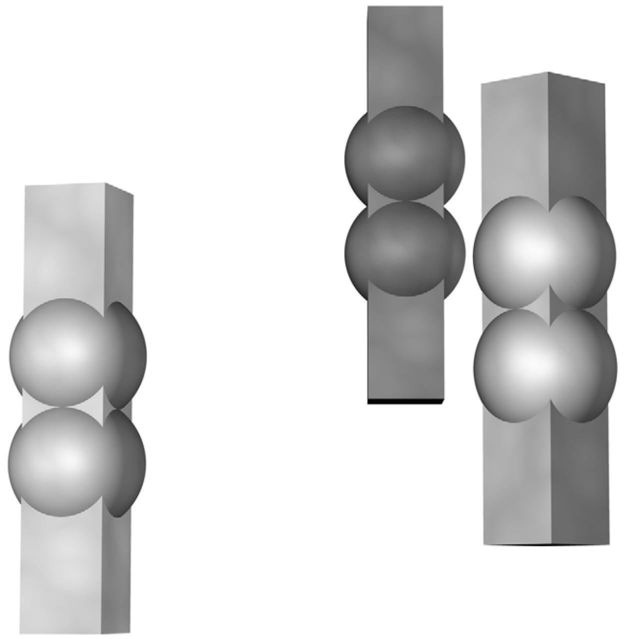
Idol #5 / 1965



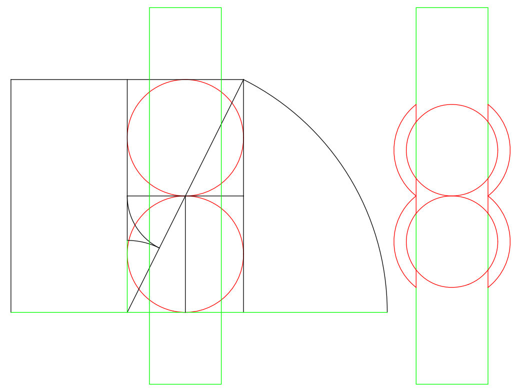
The height of the center bar (green) is *c* with *f* its width. The spheres are cut vertically when placed over the bar, which causes their combined height to compress.



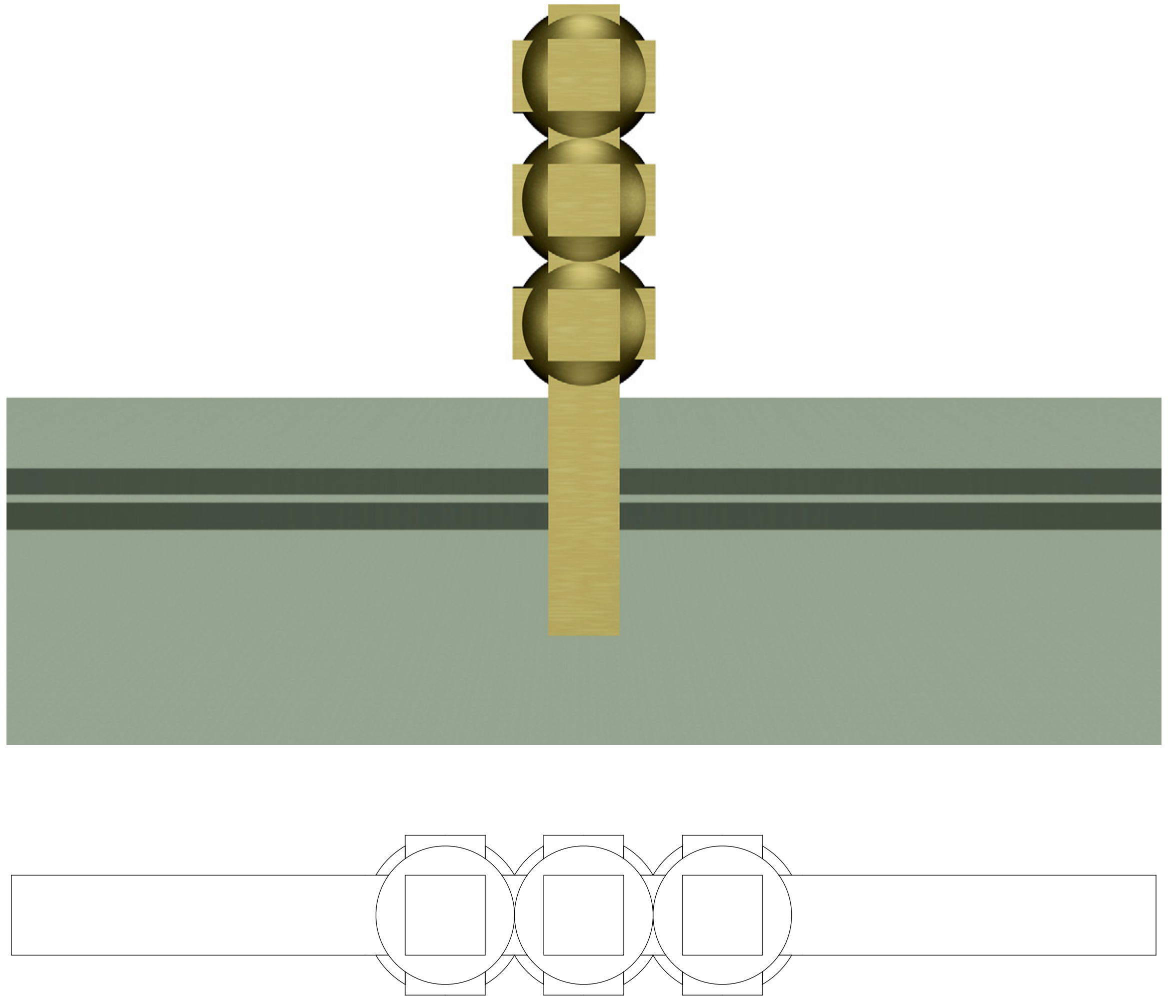
No. 6 / 1965



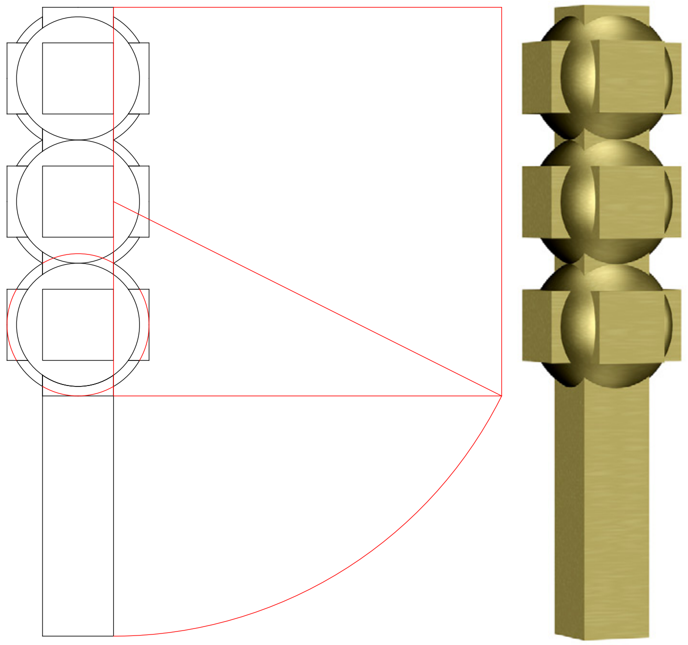
No. 6 and No. 7 consist of groups of three identical hanging pieces. Working in plaster, the proportions were originally found by trial and error before applying the ratio of the golden section. The final fiberglass casts are in black, gray and white.



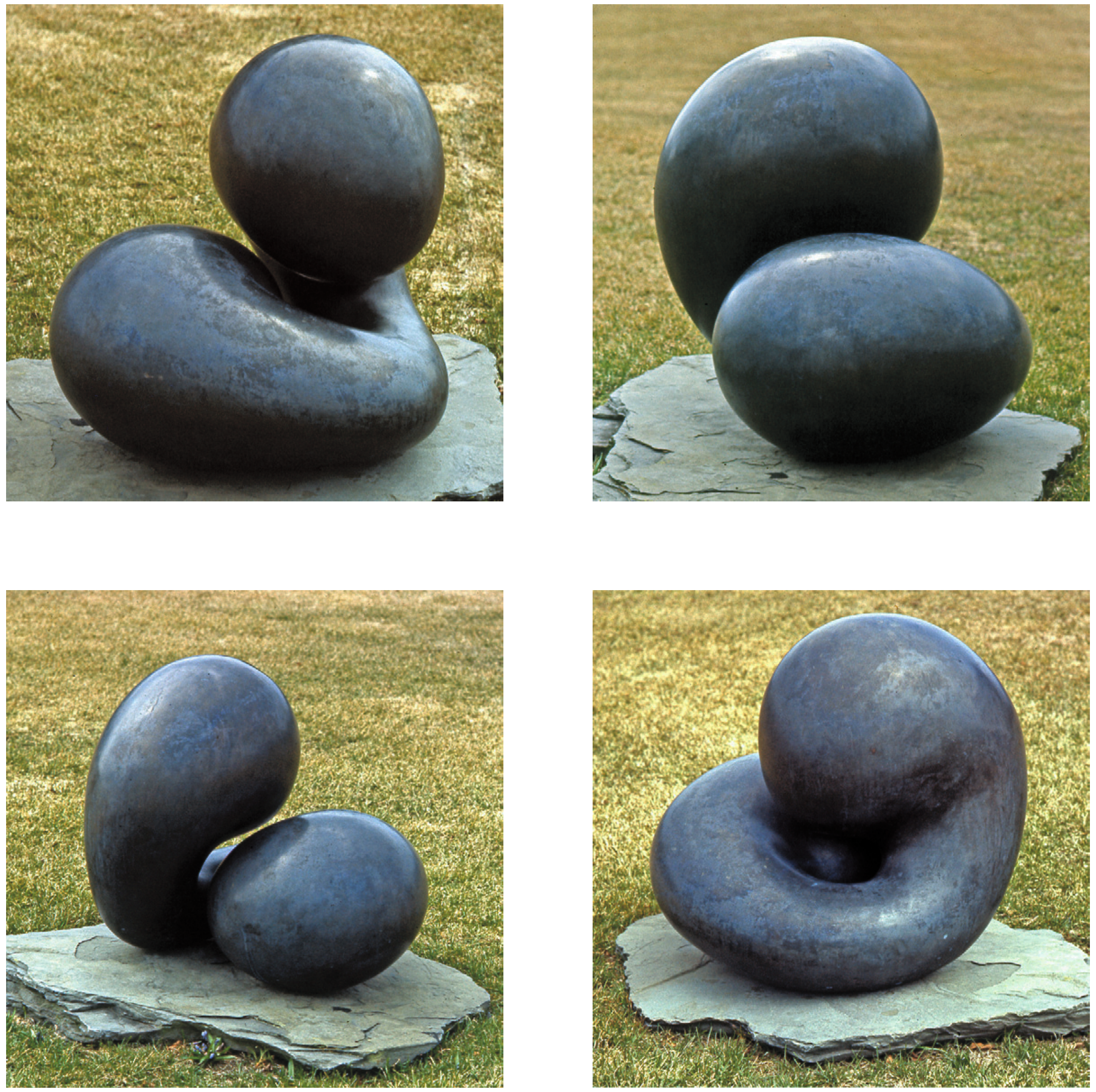
No. 7 / 1965



The relationship of circle to square is critical for the identity of the sculpture. Neither element is to dominate. The extension of the boxes is determined by the diameter of the spheres. The sides of the squares equal the radii of the circles. The design was inspired by an Aztec battle axe.

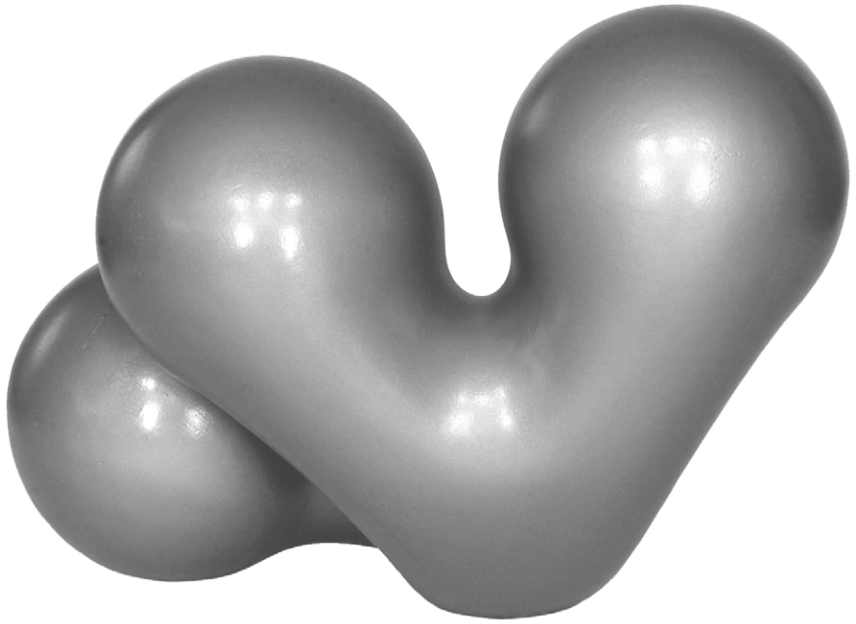


No. 8 / 1965



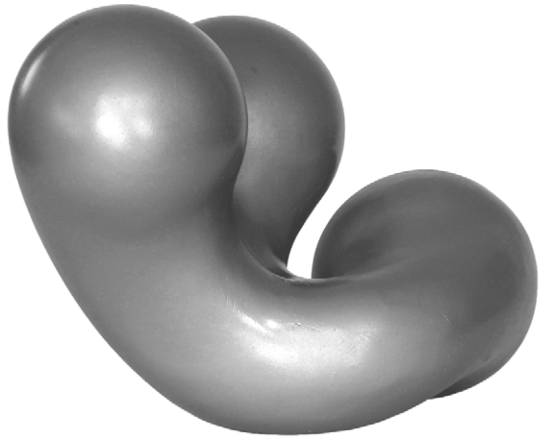
No. 9 is based on a small silver ornament from the royal tombs of Ur, Mesopotamia, 2600-2500 BCE, now in the archaeological museum in Damascus, Syria. One half section was modeled in clay, and two copies were assembled in plaster. The bronze was cast in New York, 1965.

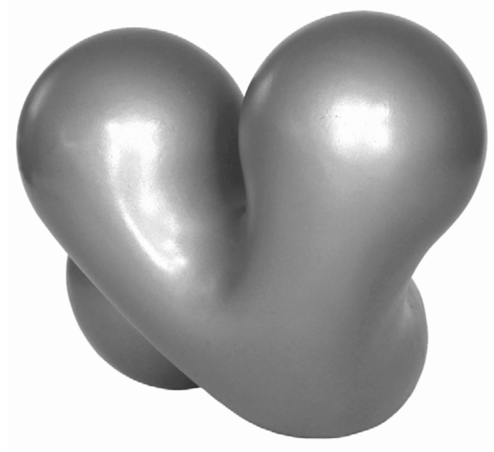
No. 9 / Ladies of Ur / 1965

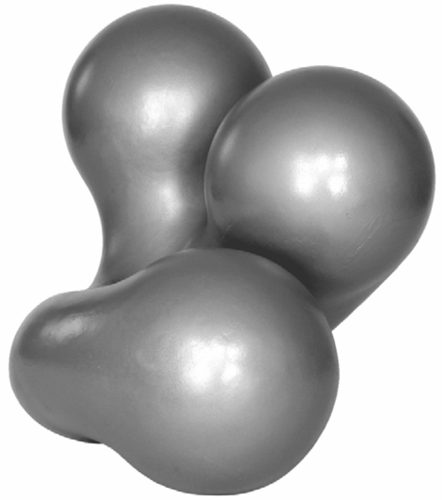


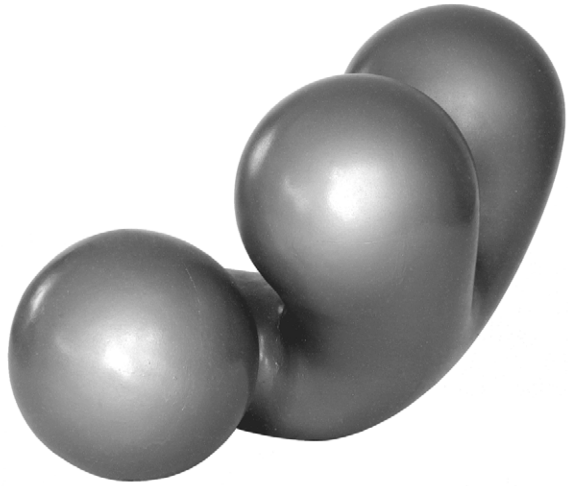
No. 10 represents a variation of a golden piece of jewelry from the royal tombs of Ur, now in the British Museum, London. The sculpture incorporates three spheres cast in plaster.

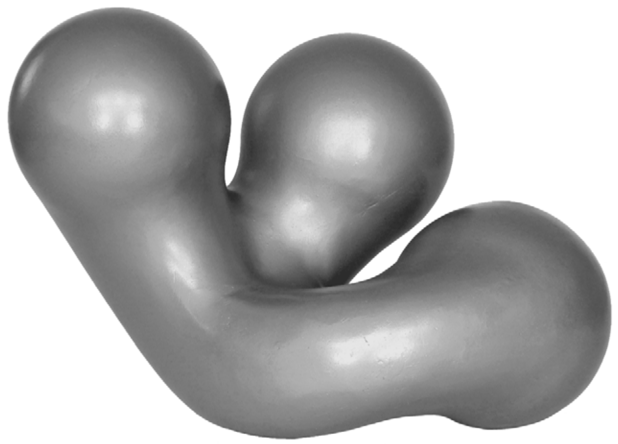
No. 10 / 1961 - 1968











No. 10 / 1961 - 1968

In No. 11 the previous composition is compressed into one sphere. The twisting of the original ornament transforms here into a cylindrical channel.

No. 11 / 1965

No. 12 was inspired by an 11th century BC. Chinese Zhou ritual vessel now in the British Museum.

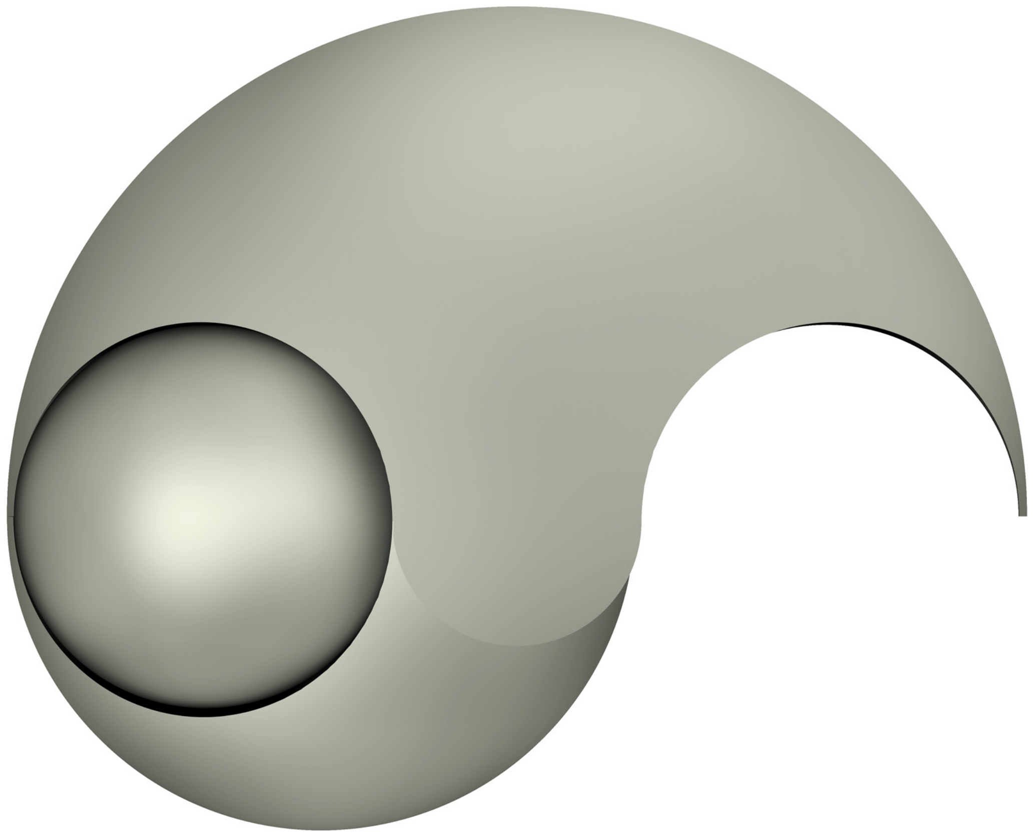
No. 12 - Tripod / 1965

No. 13 evolved out of the Idol series with a reference to the “torso of a young man” by Brancusi.
Two sphere sections are joined to a cylinder. The aluminum piece hangs in a leather sling.

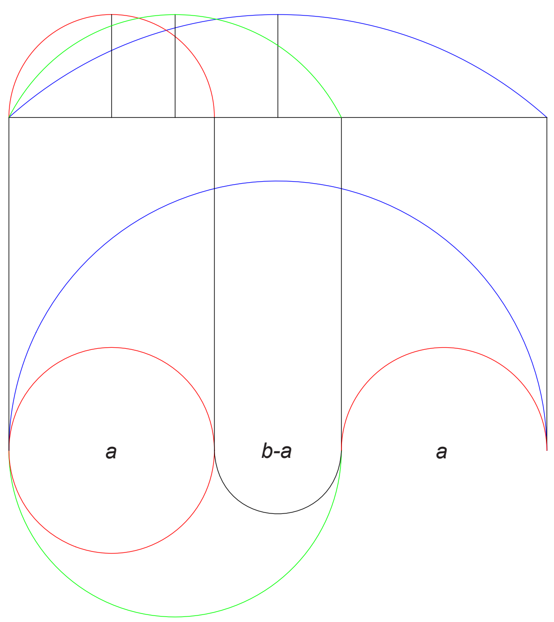
No. 13 / 1968

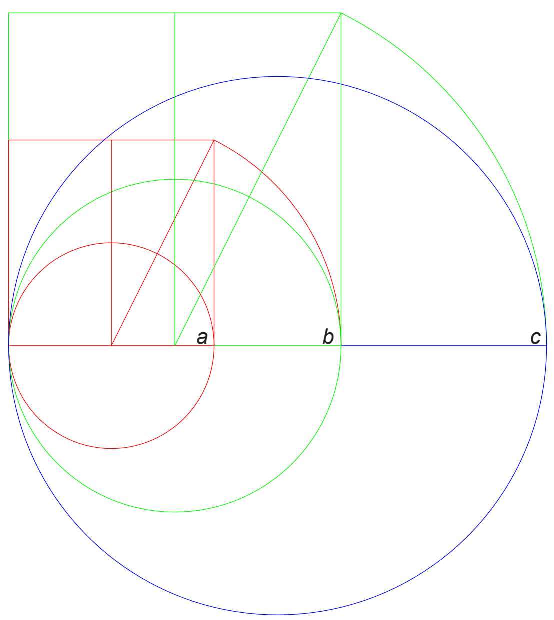
Two sphere sections are added to a hemisphere. The piece was reconstructed as No. 61 in 1982.

No. 14 / 1968

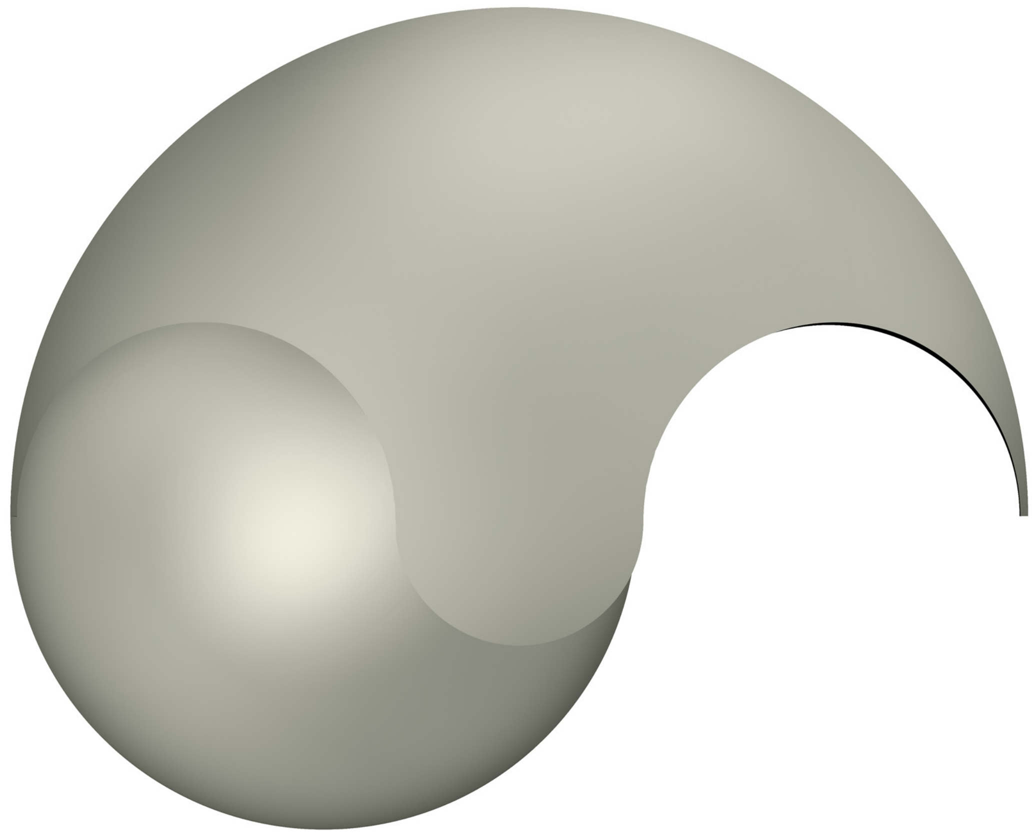


The diameter of circle *c* can be expressed as 2*a* + (*b*-*a*). The curvature of the sphere sections and their height are determined by the radius of *a*. Sphere sections *b* and *c* have been slightly enlarged to provide sufficient mass for the cutout of the hemisphere at the left and the right.

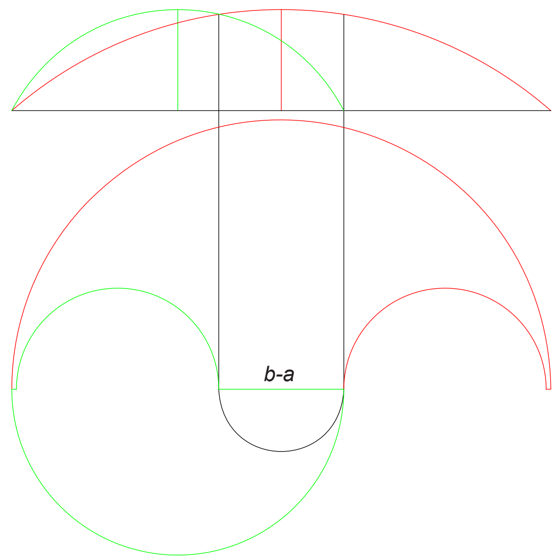


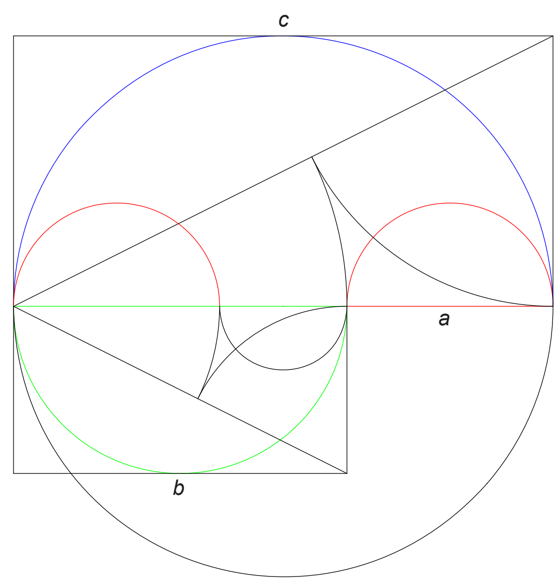


No. 15 / 1967 - 1970



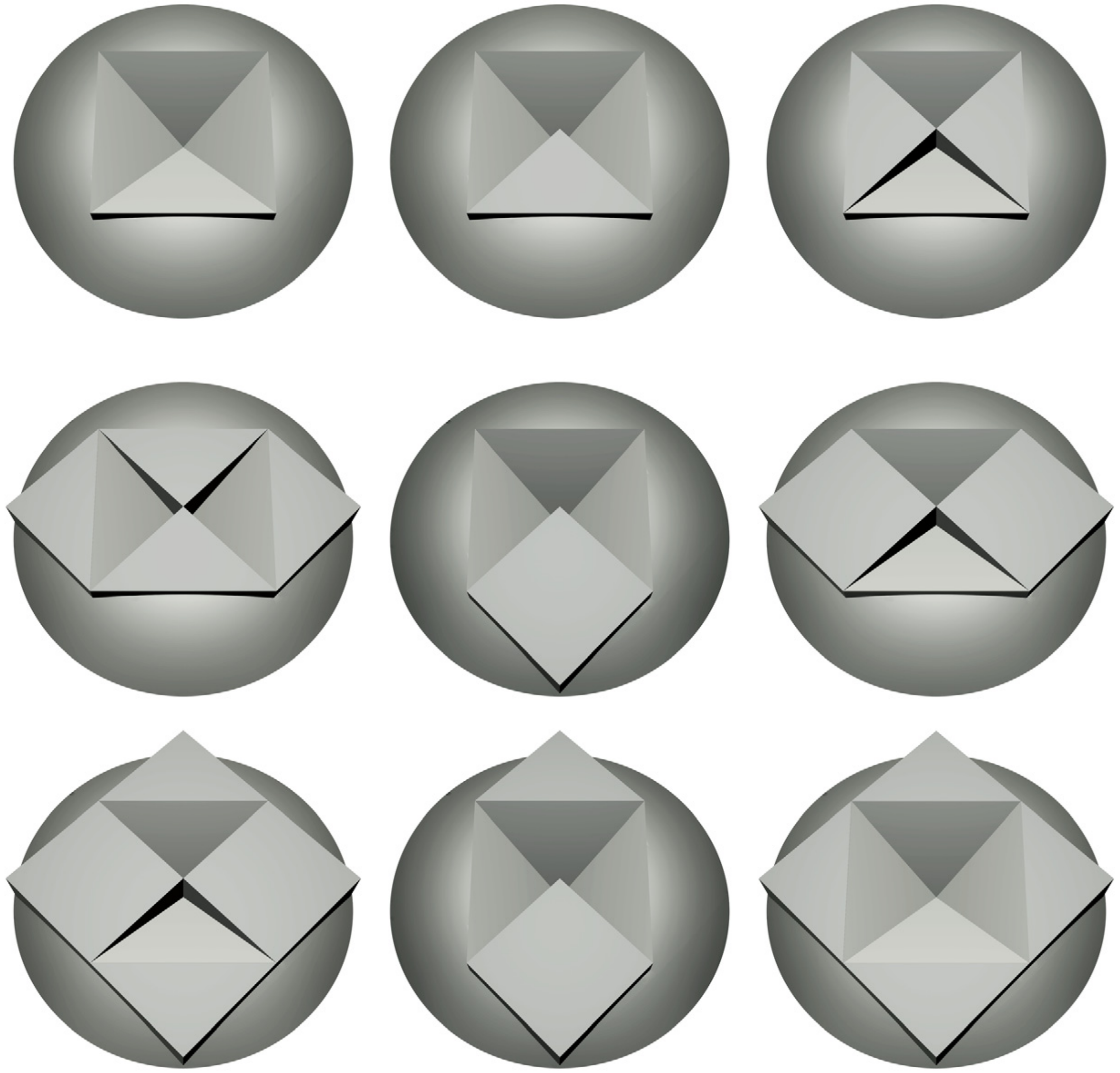
The diameter of circle *c* is 2*a* + (*b*-*a*), where (*b*-*a*) relates to *a*, as *a* to *b* and *b* to *c*. Sphere sections *b* and *c* have been slightly enlarged to make the end points of sphere section *c* more substantial for execution. The sections were created in plaster using a turntable and templates.



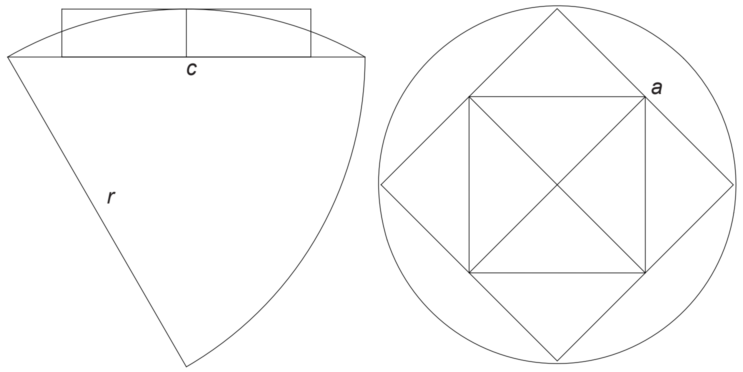


No. 16 / 1967 - 1970

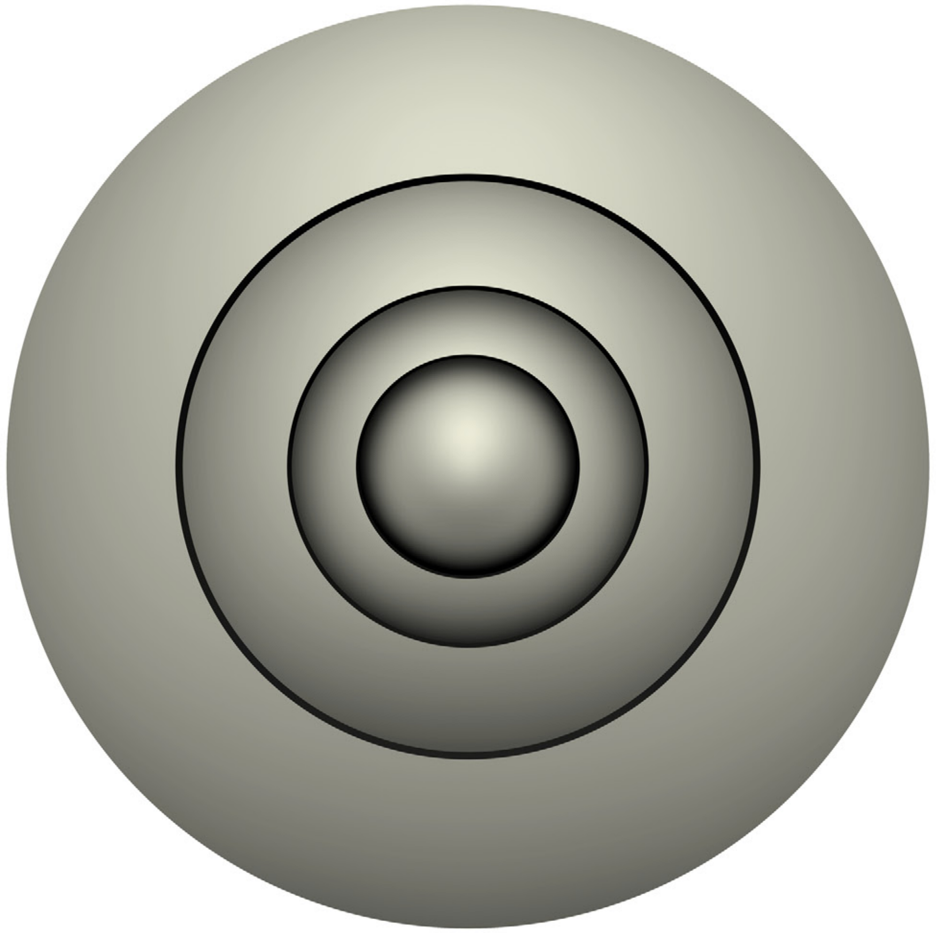
No.17 / Fountain / 1972



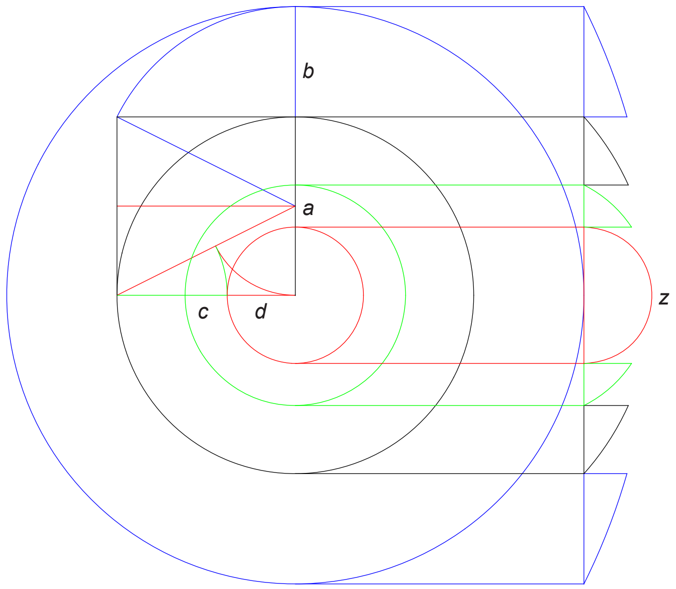
A sphere section is cut with the chord *c* equal the radius *r*. The area over the chord divided by Φ results in the square over *a,* which is divided into equal triangles. Sphere sections, boxes, halved boxes, wedges were cast and assembled in plaster. The final reliefs were cast in fiberglass.



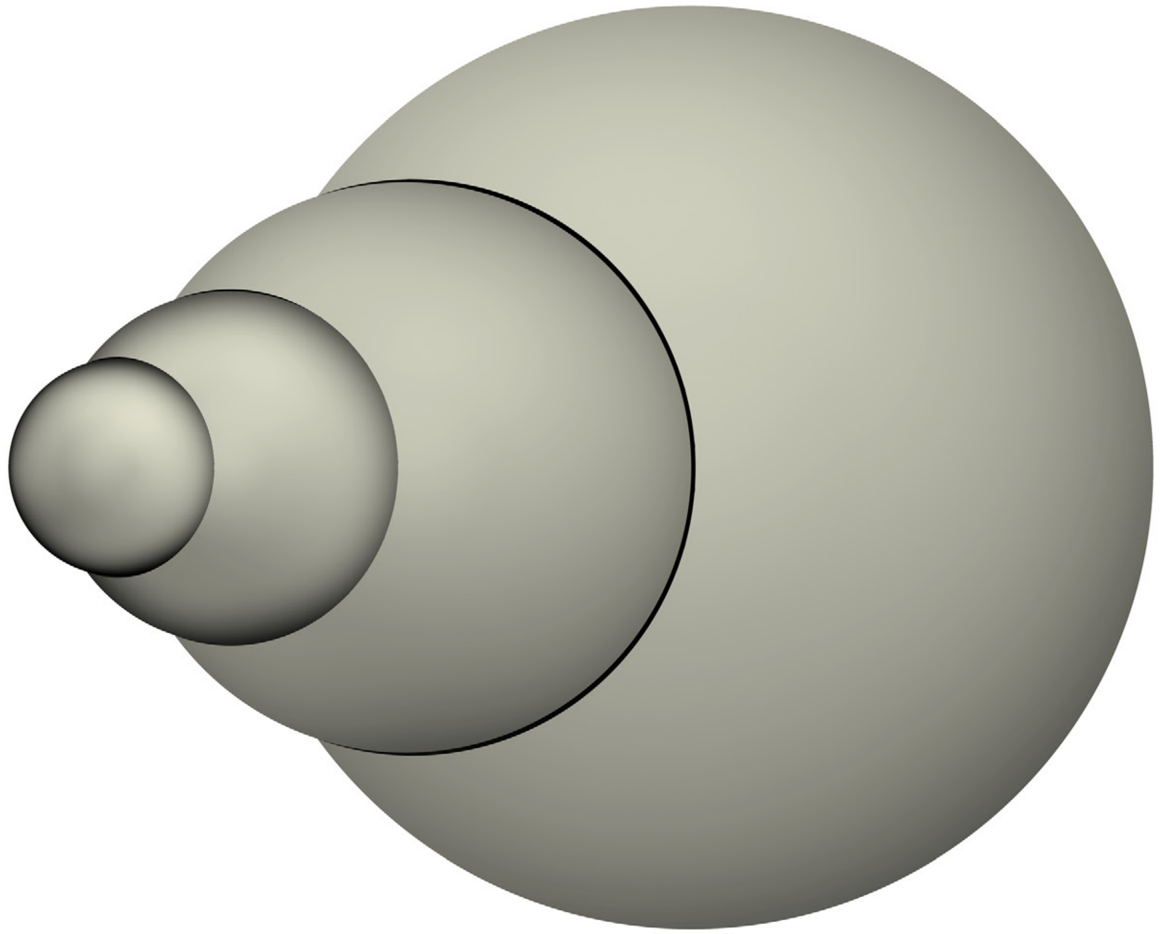
No. 18 - 26 / 1972



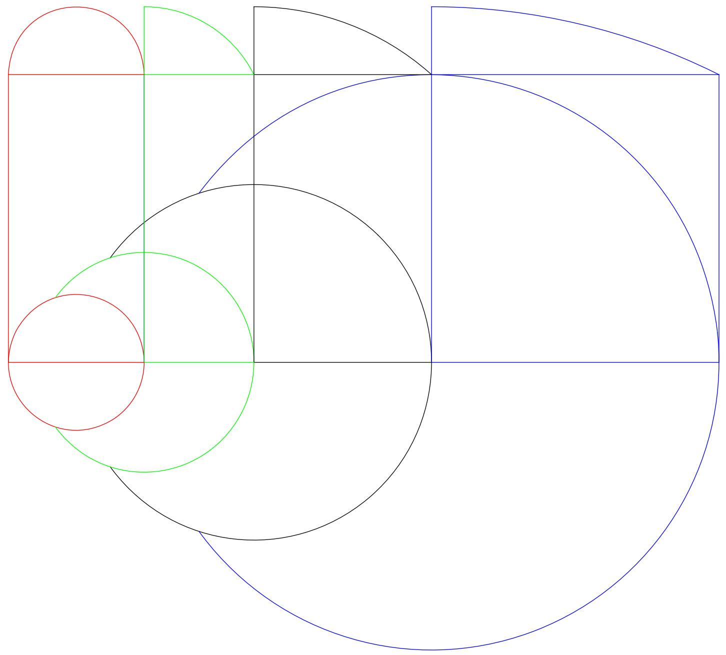
A line is drawn from the middle of radius *a* to the opposite corner of the square over *a*. An arc over this line (blue) intersects the extension of *a,* establishing radius *b.* The base of the square over *a* is divided by Φ into *c* (green) and *d* (red). The zenith *z* of the hemisphere with radius *d* becomes the point of conversion for the sphere sections with the radii *a, b* and *c*. The formula for the radii of the sphere sections is (4 x *height* ² + *chord* ²) : (8 x *height)*



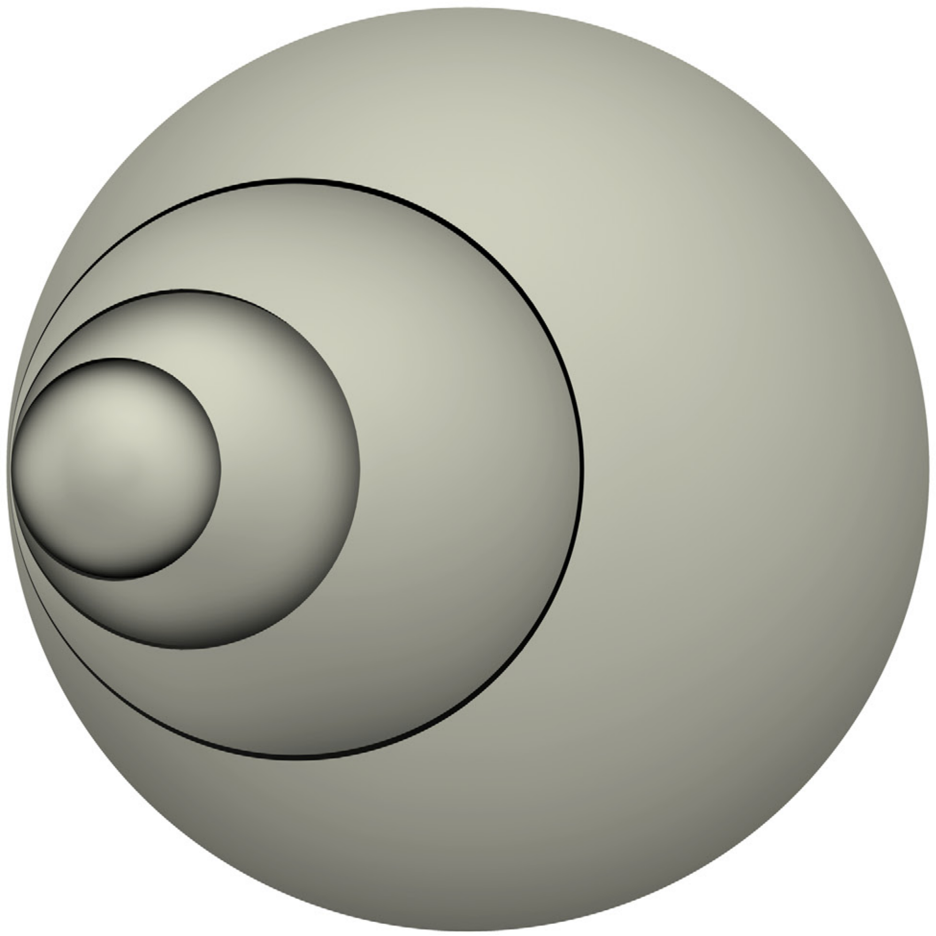
No. 27 / 1971



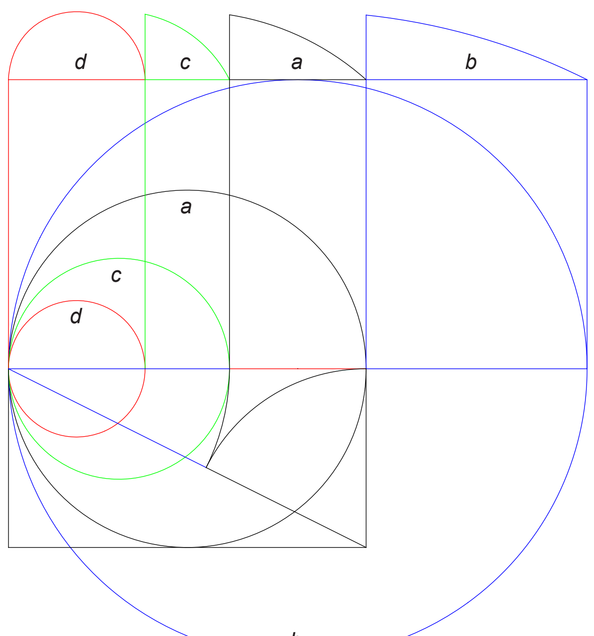
Instead of the concentric arrangement in No. 27, the hemisphere in this relief intersects the next sphere section at its center. The other sections are likewise cut through their centers.



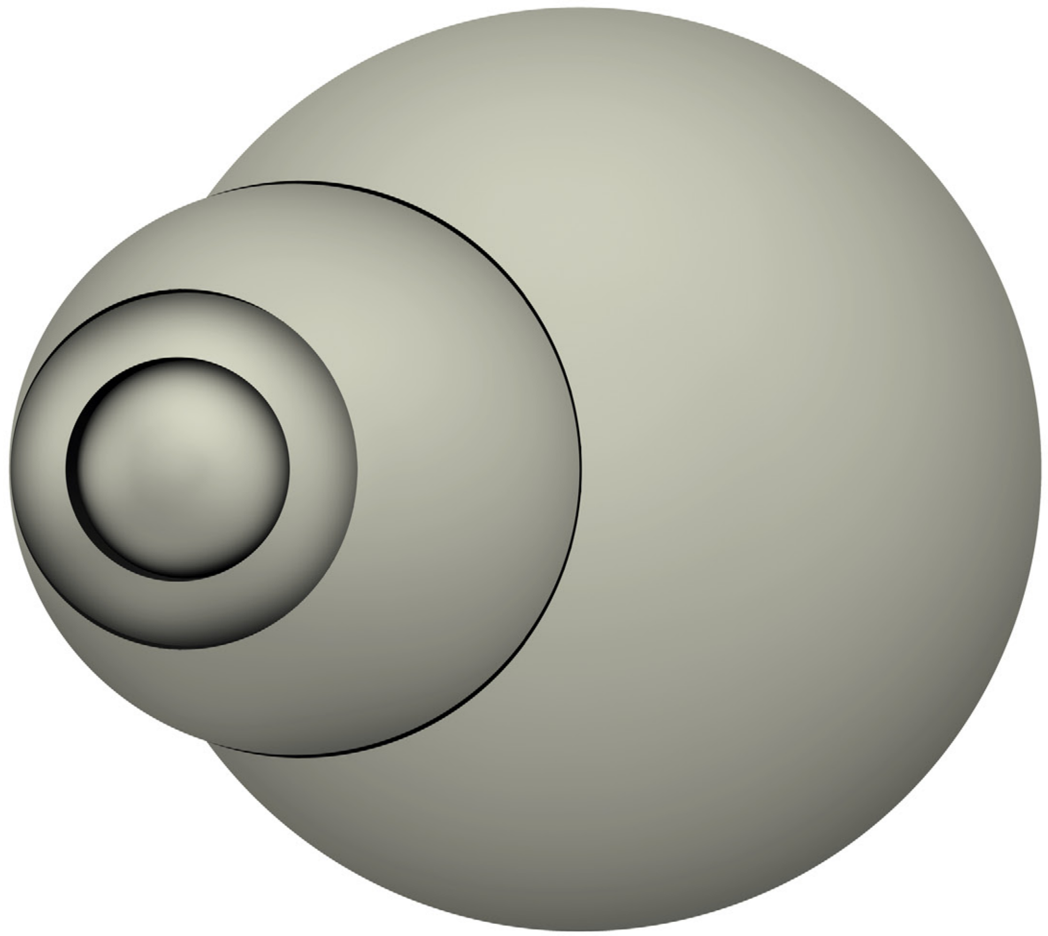
No. 28 / 1971



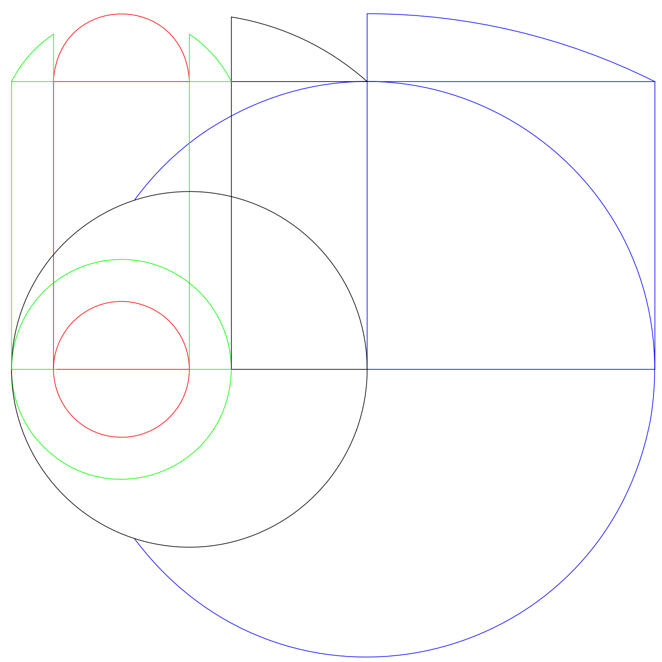
The diameter of circle *a* is divided by Φ. The longer section is equal to the diameter of circle *c* (green). The short (red) part equals the diameter of circle *d*. The radius of *d* is also the height for the sphere sections over the chords *a, b, c.*



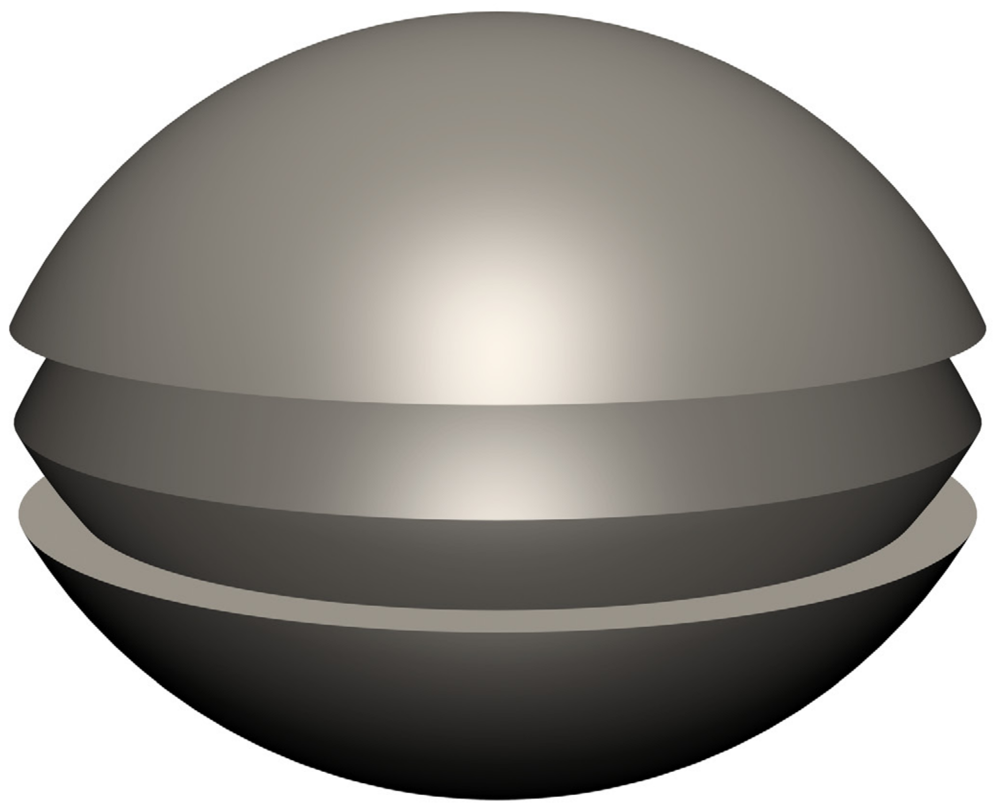
No. 30 / 1972



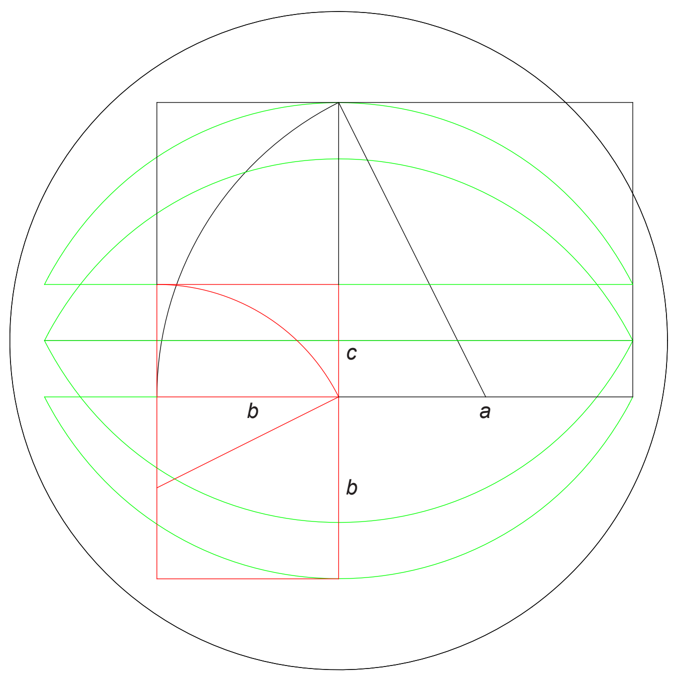
No. 31 combines the configurations that make up reliefs No. 27, 28 and 30. Each element was turned in plaster using a custom made turntable, where profiles of the elements, cut out of Formica and reinforced with plywood, could be mounted in the correct position to match the measurements.



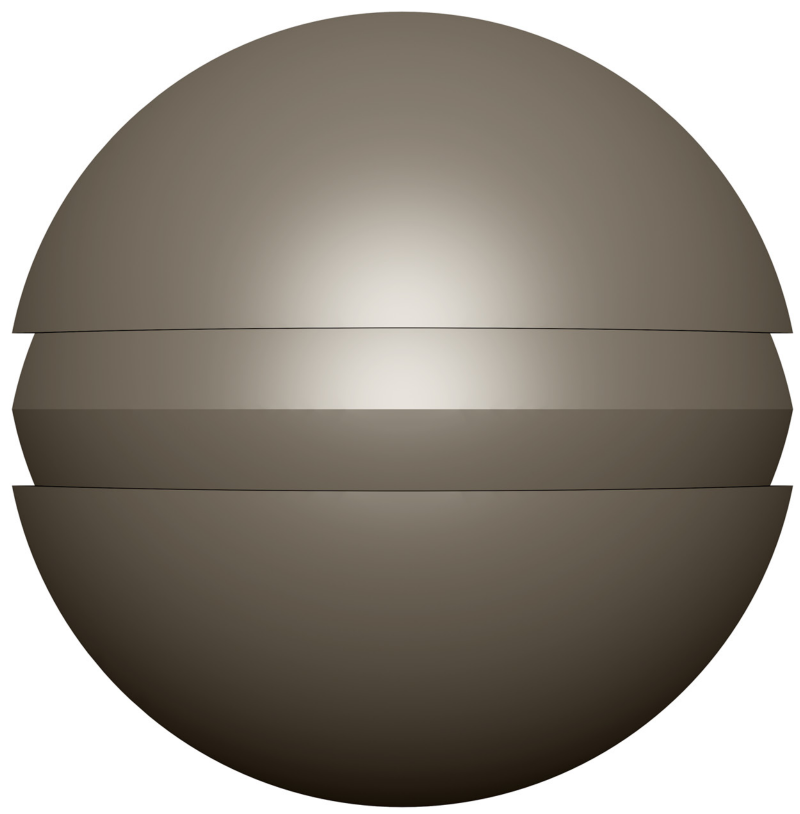
No. 31 / 1972



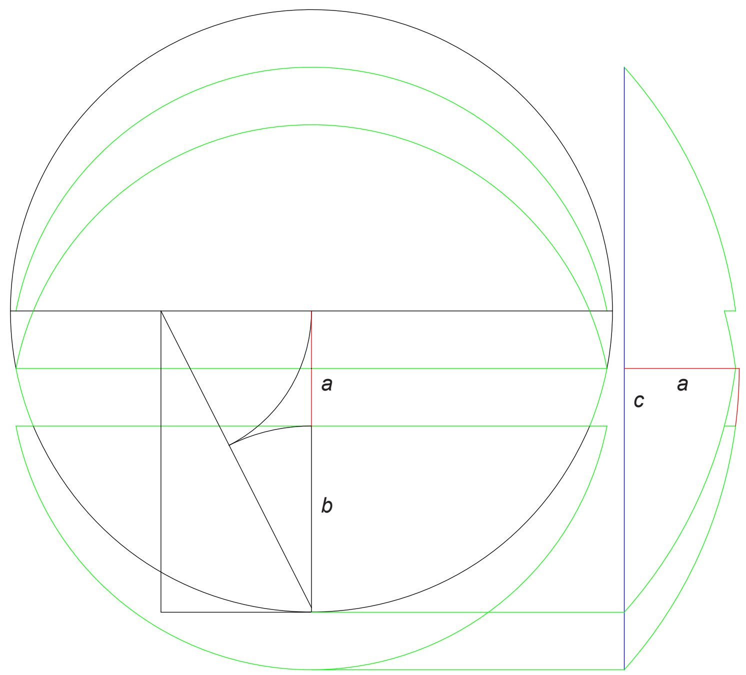
$(4b^2 + (2a)^2) : 8b$ is the radius of the sphere. The radius for the cut of the sphere section a relates to its height b as b does to c. The two identical sphere sections, mirrored over their cuts, form the core. Two identical sections are placed over the core at the distance c to each other.



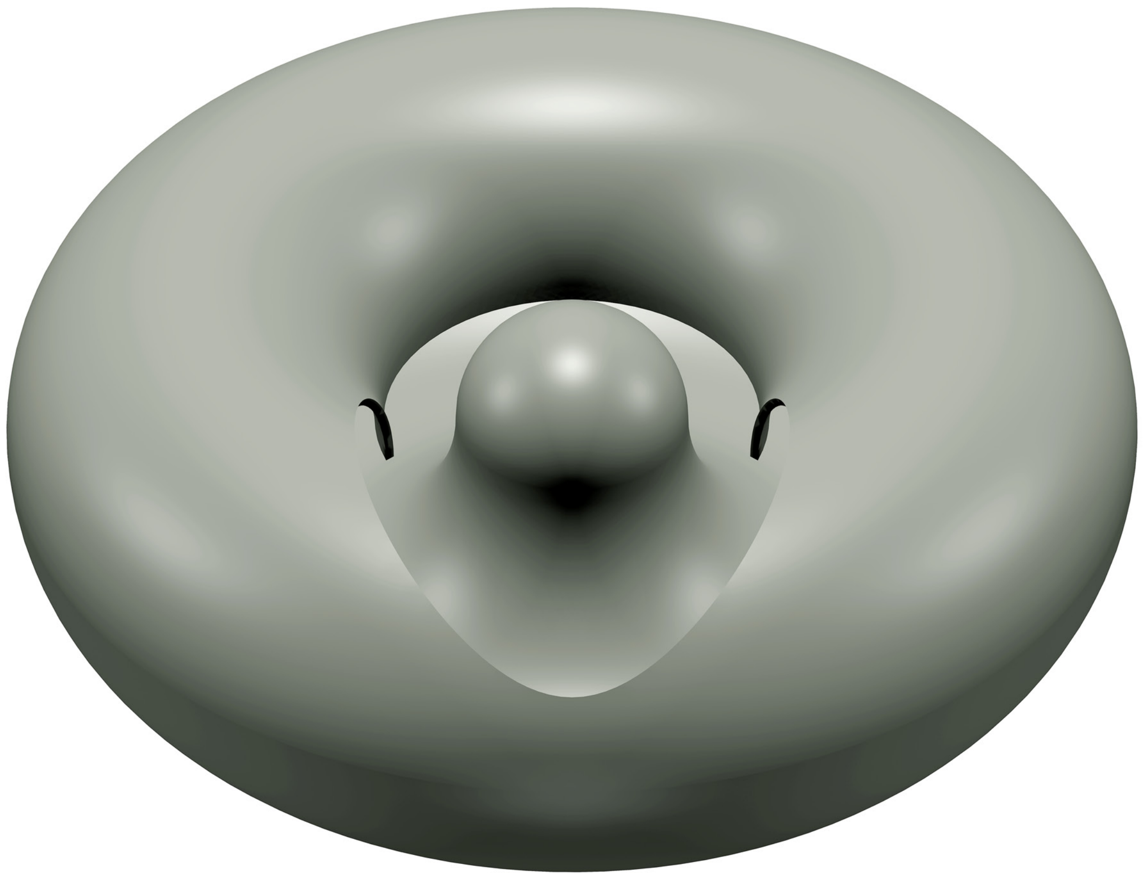
No. 29 / 1971



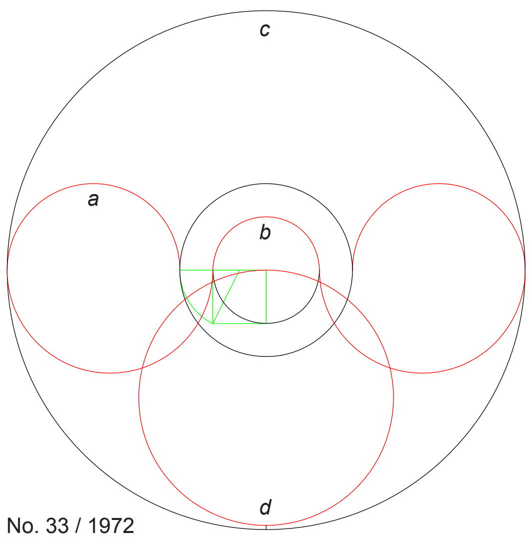
Applying Φ, a radius is divided into a and b. A circle section (in green) with the height $(b + ½\,a)$ is mirrored over its cut to form the core of the relief. Two additional copies are vertically displaced to the distance of a, retaining the outline of the circle. When a (red) is the height of the sphere section and c (blue) its chord, the radius of the curvature is $(4a^2 + c^2) : 8a$.



No. 32 / 1972

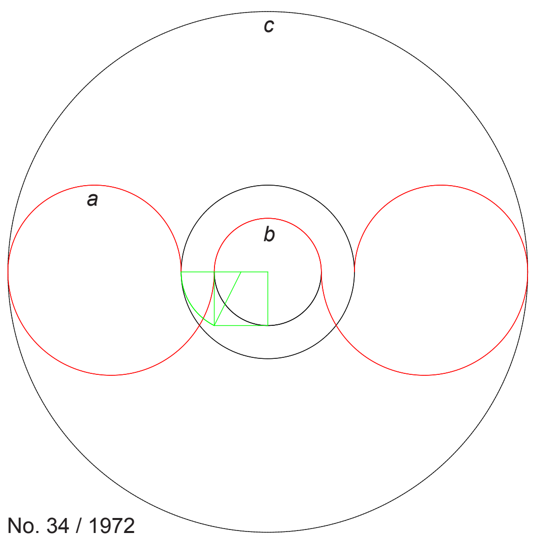


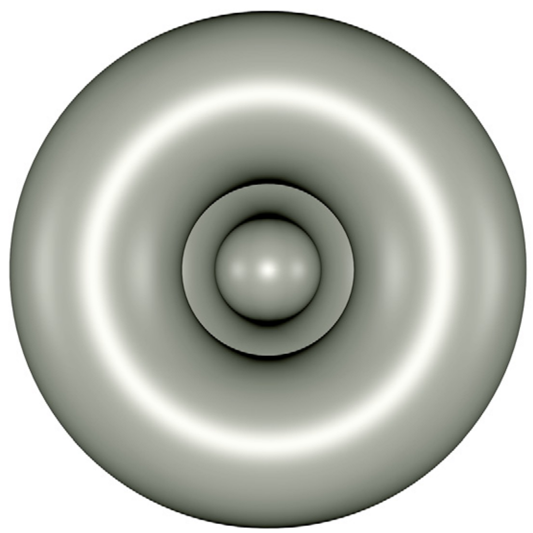
The minor radius of torus *a* is a third of its major radius and relates to the radius of hemisphere *b,* at the center, by Φ. A sphere *d*, whose diameter is equal to the major radius *c* minus the thickness of the shell, and with its north quadrant placed at the point of origin of the torus, is subtracted from the top half of the shell. Water is intended to reach the mid level of the shell.



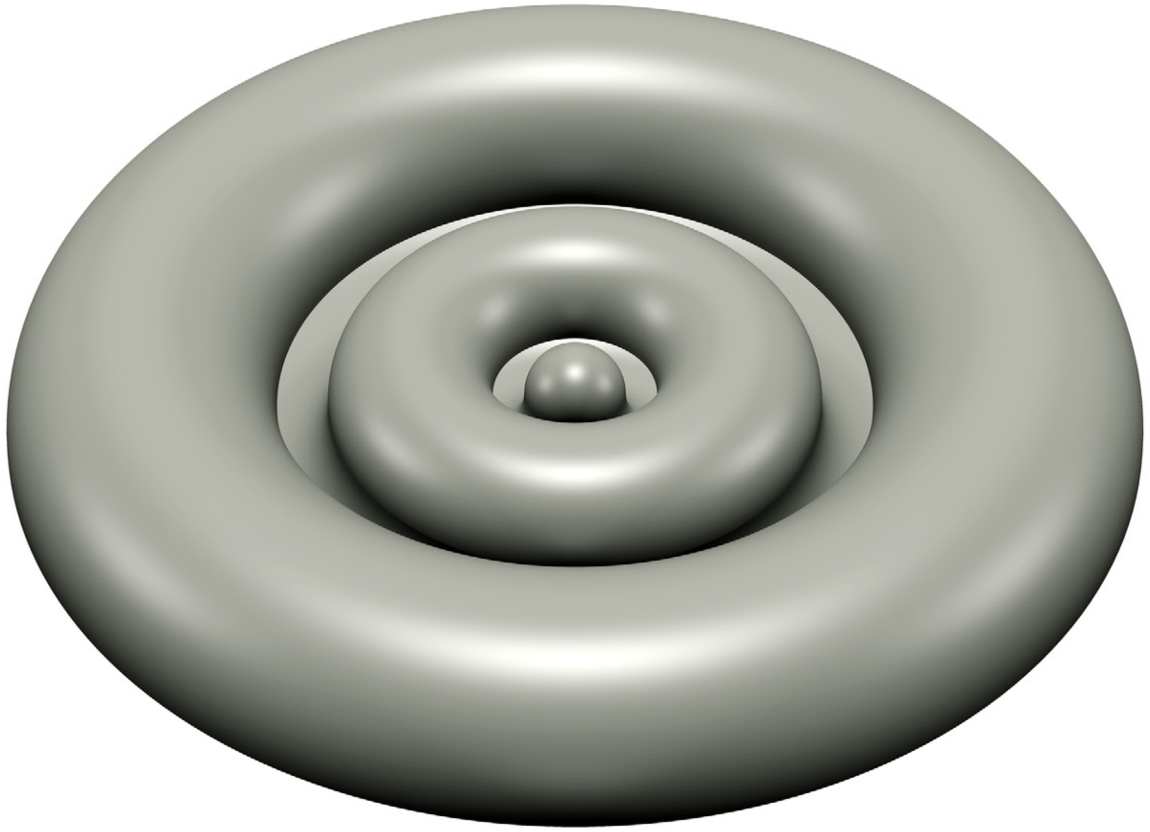
No. 33 / 1972

The minor radius of the upper torus *a* is a third its major radius *c* and relates to the radius of the hemisphere *b* at the center by Φ. Water is intended to reach the mid level of the shell.

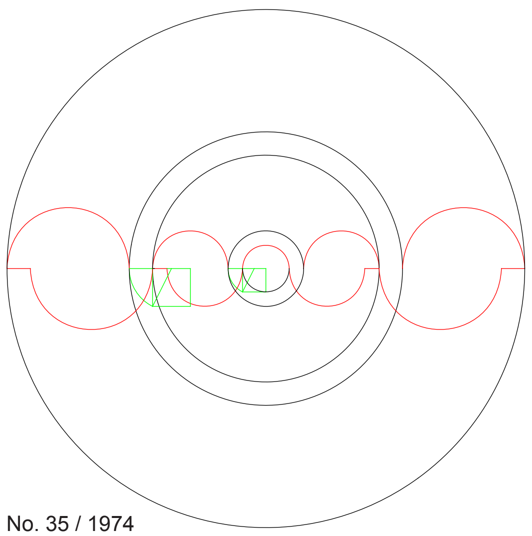


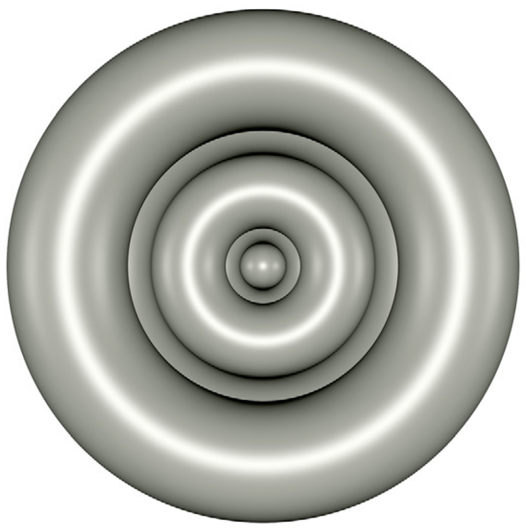


No. 34 / 1972

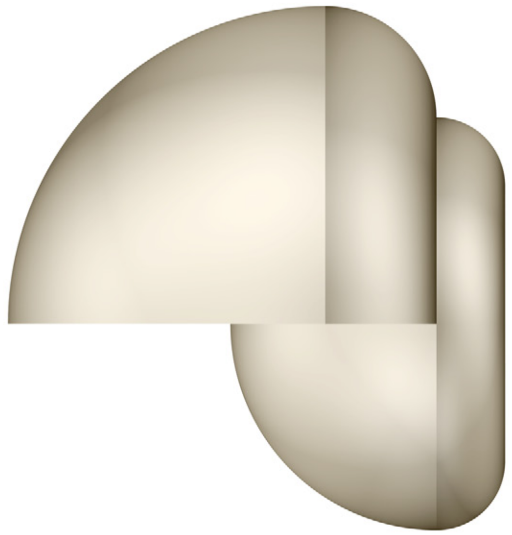


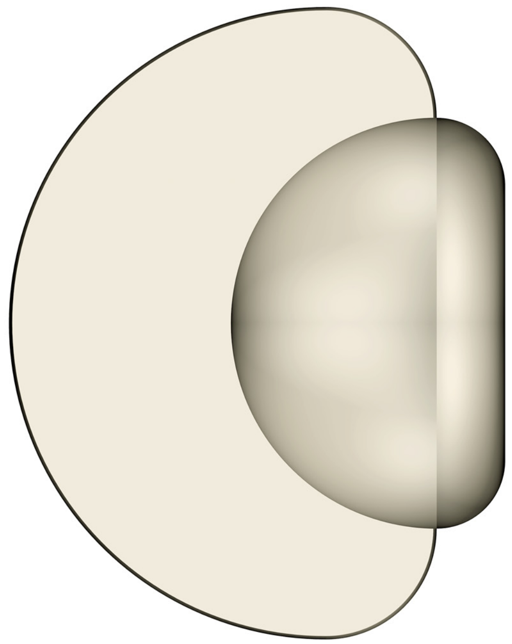
The radius of the hemisphere at the center relates to the minor radius of the inner torus, as this one relates to the minor radius of the outer torus. The major radius of the inner torus is twice its minor radius. The inner torus can adjust its position to the water level.

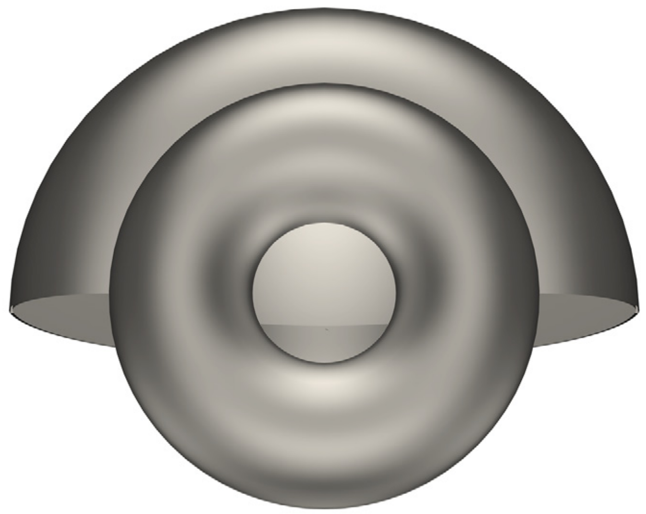




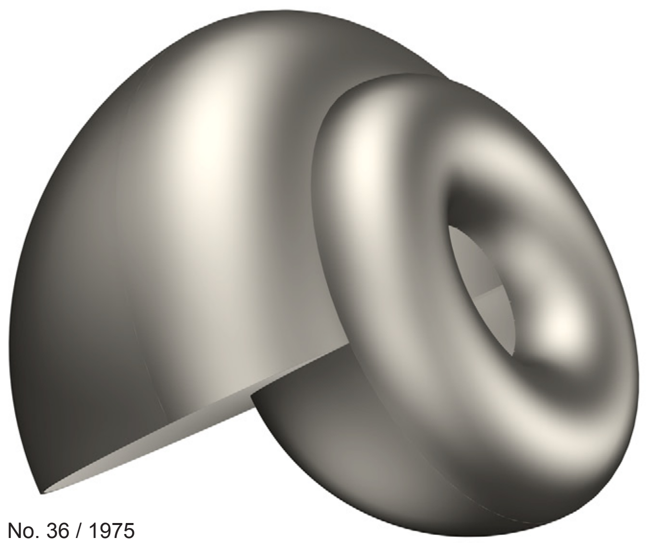
No. 35 / 1974

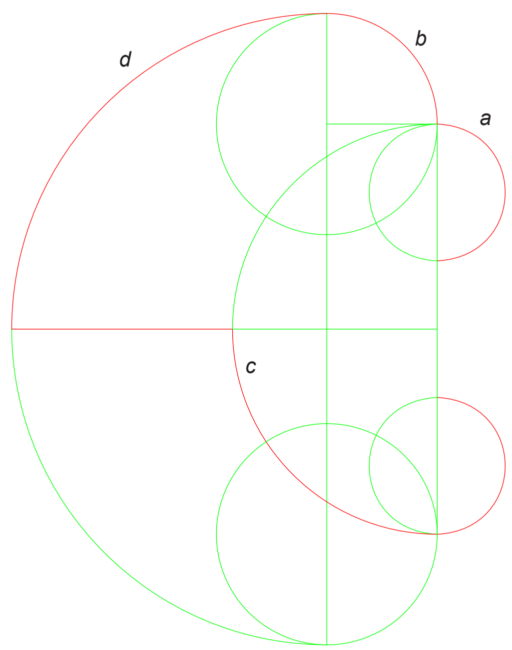






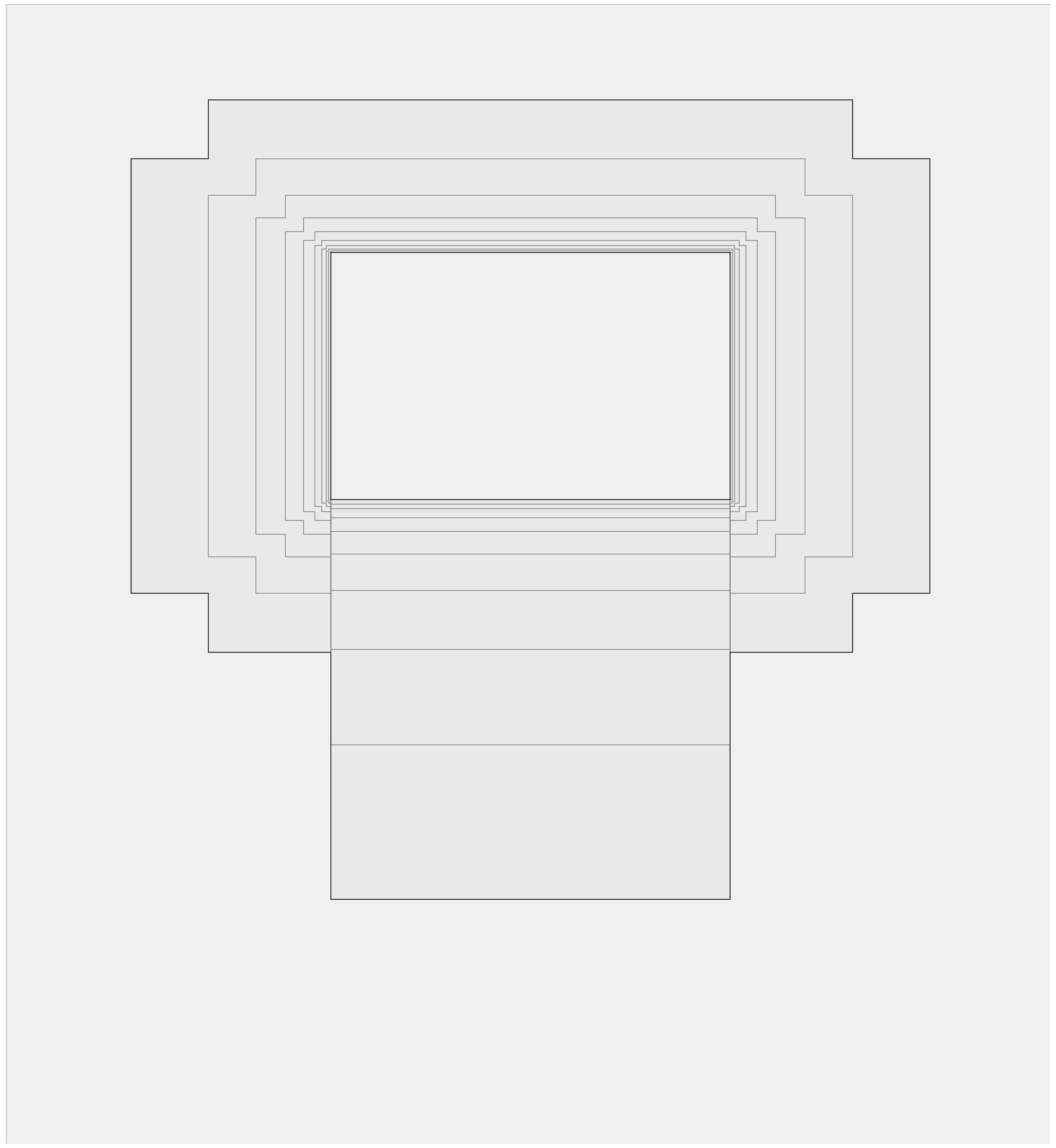
The radius of circle *a* multiplied by Φ produces the radius for circle *b*. The radius of circle *c* is 3 times radius *a*. The radius for circle *d* is the sum of *b* + *c*. The sliced half of a torus with *c* for major and *a* for minor radius fits at its cut on top of the quarter sphere with *c* as radius (red). Above the quarter sphere *d* sits half of the second torus, with *d* for major and *b* for minor radius.



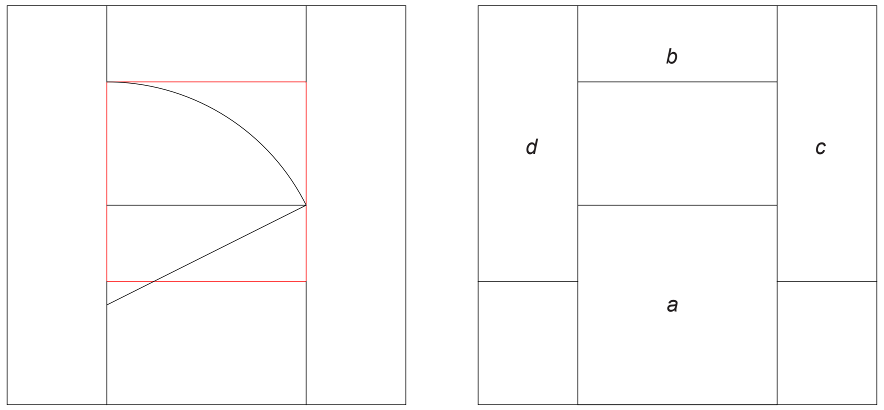


No. 36 / 1975

Tikal - Tempel 1 / 1974

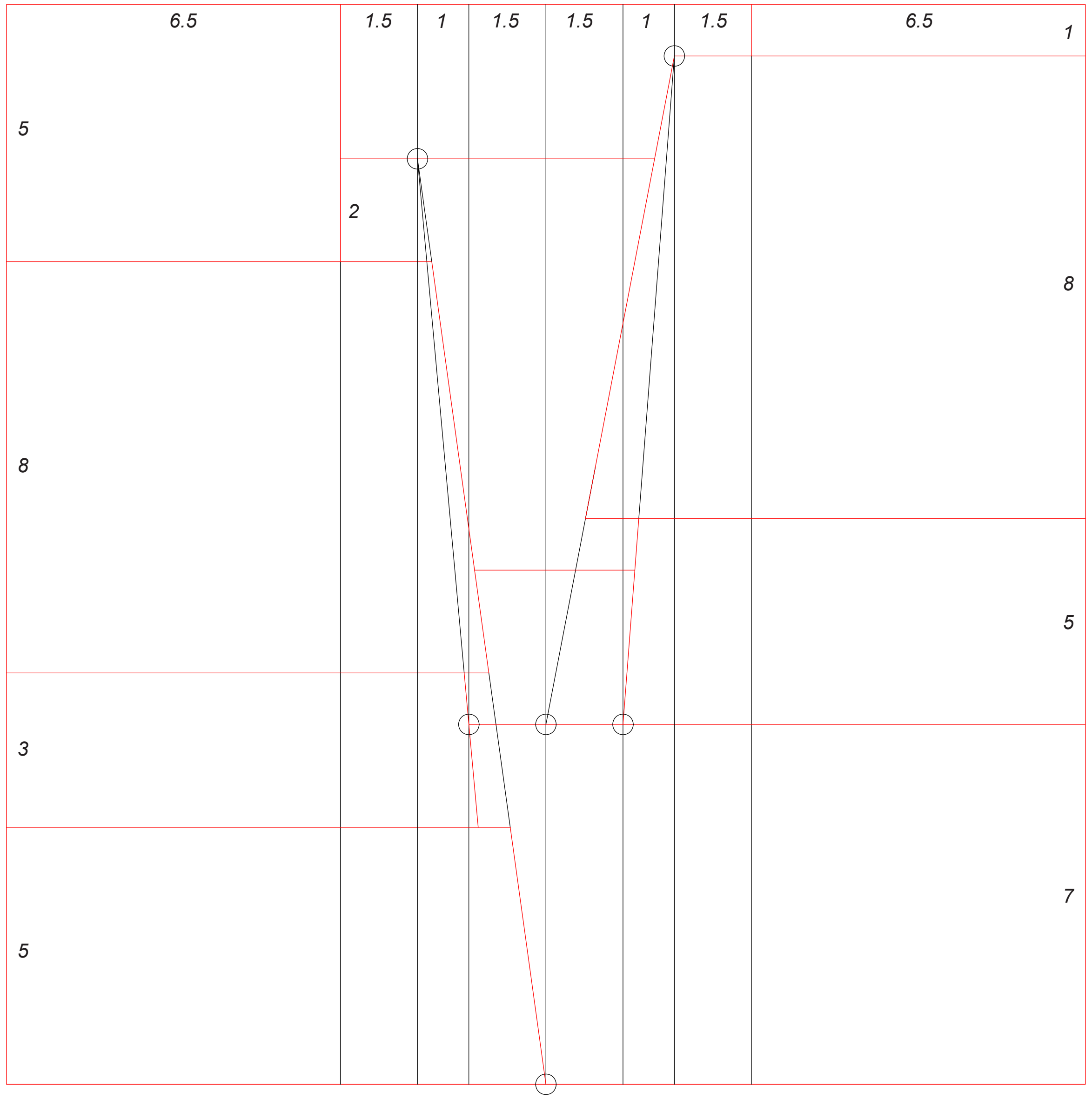


A square is vertically divided into two equal squares, with a third copy, in red, intersecting the other two by Φ, creating two pairs of vertically arranged rectangles. Within the original square the areas *a, b, c, d* are divided, following Fibonacci, in nine progressively spaced steps in the order of 1+1=2+1=3+2=5+3=8+5=13 etc. The drawing was inspired by Temple I in Tikal, Guatemala.



No. 37

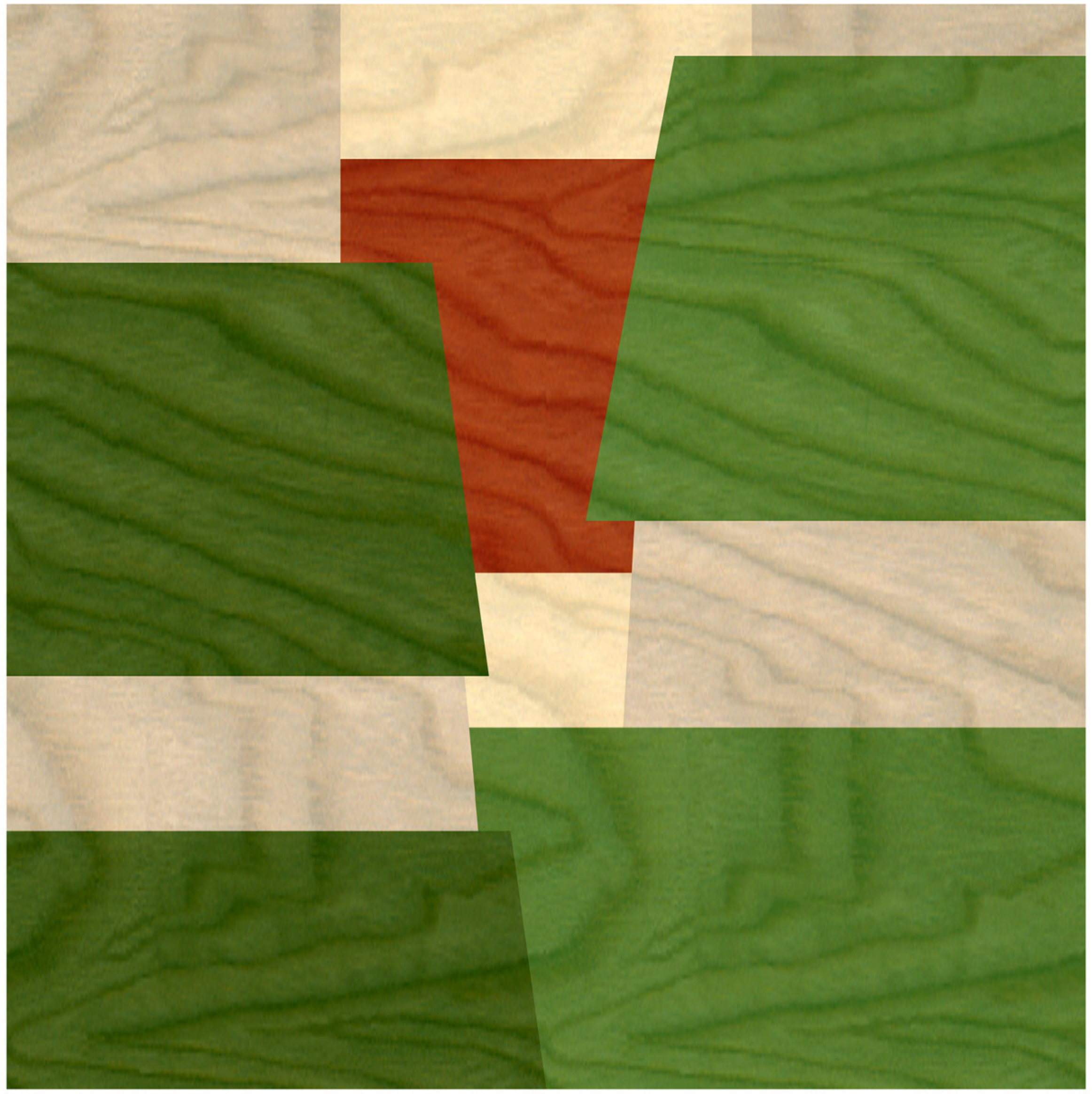
Tikal 1 / 1974



The composition follows the design of an architectural detail from Temple 34 in Tikal, Guatemala.

No. 38

Tikal 2 / 1975



A frieze runs along the side of temple 34 of the North Acropolis in Tikal, indicative of the inside room arrangement. The vertical shift is representative of the floor levels. It evokes the backward and forward folding of a ribbon in an attempt to shift its position from a lower to a higher level.

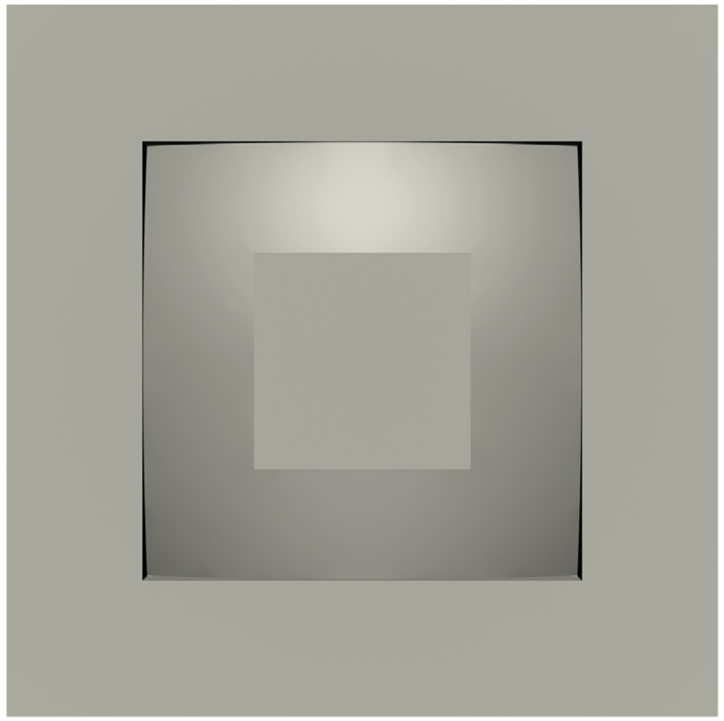
Edzna / 1974

Edzna / 2001

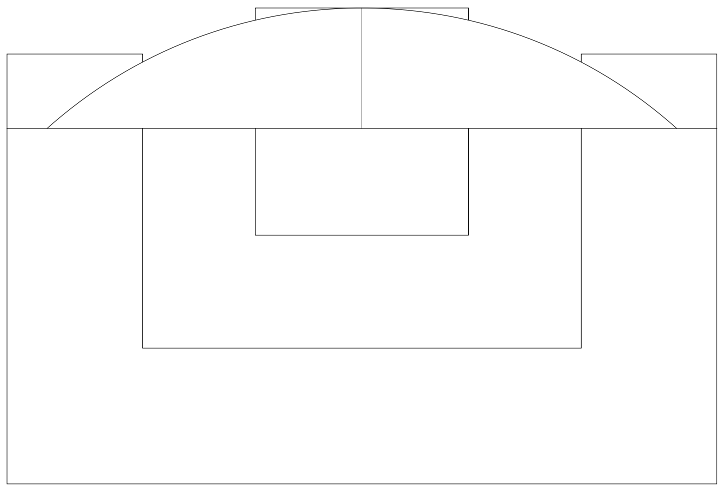
A late classic Maya platform from Edzna in Campeche, Yucatan, shows irregularities, which seem in contrast to a convention that values symmetry. The top section is cut diagonally on its right side, repeated on the next level, suggesting a line of vision. To the left a step-like level adds to the irregularity and echoes the second front step.

No. 39

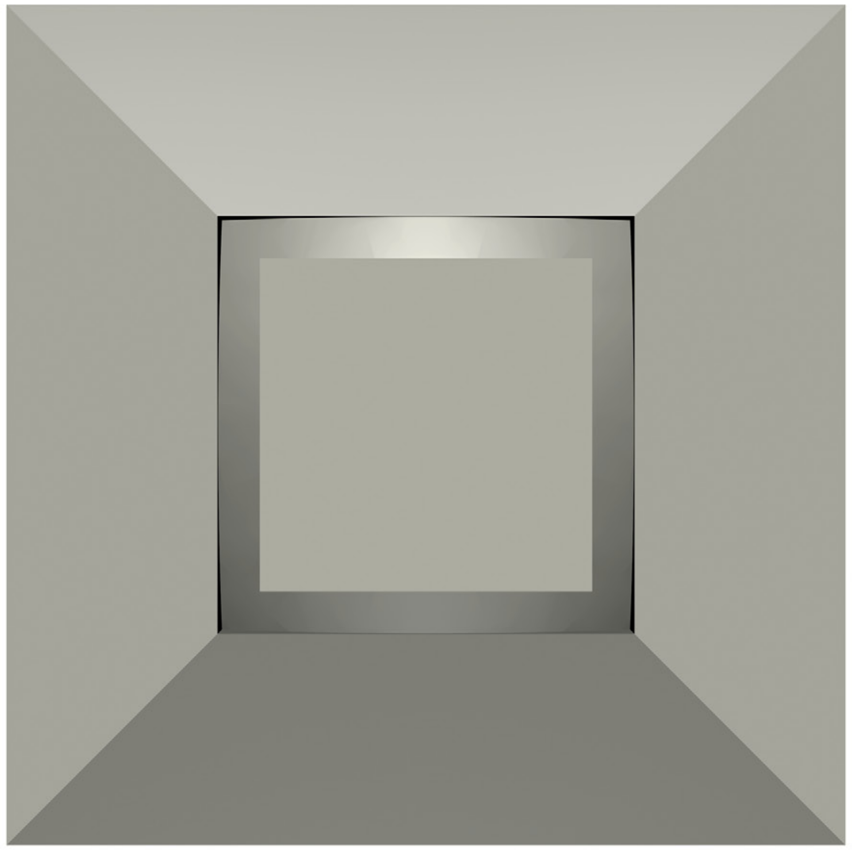
Edzna / 1974 - 1984



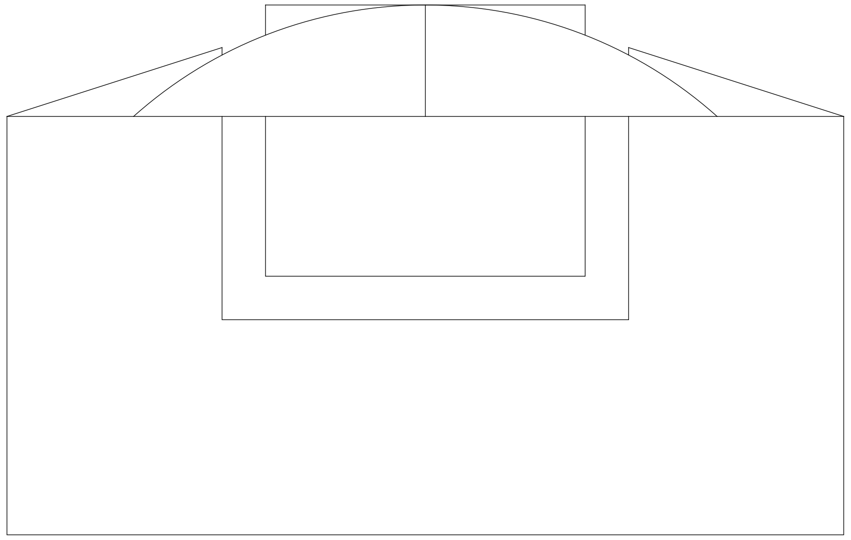
The area covered by the sphere section has been multiplied by Φ, the sum of which constitutes the area of the largest square. Dividing the base of this square by Φ results in the base for the next smaller square. The dimension of the inner square results from the area of the second square being divided three times by Φ and its height by dividing the radius of the area of the sphere section twice by Φ. The radius of the curvature is calculated from the chord of the section and its height. The method applied is incidental, the sense of order achieved is essential.



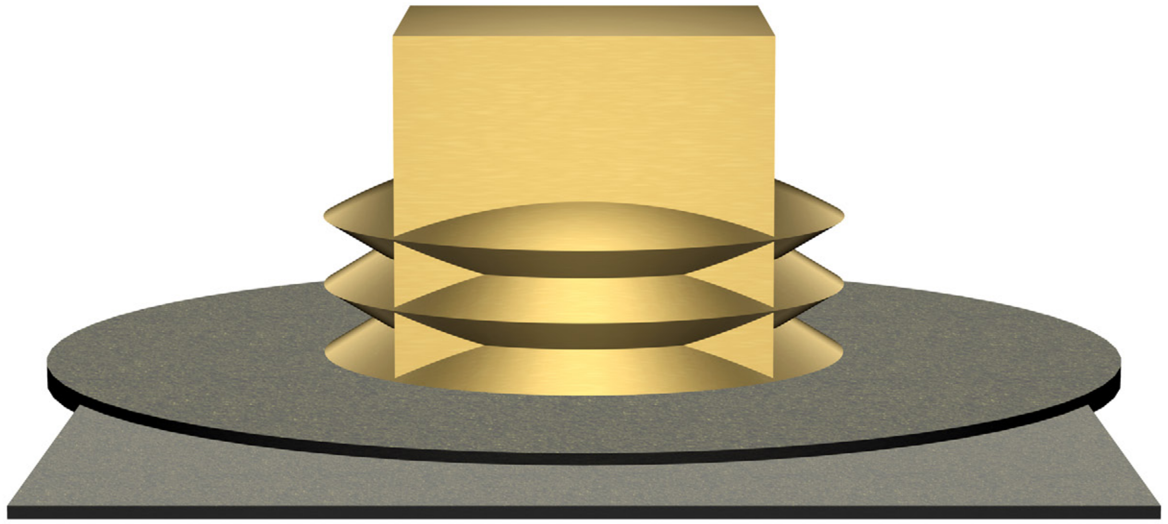
No. 40 / 1975



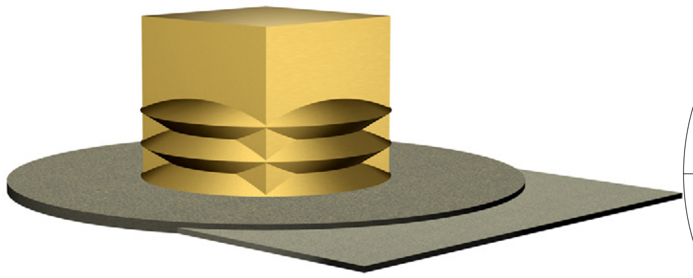
The area of the largest square equals the area covered by the sphere section multiplied twice by Φ. Dividing the area of this square three times by Φ results in the area of the second square, and dividing the area of the second square by Φ results in the area of the third square. Dividing the radius of the area of the sphere section twice by Φ provides its height.

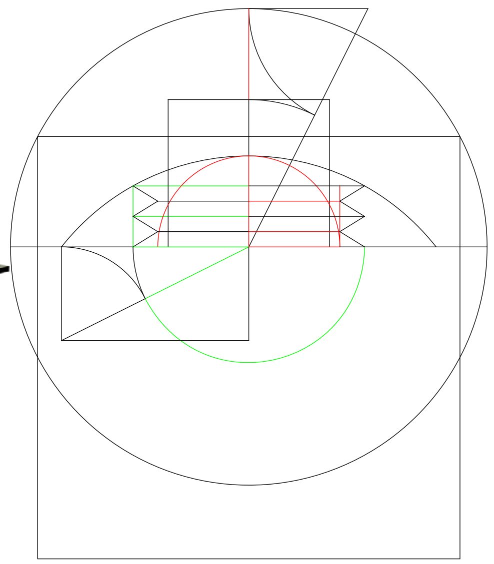


No. 41 / 1975

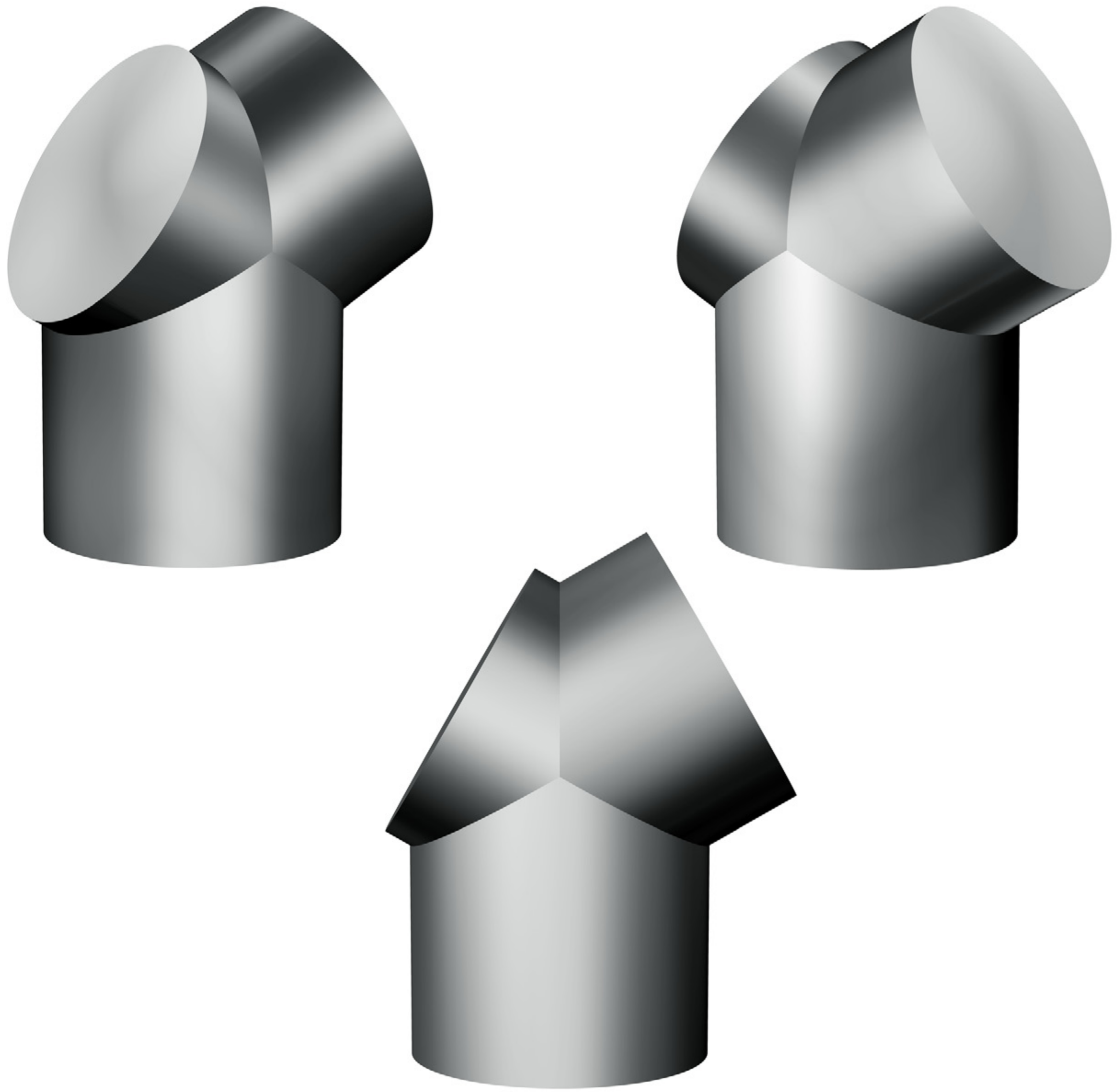


The radius of a circle is proportioned applying Φ. The short portion (red) becomes the height of an arc cut from the circle (black). The same method of proportioning applied to half the chord of this arc, establishes the larger radius (green) for a cone section, the height of the arc serving as the smaller radius. A perpendicular drawn from the outer left point of the larger radius intersects the arc, defining the combined height of four alternating cone sections, as well as the cord for a sphere section. The combined height of the sphere section and the four cone sections relates to the height of the intersecting box by Φ. The base area of the box is equal to the area of the smaller cut of the cone section. The intersected platform square has the same surface area as the intersecting platform cylinder.

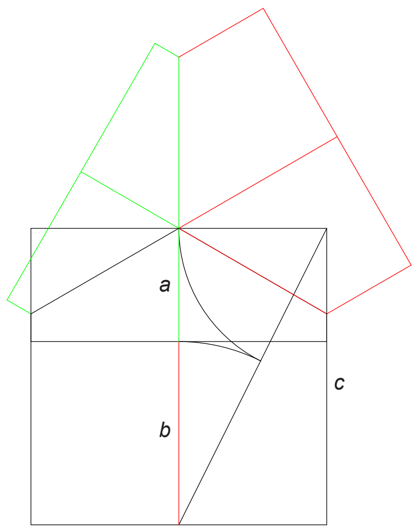




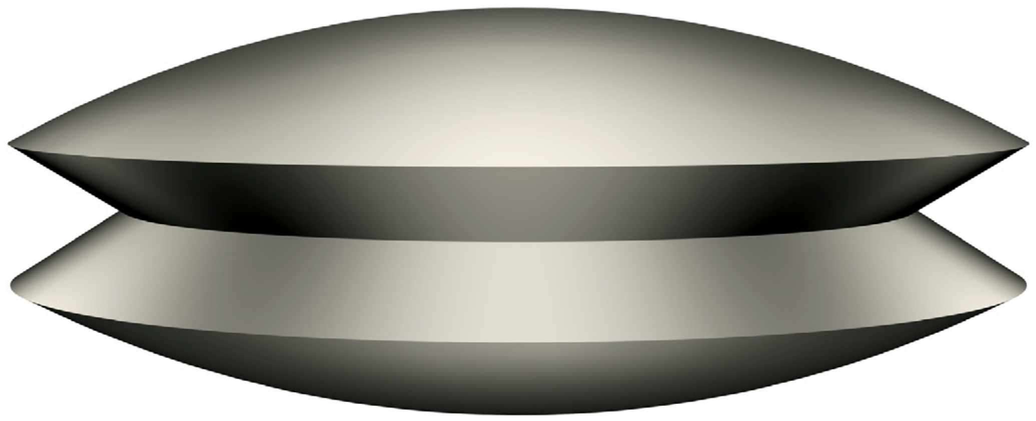
No. 42 / 1975



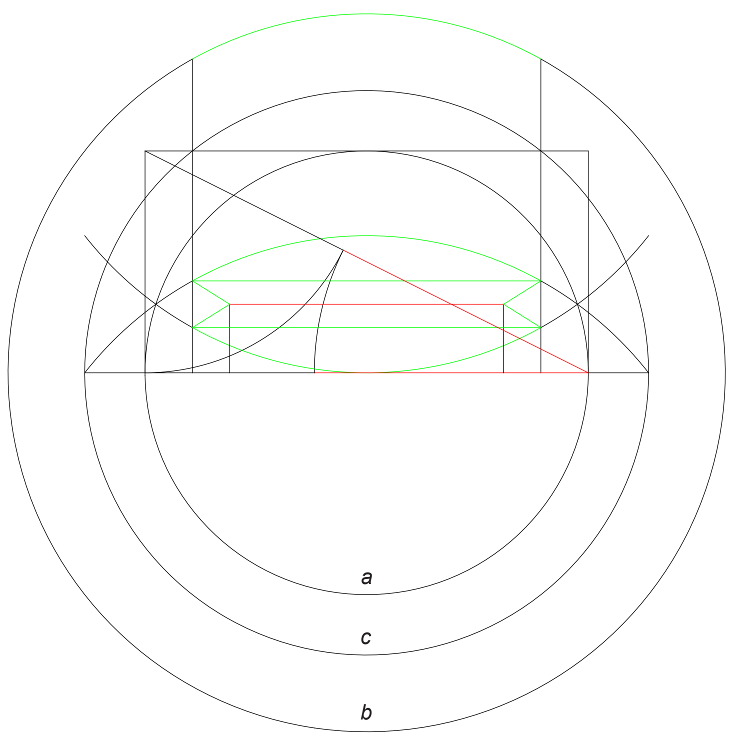
The diameter and height of the vertical cylinder is *c*. A second cylinder with the length *a*, rotated 120 degrees over the pivot of its axes, intersects the first cylinder as shown. A third cylinder with the height *b* completes the sculpture, a reference to the “Torso of a young man” by Brancusi.



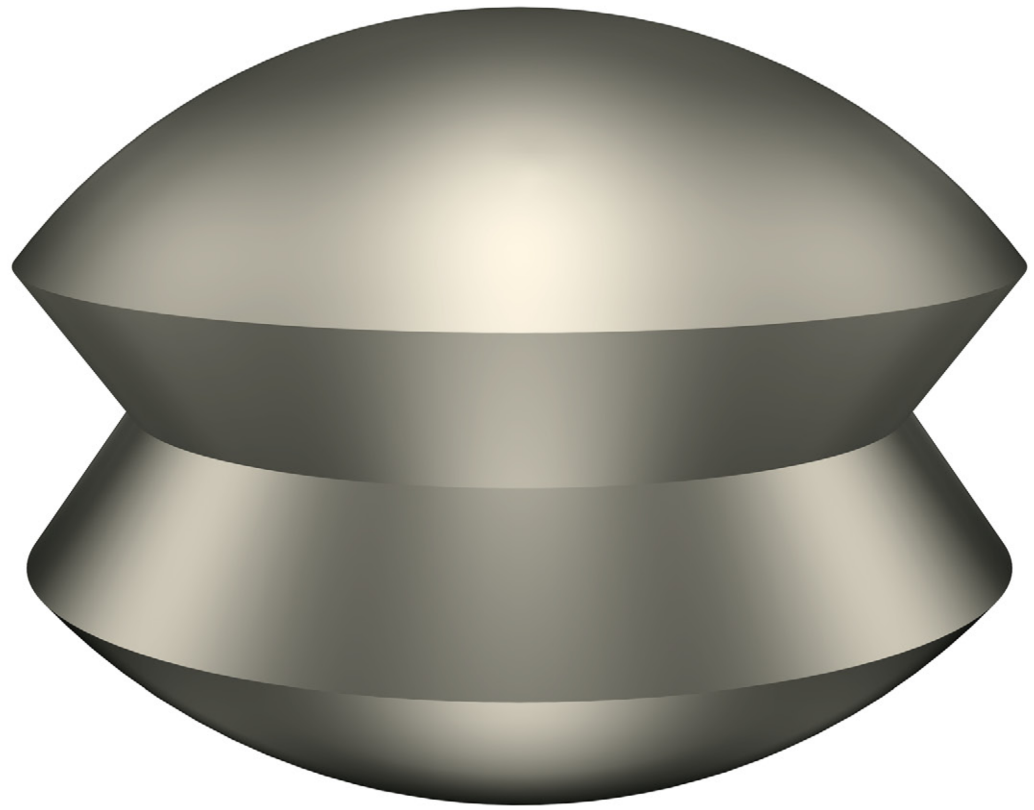
No. 43 / 1975



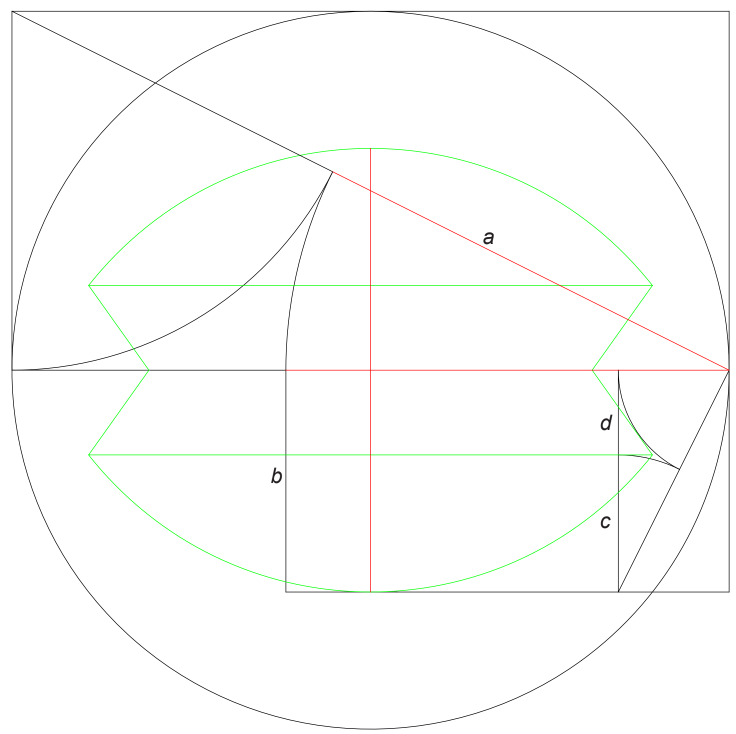
The diameter of circle *a* is divided by Φ. The larger part (red) becomes the diameter for the smaller cut of a cone section. Multiplying the area over this cut by Φ results in the area of the larger cut. Multiplying the diameter of circle *a* by Φ results in circle *b.* A section of circle *b* is cut equal in width to the diameter of the larger cut of the cone section. The area of circle *b* divided by Φ results in circle *c.* The arc from circle *b* (green) is positioned with its extensions intersecting *c* at its horizontal quadrants. A mirrored copy of the arc on this horizontal sets the vertical order.



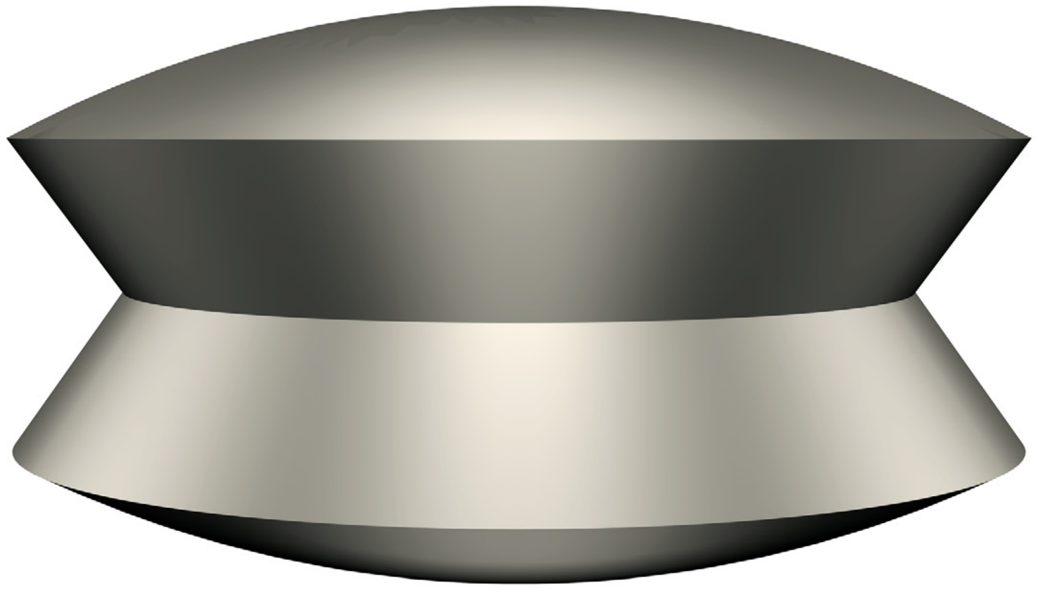
No. 44 / 1976



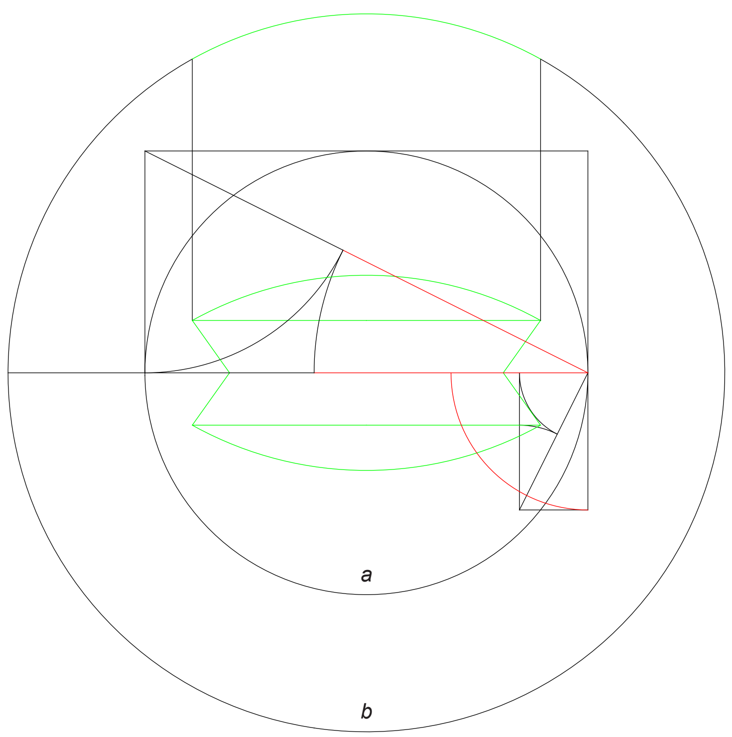
The diameter of a sphere is divided by Φ. The larger section *a* becomes the diameter of the smaller cut of a cone section, as well as the total height of the sculpture. Dividing *b* by Φ establishes the height of the sphere section *c* and the height of the cone section *d.* The diameter of the larger cut of the cone section is equal to the diameter of the sphere section.



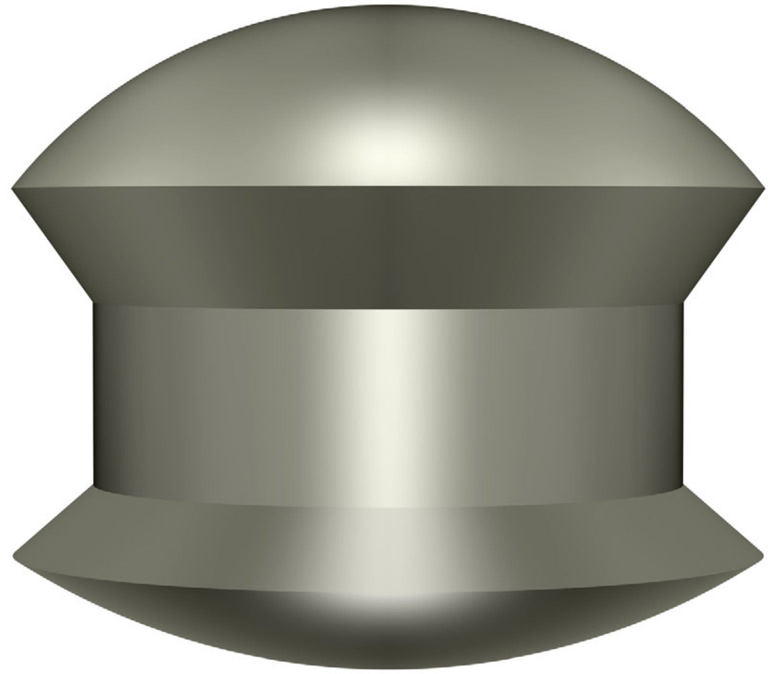
No. 45 / 1976



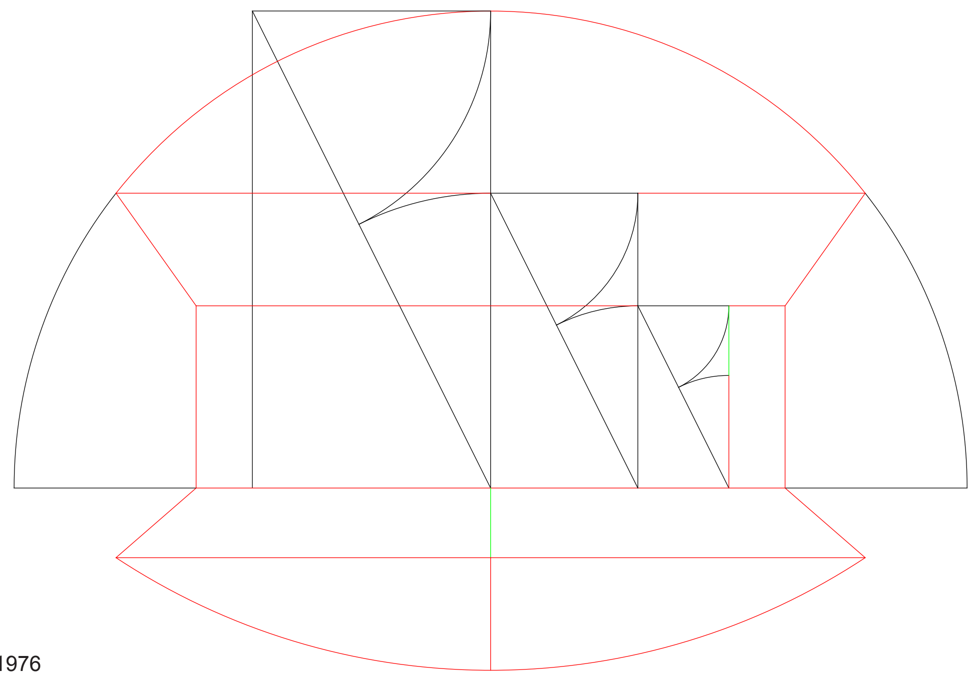
Dividing the diameter of circle *a* by Φ provides the diameter of the smaller cut of the cone section. Dividing half of this diameter by Φ provides the height of the cone section. The area over the larger cut of the cone section is the result of multiplying the area over the smaller cut by Φ. The diameter of circle *a* multiplied by Φ equals the diameter of circle *b.*



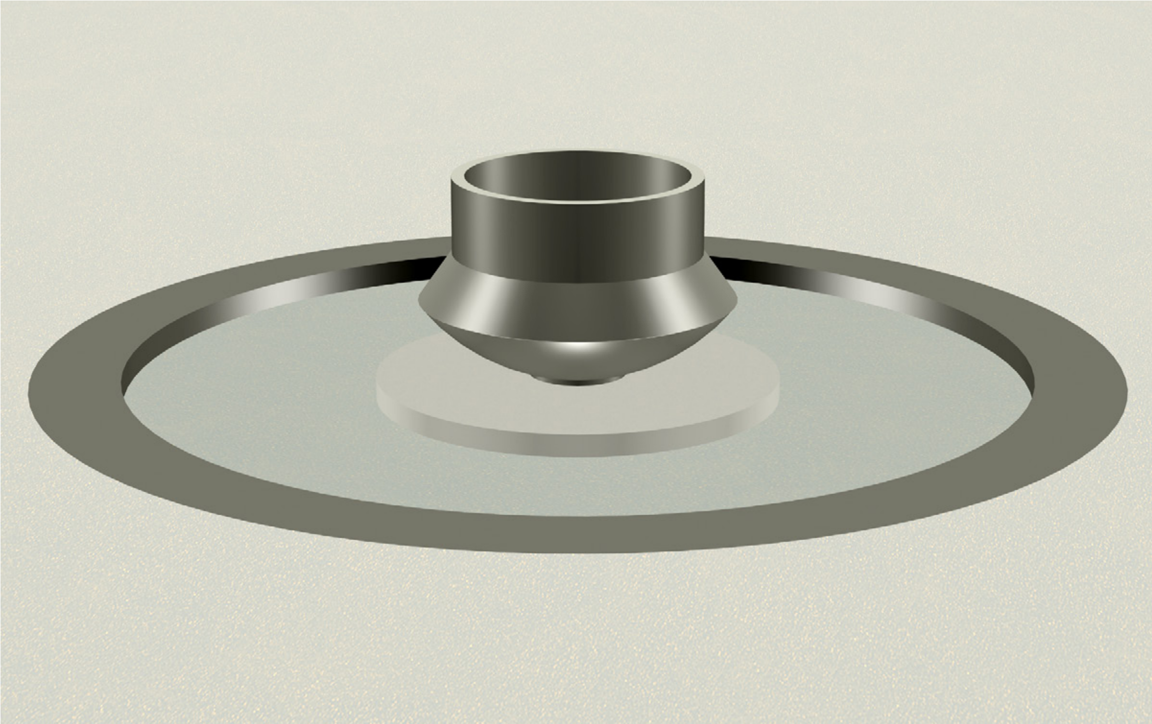
No. 46 / 1976



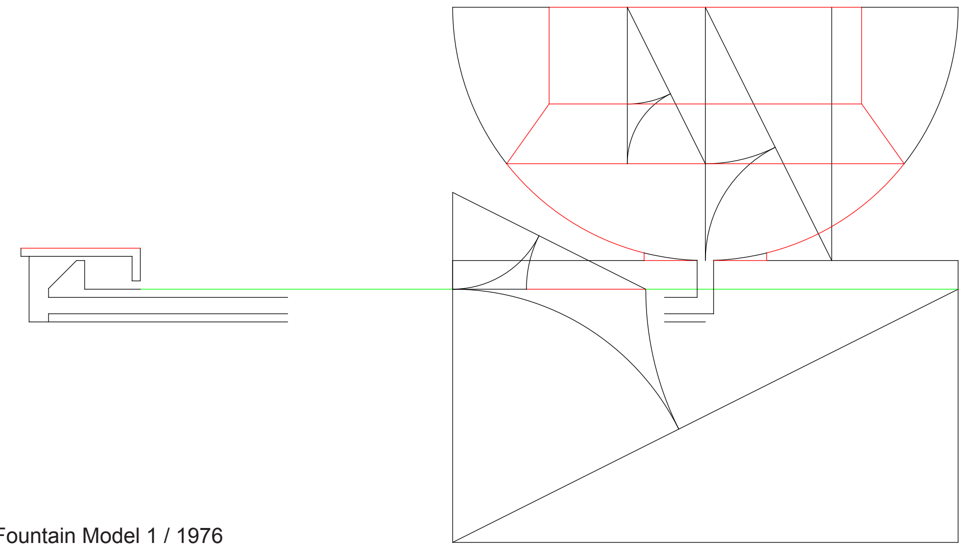
The height of the sphere section on top is determined by dividing the radius of a sphere by Φ. Dividing the larger proportion by Φ, results in two dimensions, which constitute the height of a cone section and the height of a cylinder, which, in turn, divides into the height of the bottom cone section (green) and the height of the bottom sphere section (red). Dividing the area over the radius of the sphere section by Φ results in the area over the radius of the cylinder.



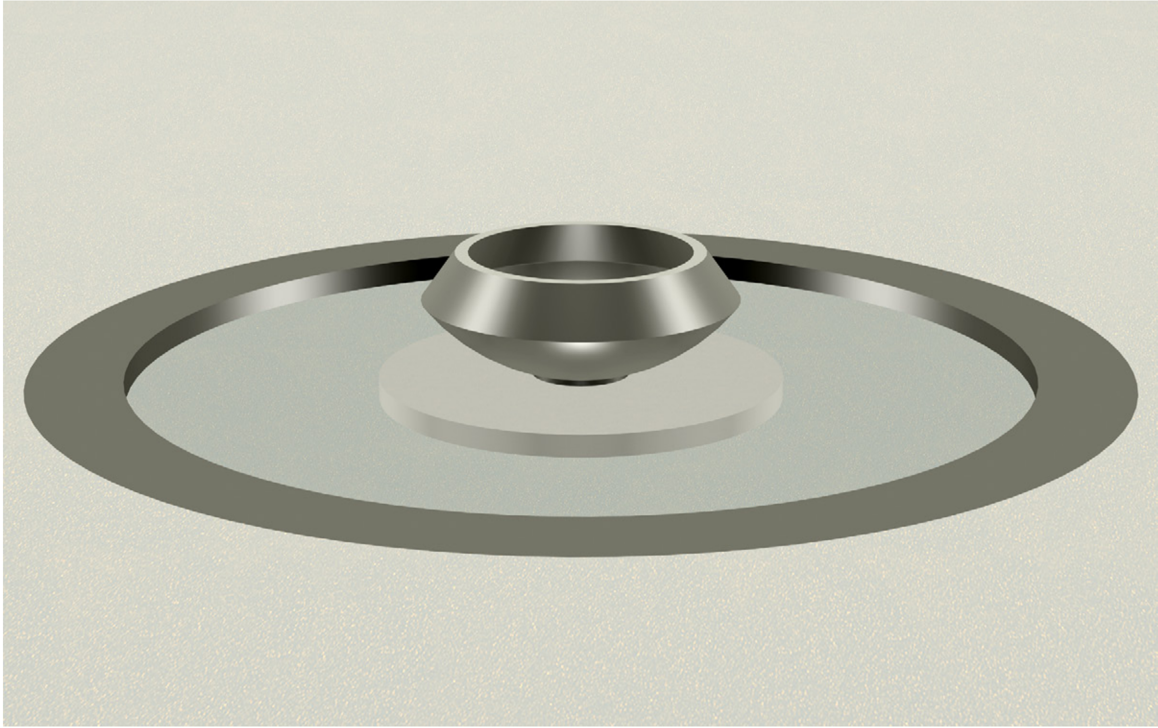
No. 47 / 1976



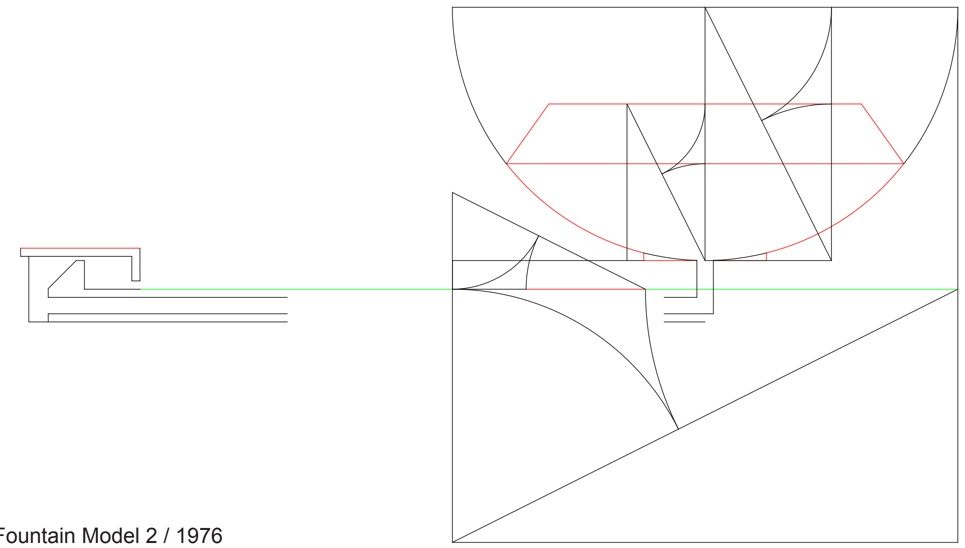
Water pressure is to be controlled to cause an overflow in the container, covering its surface.



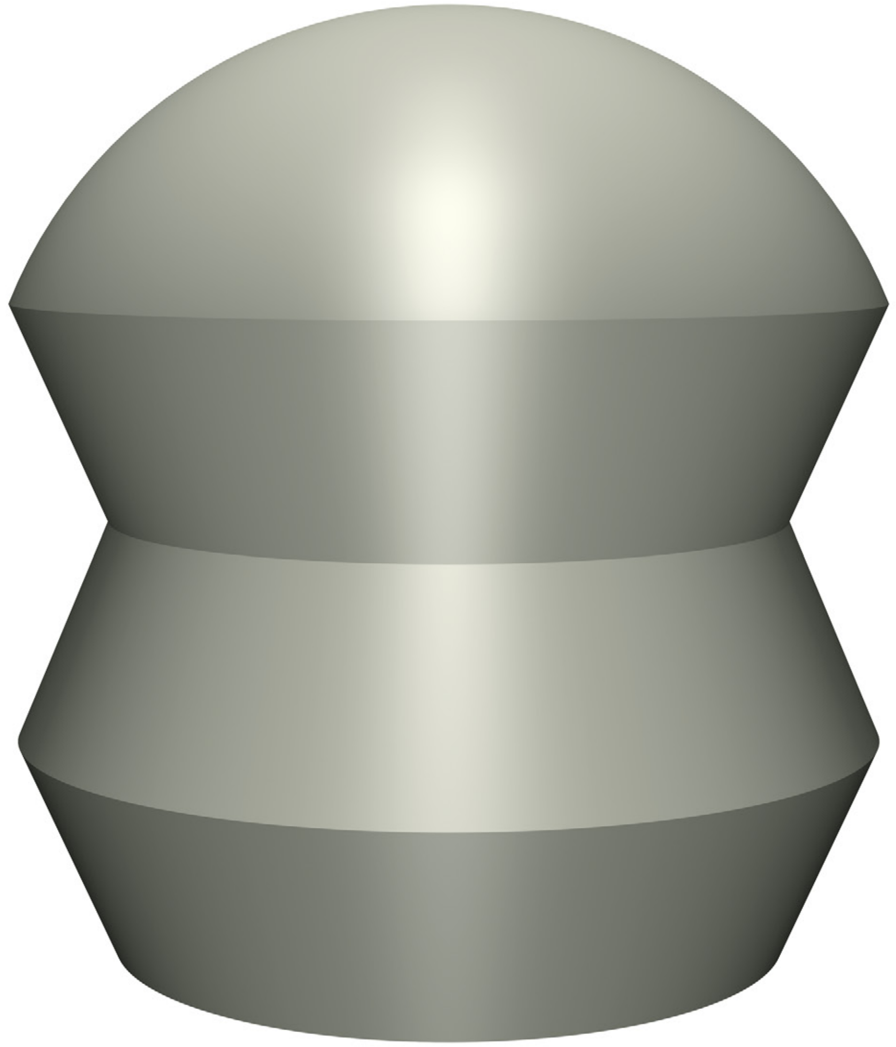
No. 48 / Fountain Model 1 / 1976



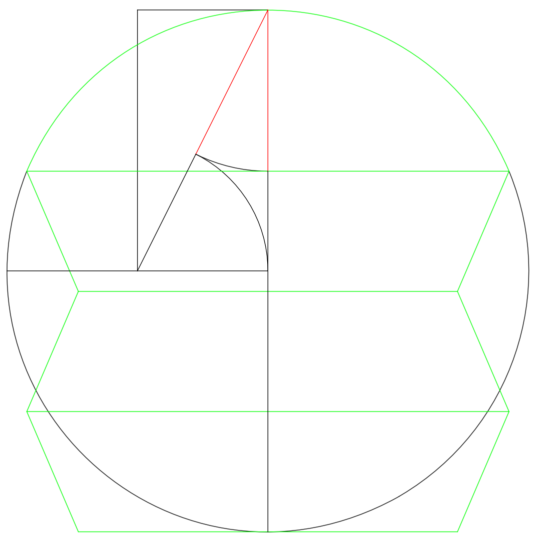
The height of the cone section relates to the height of the sphere section, as their combined height relates to the radius of the sphere. The base and the sphere have the same radius.



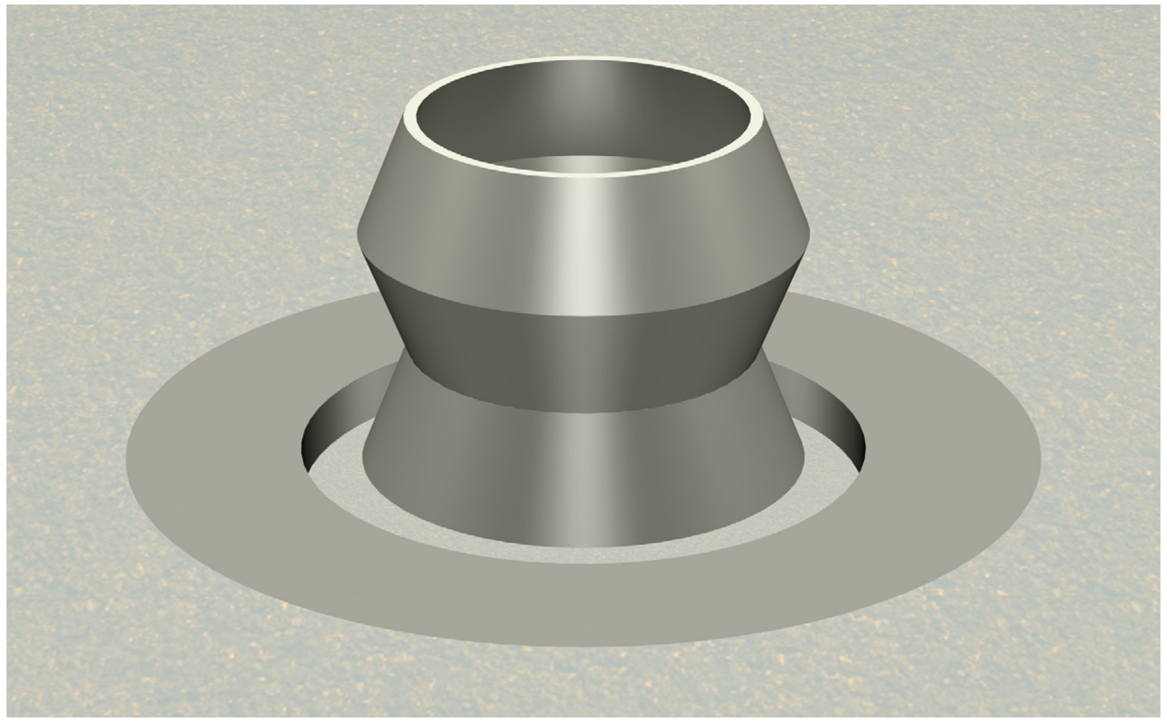
No. 48 / Fountain Model 2 / 1976



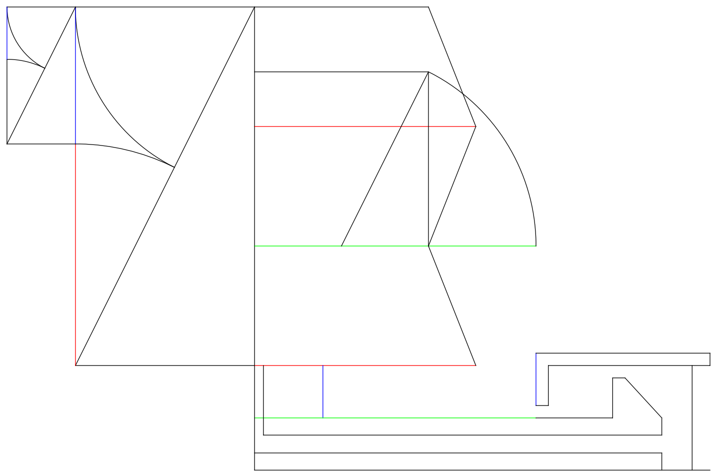
The radius of a sphere is divided by Φ. The larger part becomes the height of a sphere section. The diameter of the sphere minus the height of the sphere section is divided into three equal parts, determining the height of the cone sections. The cut of the sphere section equals the cut of the larger cone section, the area of which, divided by Φ, is the area over the smaller cut.



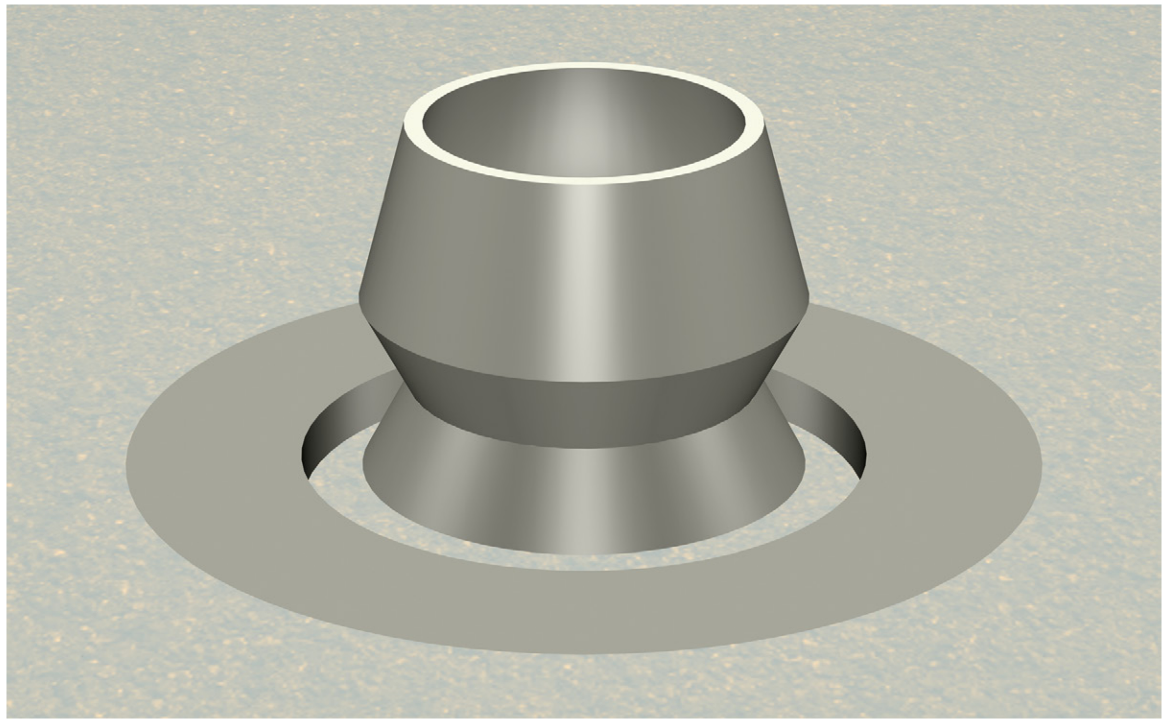
No. 49 / 1976



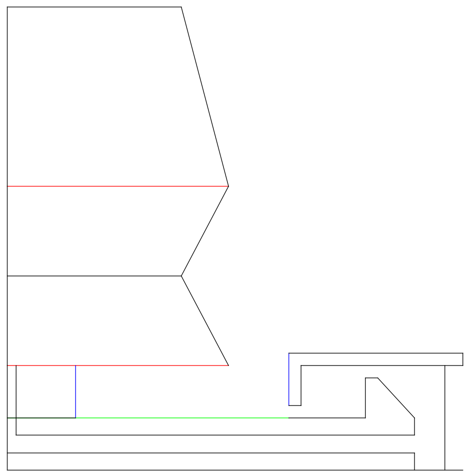
The water pressure is to be sufficient to overflow the container and thereby cover the surface. The basin collecting the water extends under a removable overhang. The water level is intended to reach at the height of, or slightly above, the base of the container.



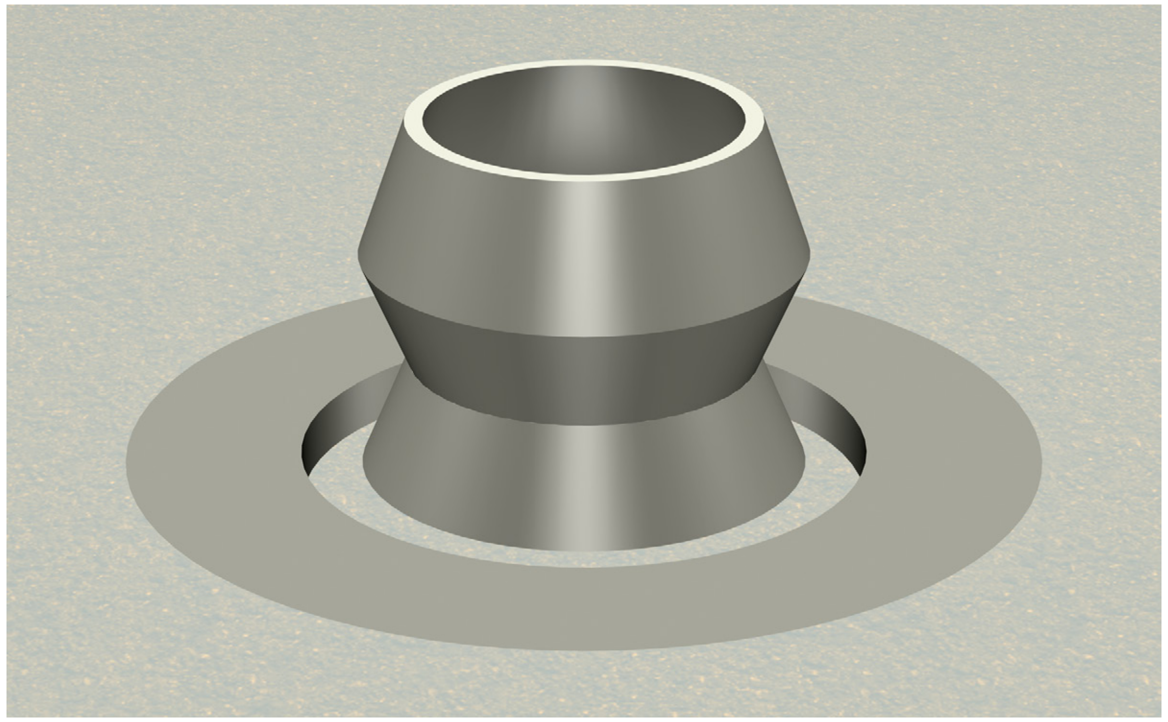
No. 50 / Fountain Model 1 / 1977



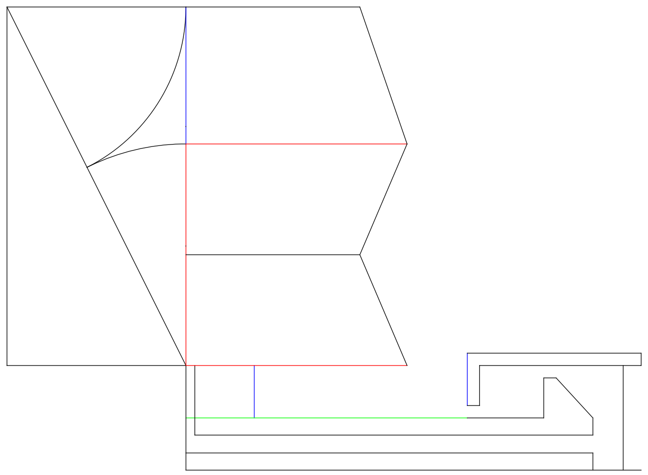
The height of the container is divided into two equal halves, with the top half made up by one and the bottom half by two cone sections. The area over the larger radius of a cone section relates to the area over the smaller by Φ, so does the height of the container to the larger radius.



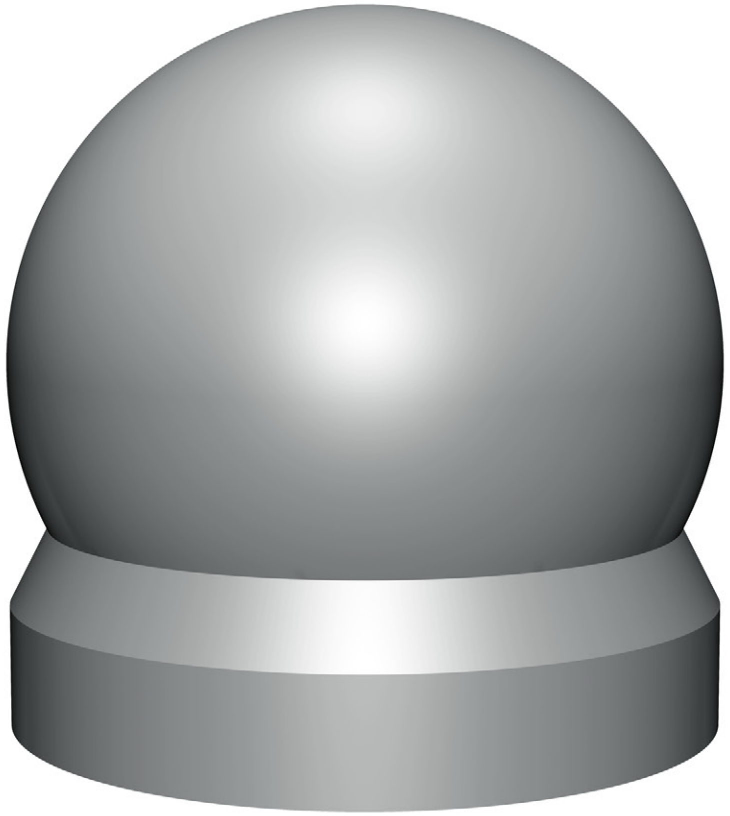
No. 50 / Fountain Model 2



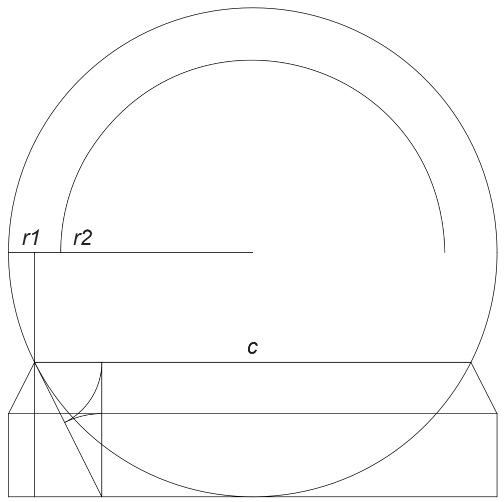
The height of the container is divided by Φ, with the larger proportion divided into two.



No. 50 / Fountain Model 3 / 1977

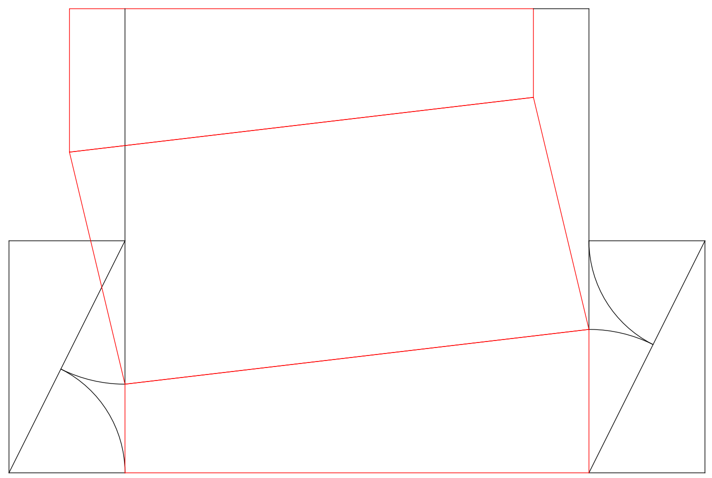


Dividing the area over *r1* by Φ results in the area over *r2*. Subtracting *r2* from *r1* and dividing that distance by 2 results in the radius for *c.* The height of the bottom section is proportioned by Φ. The larger part becomes the height of a cylinder, the shorter the height of a cone section.

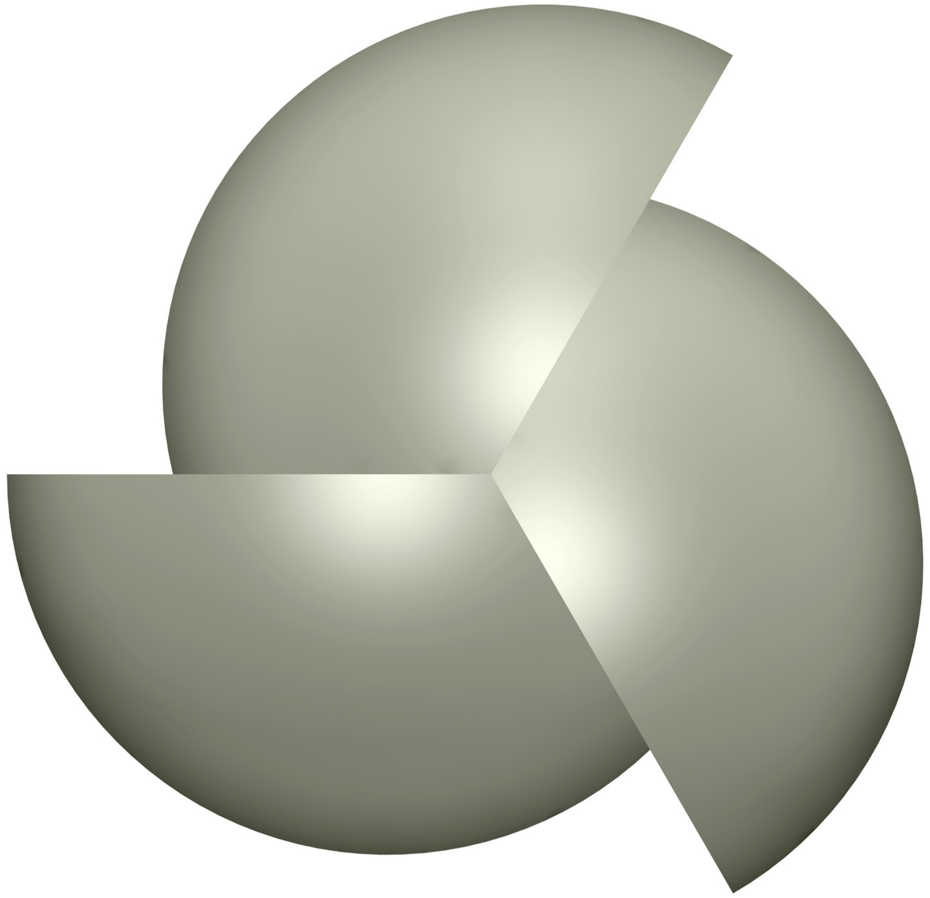


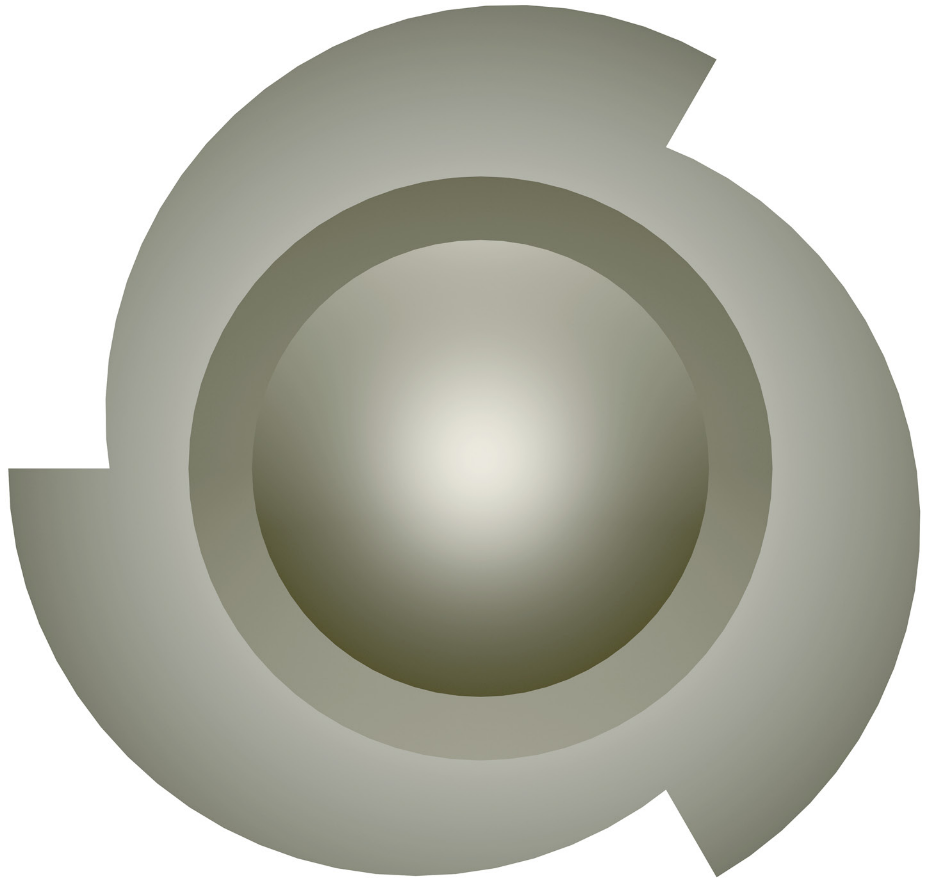
No. 51 / 1978

The diameter of the cylinder is equal to its height. Φ is applied to half its height, and the proportions are assigned as shown.



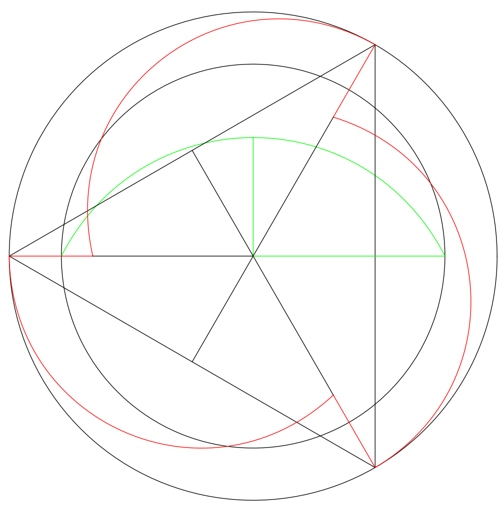
No. 52 / 1979



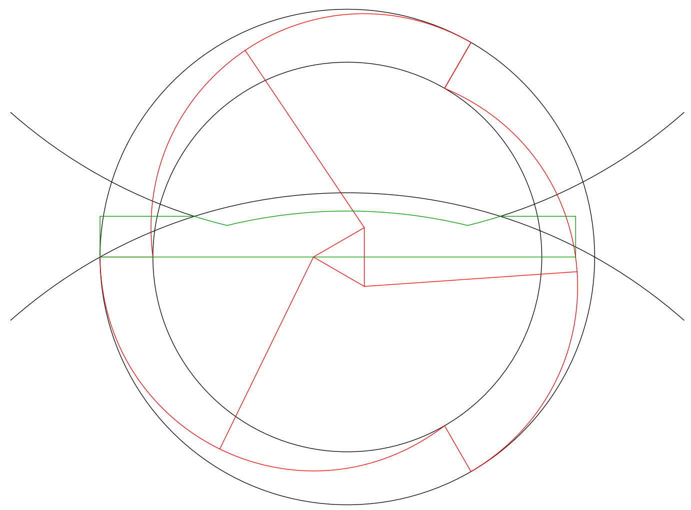


A sphere section is cut, so that the radius of its cut relates to its height by Φ (green). The area over the cut times Φ equals the area of the outer circle. One half of the sphere section is positioned on the horizontal baseline with one corner on the outer circle. An inscribed equal sided triangle establishes two more points on the periphery of the outer circle. A perpendicular is drawn from the lower right corner of this triangle to its facing side, indicating where the sphere section, in red, is to be cut again. Two copies of this sphere section are then rotated 120 and 240 degrees and placed similarly to the perpendiculars.

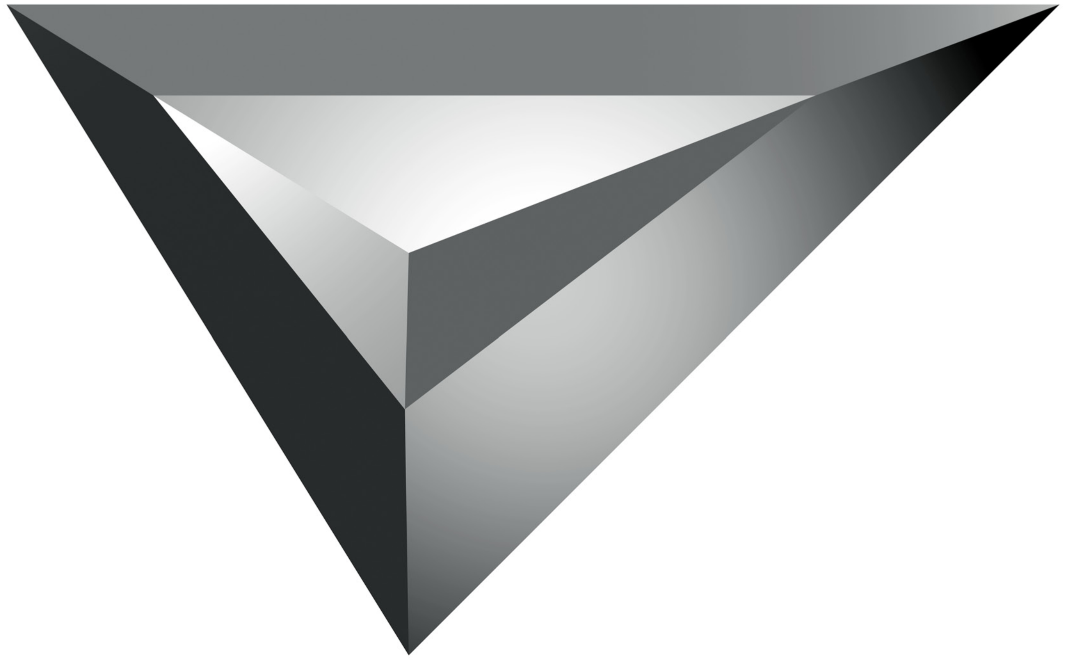
The implied movement gives an expression of vitality similar to a Greek triskelion and can be recognized in the Delos Nike from 540 BC.



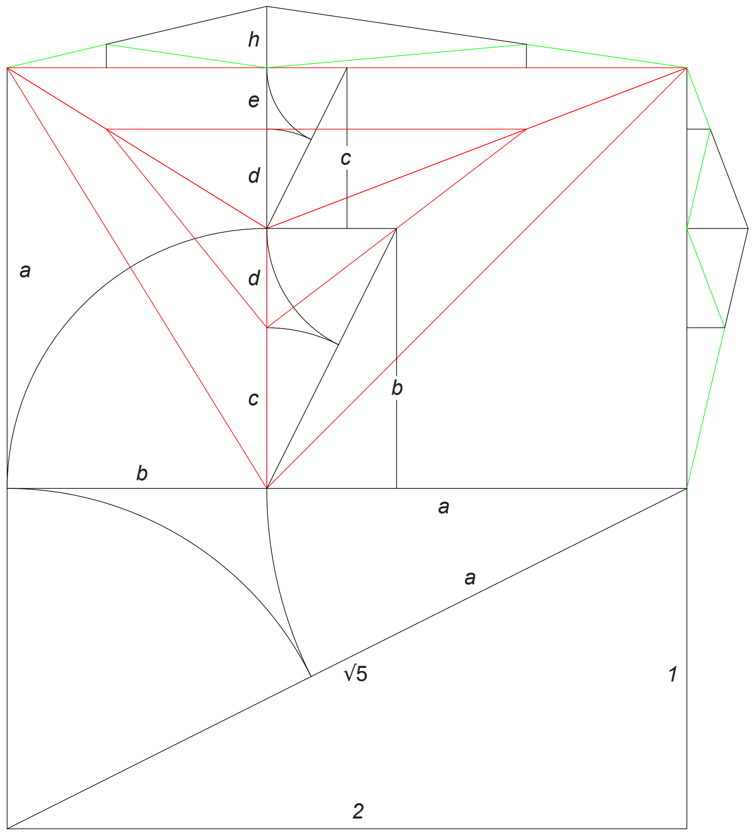
No. 53a / 1979



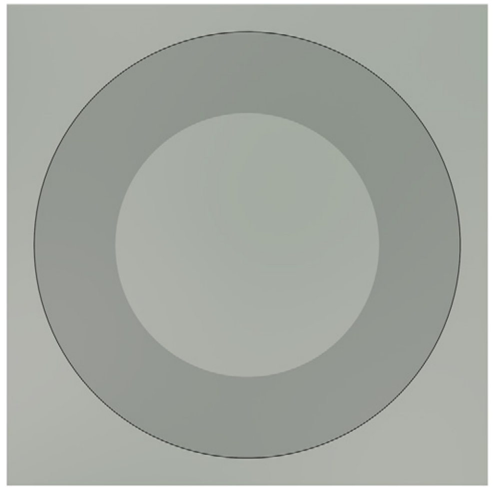
No. 53b / 1982



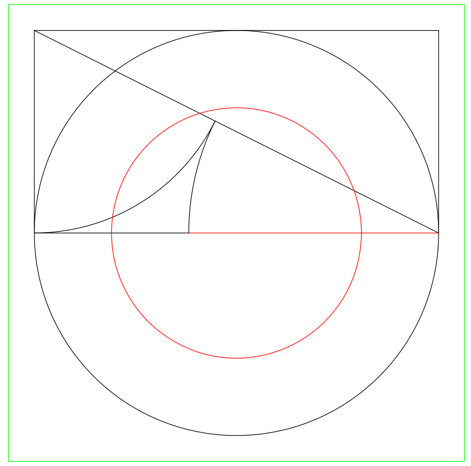
The rectangle *a* x *b* is the reciprocal of the rectangle *a* x *ab*. Dividing the base *ab* five times by Φ, results in *h*. The angle of the three outer planes is determined by *h*. The intersections with the three inner planes are determined by *c,d* and *d,e* as shown in the cross-sections.



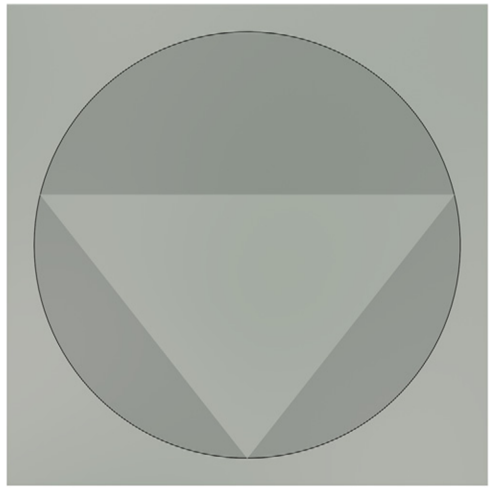
No. 54 / 1980



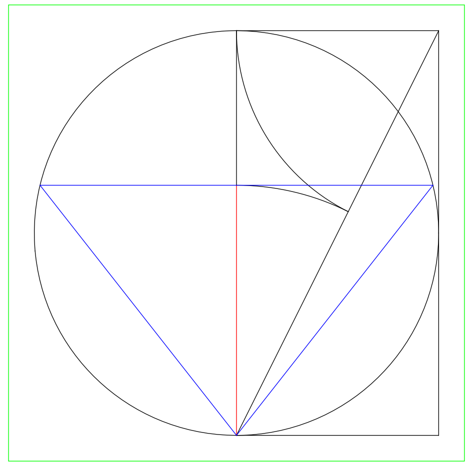
No. 55a / 1980



The area of the square divided by Φ yields the area of the larger circle. Dividing its diagonal by Φ yields the diagonal for the smaller circle.

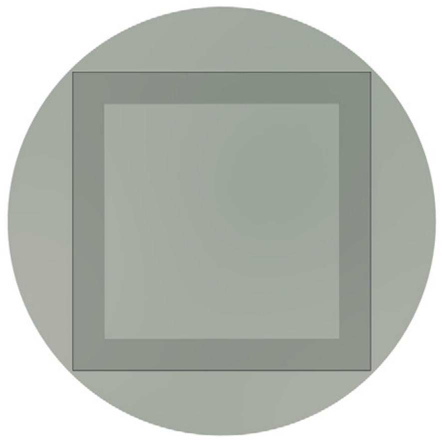


No. 55b / 1980

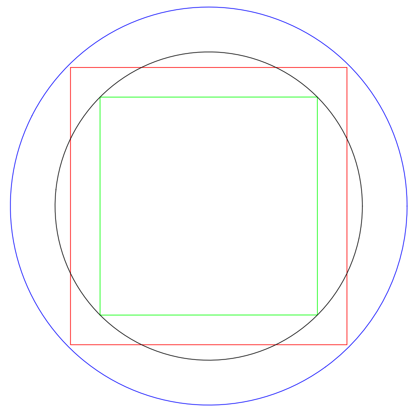


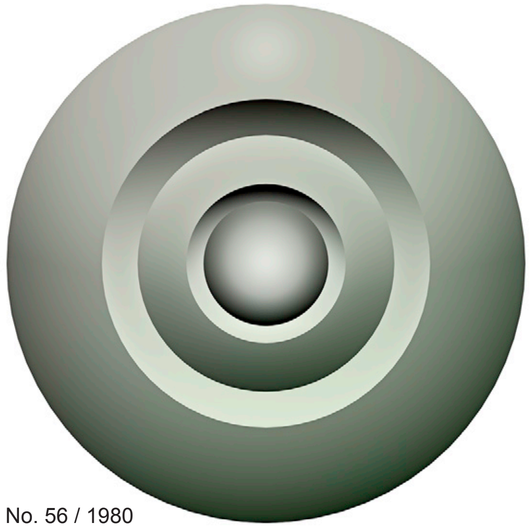
The diagonal of the circle divided by Φ yields the height (red) of the triangle, whose three points lie on the periphery of the circle.

The area of the blue circle divided by Φ yields the red square, divided by Φ yields the green.

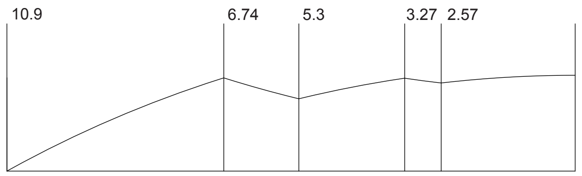


No. 55c / 1980

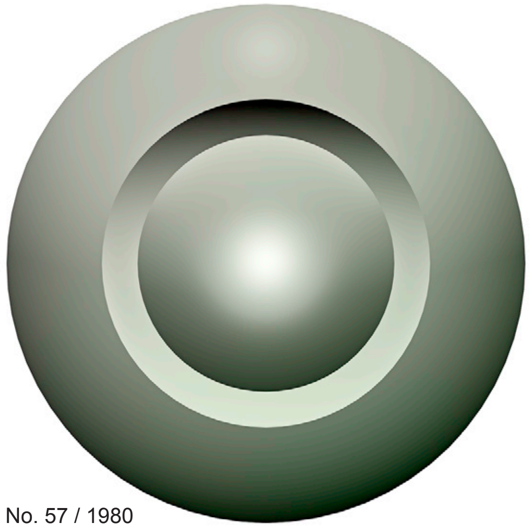




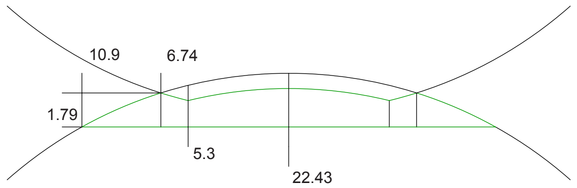
No. 56 / 1980



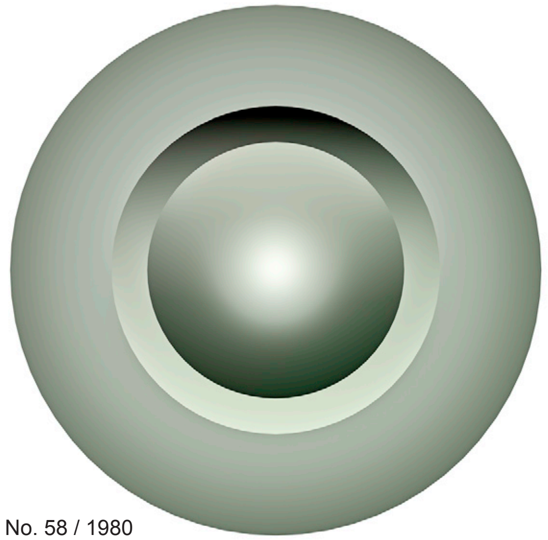
From a sphere with the radius of 22.43 a section with the radius of 10.9 is cut. The area over r 10.9 = 373.25 divided by 1.618 = the area 230.69 over r 8.57 divided by 1.618 = the area 142.58 over r 6.74 etc.



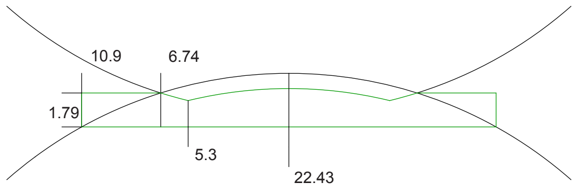
No. 57 / 1980



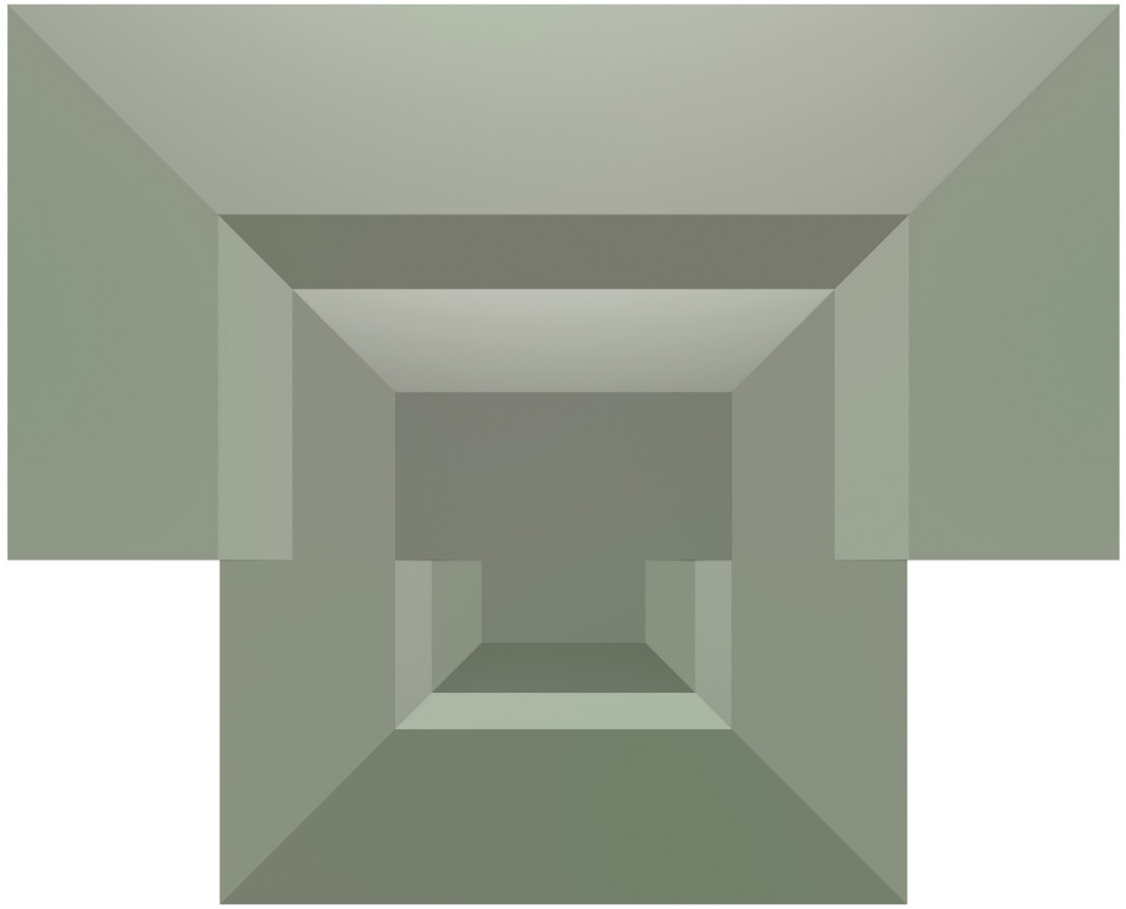
A copy of the sphere section is mirrored horizontally to intersect the original at the distance of 6.74 from its center. The copy is subtracted from the original. The resulting concavity is intersected at a distance of 5.3 from the center by a section of the original sphere.



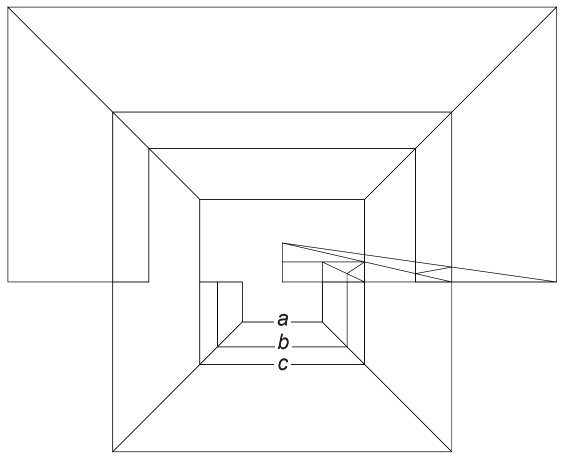
No. 58 / 1980

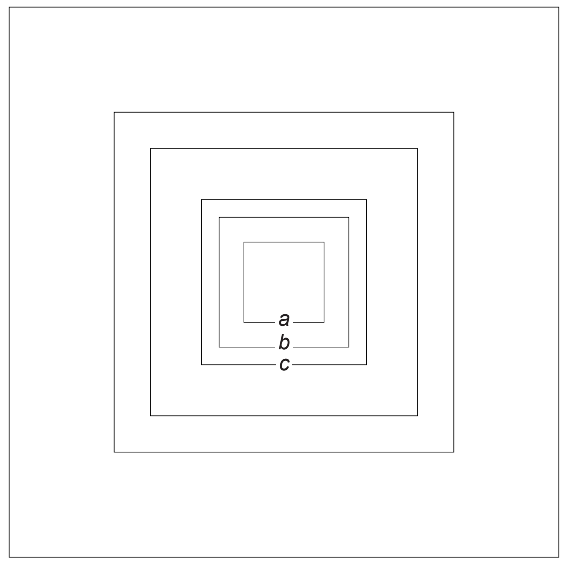


The outer ring consists of a cylinder with a sphere section subtracted in the manner shown. At the center a convex section of the same sphere reverses the movement.

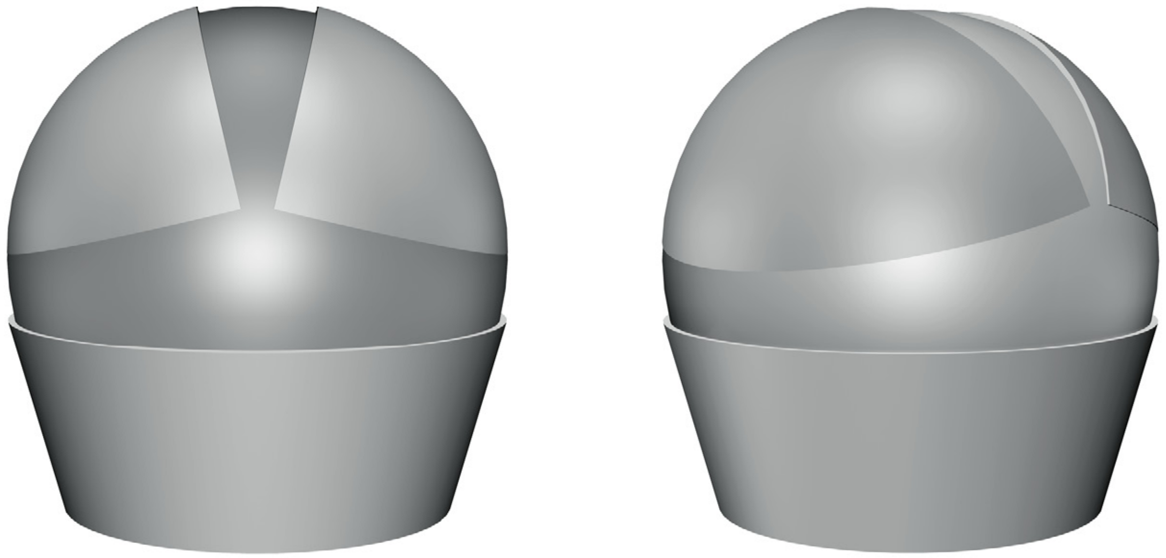


Pyramid 59 consists of a series of six interlocking squares. The ratio 1.618 applied to the baseline of square *a* results in *b* and applied to the area over *b* leads to the area over *c* etc. The focal point for the incline is similarly calculated by dividing the baseline *c* three times by Φ.



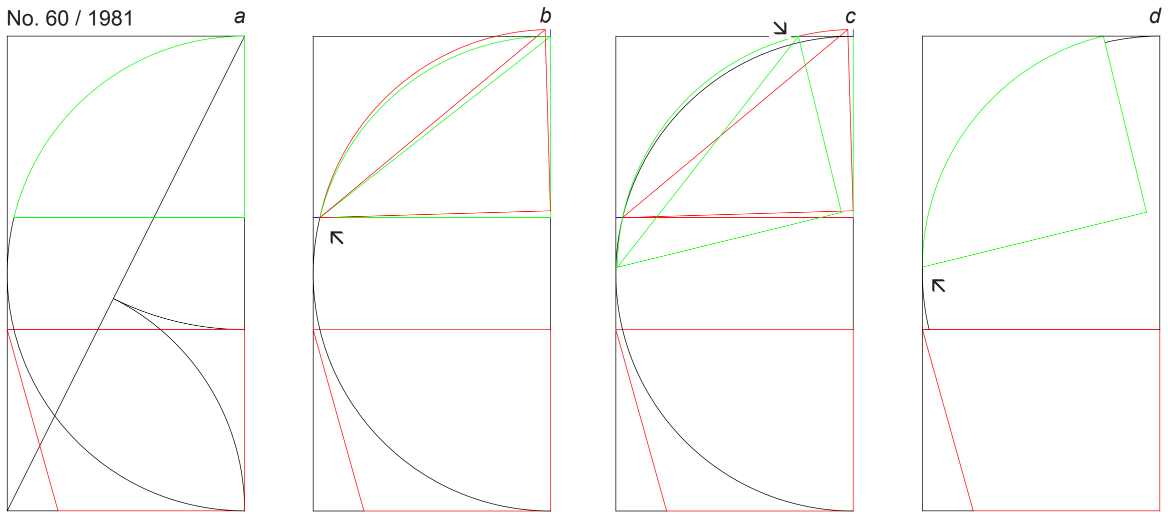


No. 59 / 1981

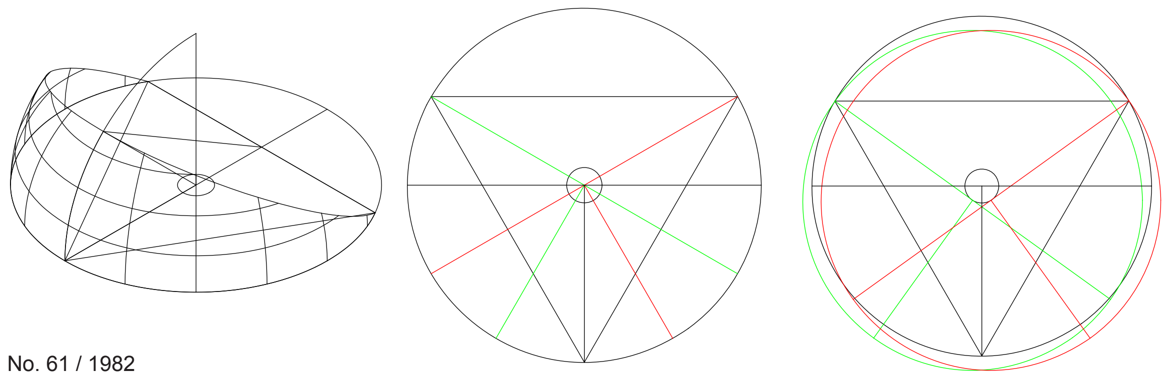


The diameter of a sphere is divided by Φ. The smaller portion becomes the height of the cone section (red). The radius of the sphere equals the radius of the larger cut of the cone section. Dividing the area over this cut by Φ produces the smaller cut. The height of the cone section equals the height of the sphere section (green), as shown in *a.* The rotation of the sphere section (arrow in *b*) to its new position (red) is determined by the difference in length of the base of the sphere section (green) and the radius of the sphere. In *c* the sphere section (green) is rotated till the endpoint (top) coincide with the height of the original diameter (arrow). In *d* the section shifts slightly to the left (arrow) to meet the periphery of the original sphere.

No. 60 / 1981

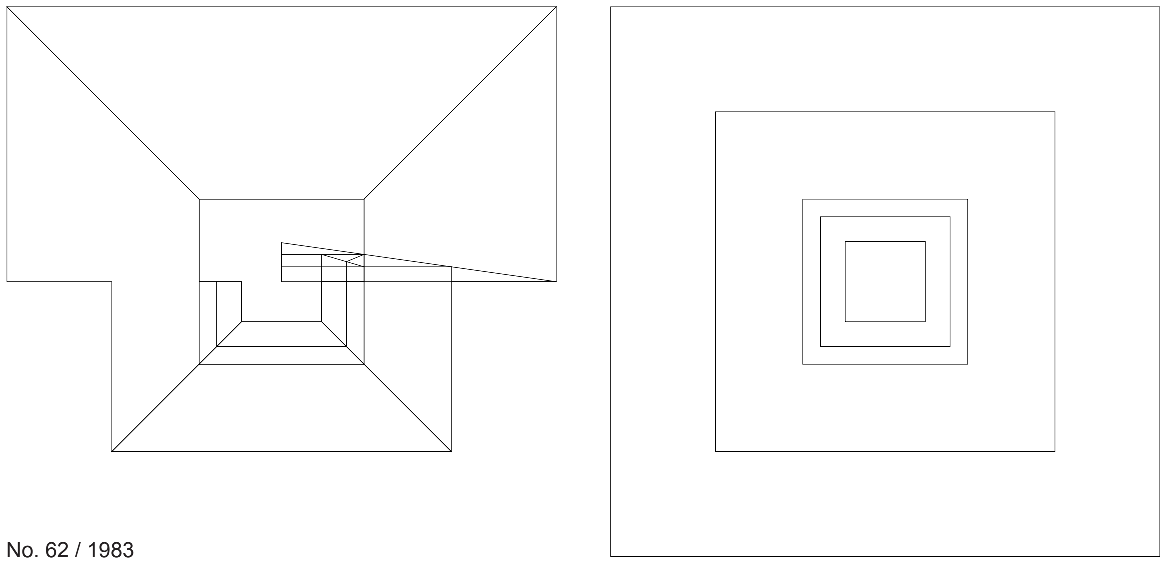


A section is cut from a hemisphere at an angle of 45º, intersecting the base of an equilateral triangle inscribed into the base of the hemisphere. Two copies of the section rotate outwards from opposite endpoints of the triangle, till there cords form tangents to a circle one tenth the radius of the plane. The two sections are cut at there intersection.

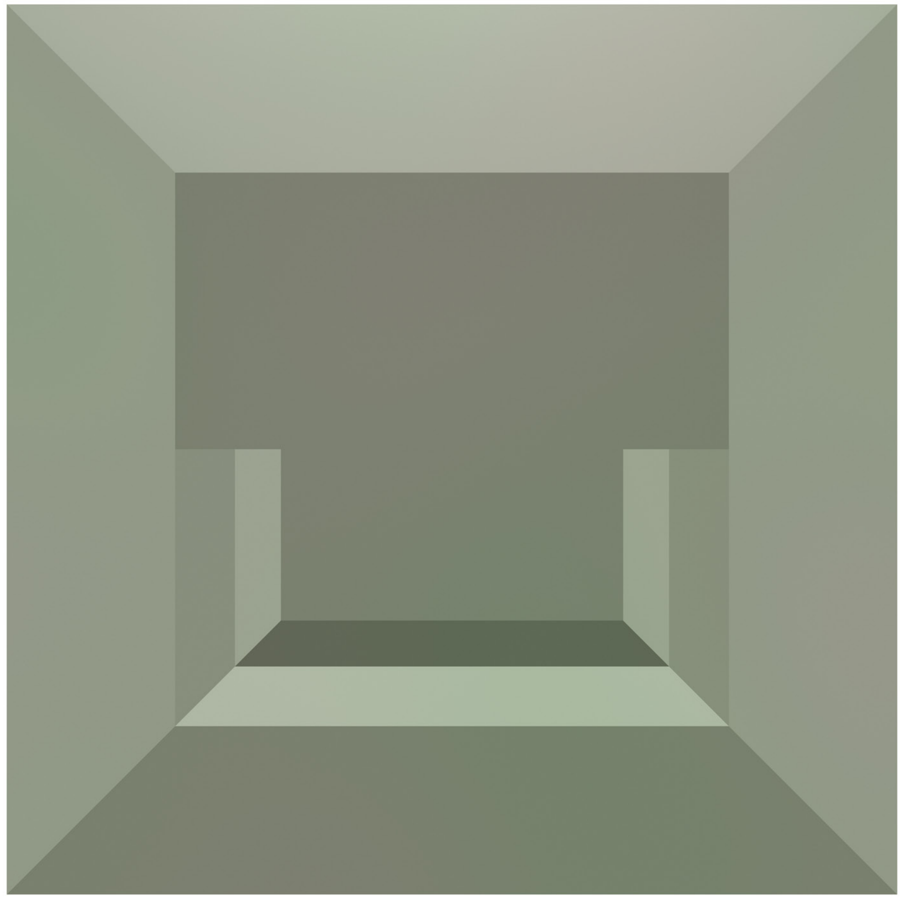


No. 61 / 1982

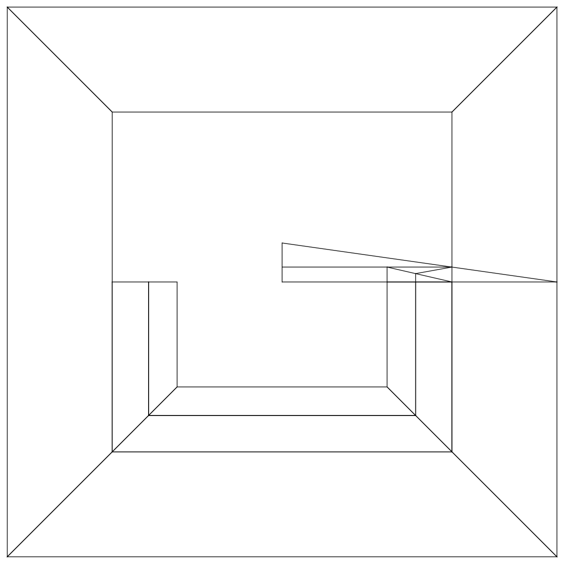
Pyramid 62 is a variation of Pyramid 59. Dimensions as well as incline remain the same.



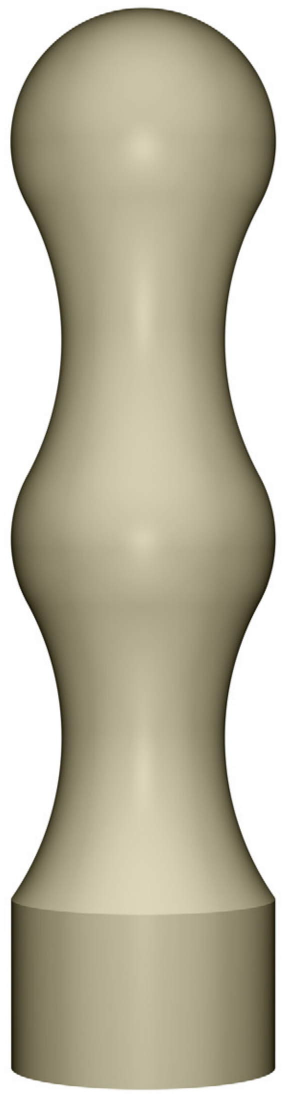
No. 62 / 1983



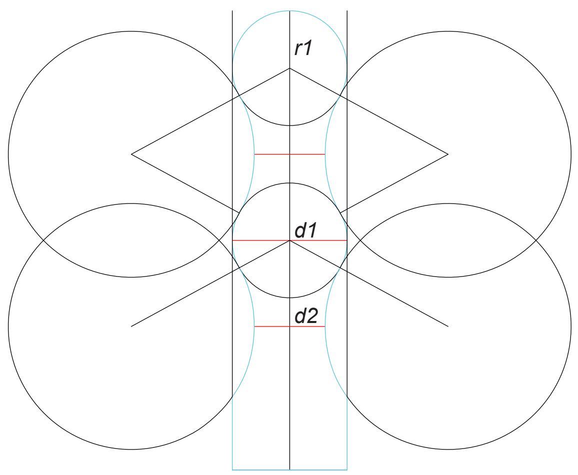
The center square of Pyramid 63 relates to the third square as the third relates to the forth, the outer square. The second square results from multiplying the area of the first square by Φ. The height of the incline is calculated by dividing the base of the second square four times by Φ.



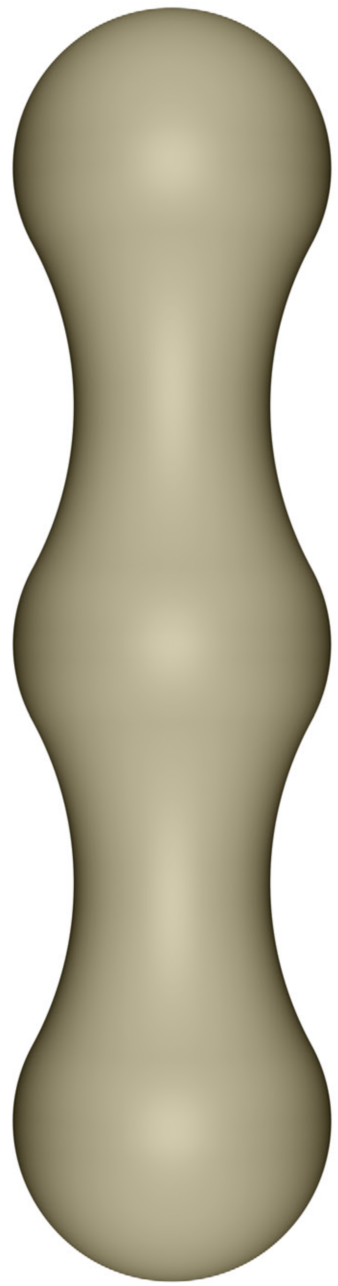
No. 63 / 1983



The total height equals 8 x r1. The diameter d1 relates to d2 by Φ.



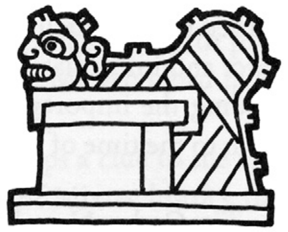
No. 64 / Trophy 1 / 1983



No. 64 / Trophy 2 / 1983

“Chicahuaxtla” Codex Sanchez Solis

House 6

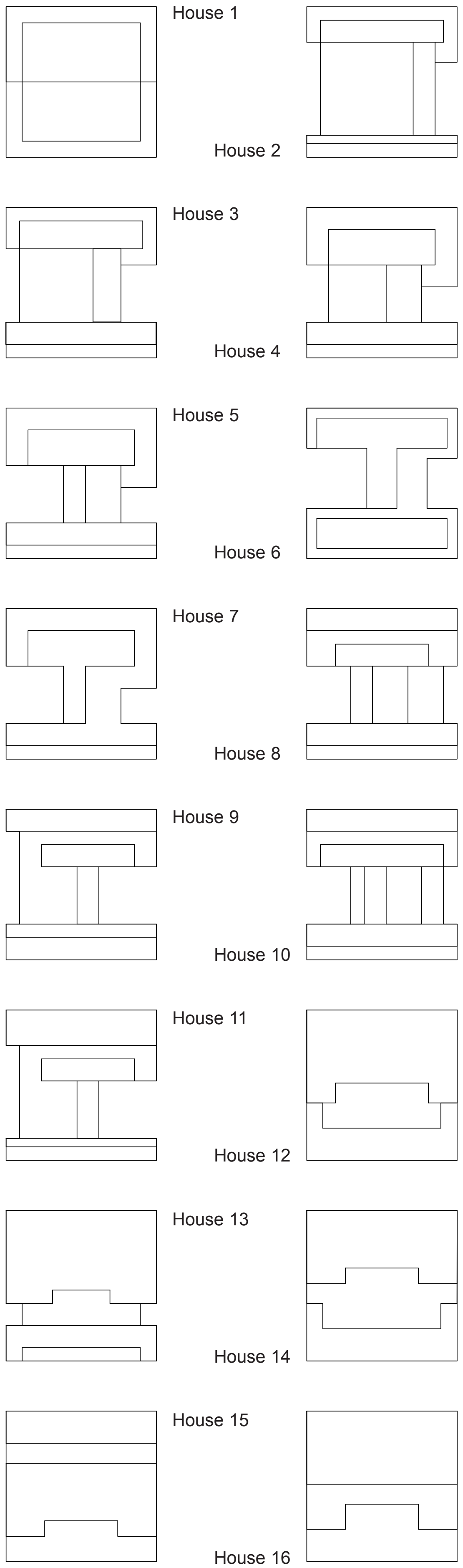


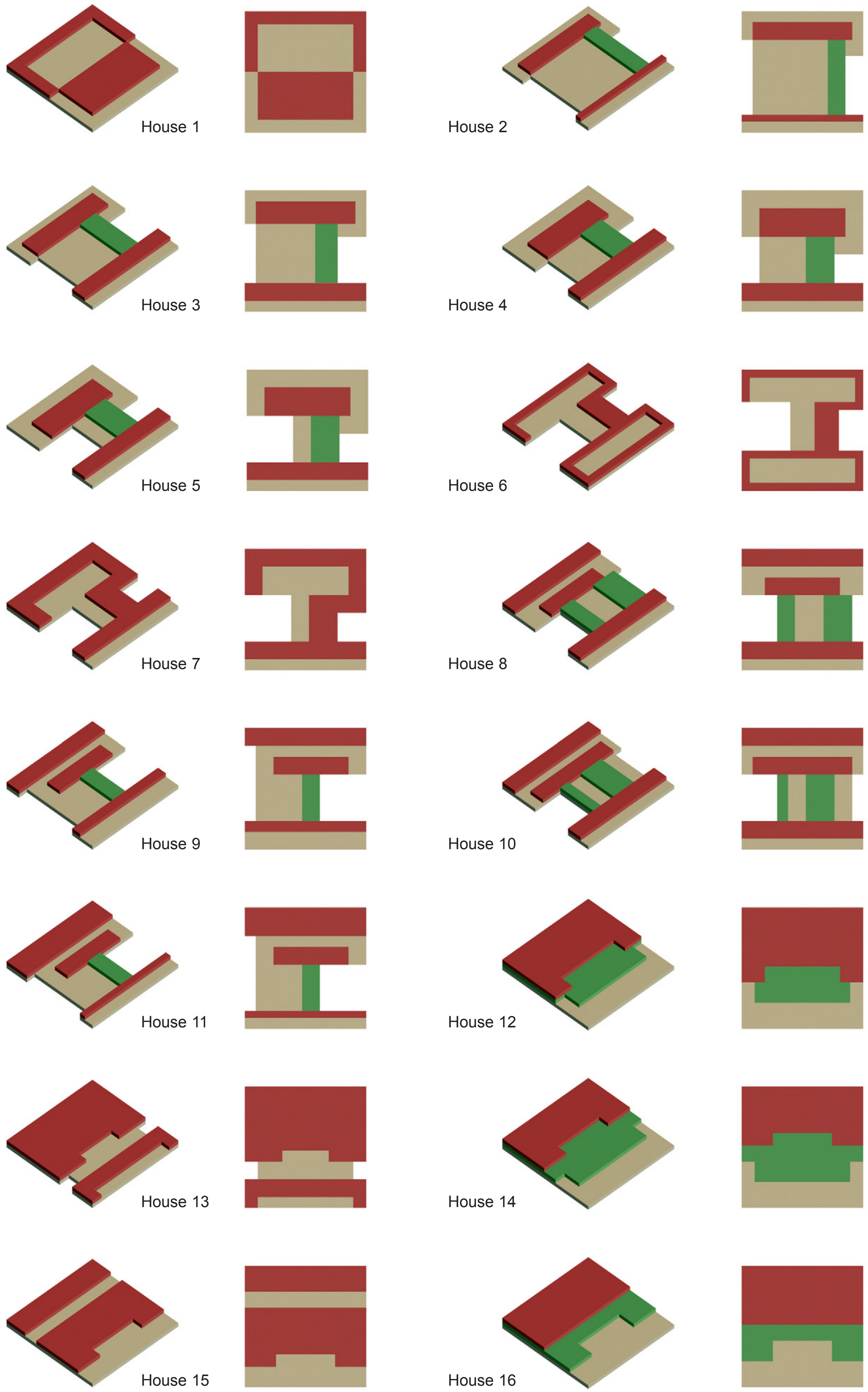
Codex Vienna

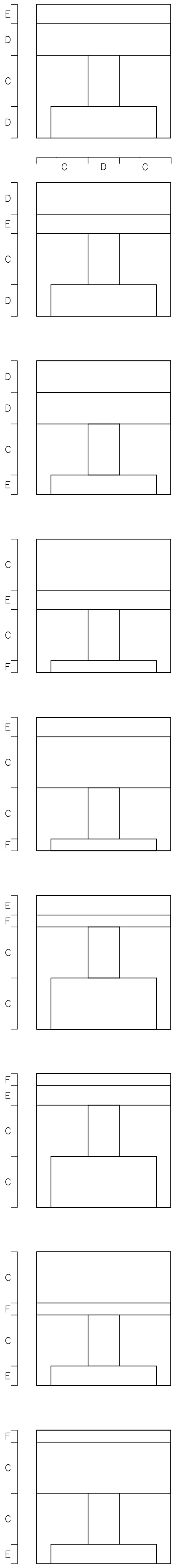
“Five-House” Codex Sanchez Solis

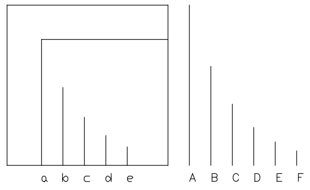
Houseglyphs 1-16 are variations on Mixtec pictographs. Easily recognizable architectural elements function as place signs and with affixes as place names.

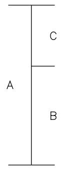
No. 65 / 1983 - 1985











$\sqrt{(A^2/\Phi)} = a$

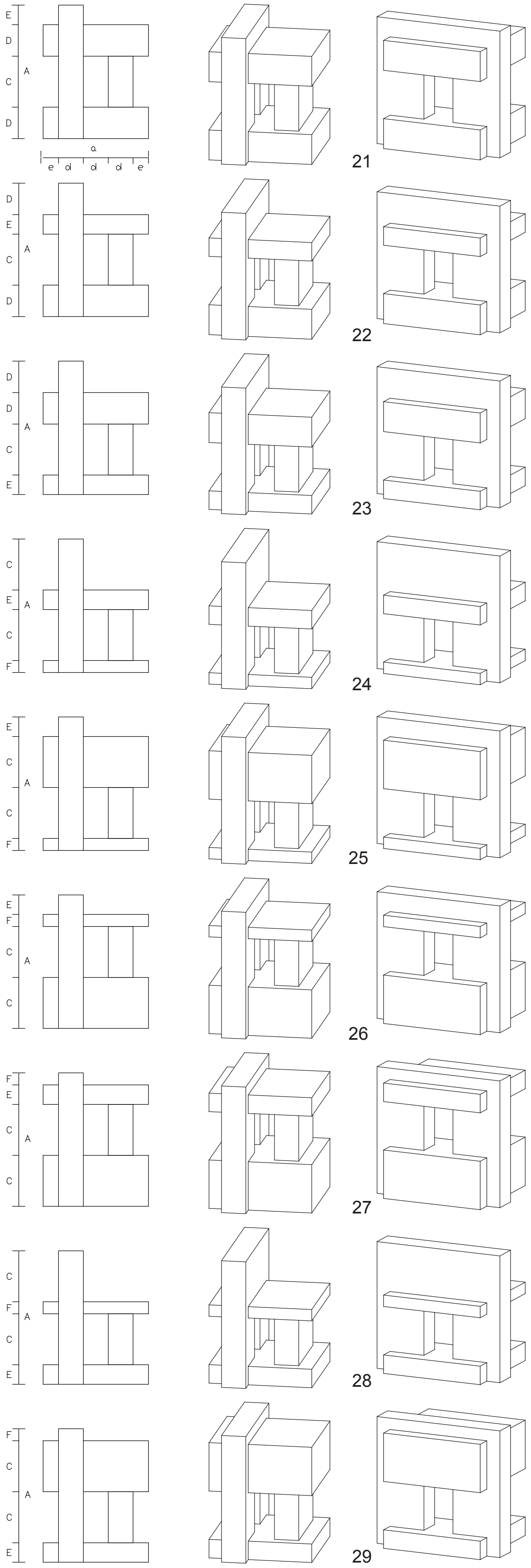
$A/B = B/C = 1.618$

Nine little houses have their facade vertically divided into four proportions adding up to *A*, which relates to *B*, as *B* does to *C*. The proportion *C* remains constant, while *B* is subdivided into three, which combine into:

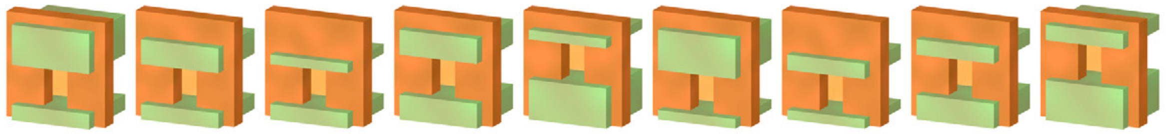
DCDE DCED ECDD
FCEC FCCE CCFE
CCEF ECFC ECCF

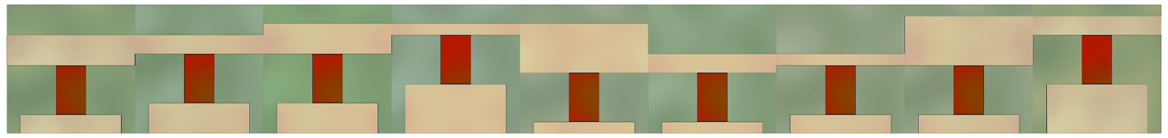
Horizontally the facade is divided into *CDC*, the only symmetry possible. The width of the steps in the reliefs and the square surfaces of the steps and lintels in the 3-D pieces result from dividing *A²* by Φ into *a²*. The sequence *a b c d e* is also the resut of divisions by Φ.

The width of the side view equals *a*, which divides into the sequence: *e d d d e*.



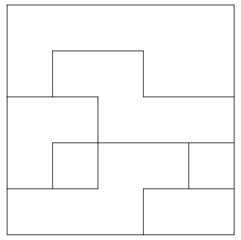
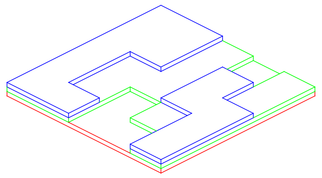
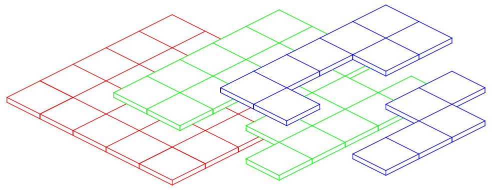
No. 66 / 1985



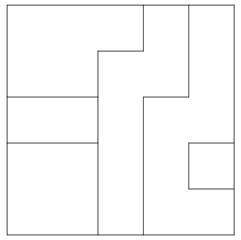
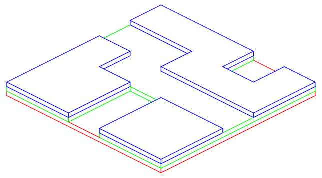
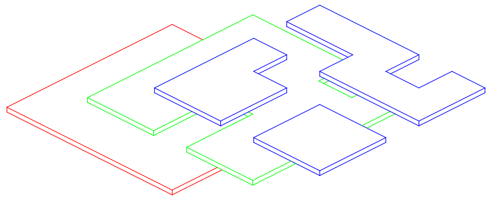


No. 66 / Nine little Houses / 1985

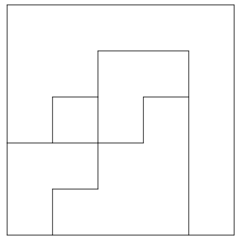
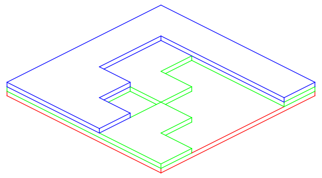
The concept for "Nine little Houses" derived from this view of the Bonampak archaeological site in Chiapas, Mexico. The ratio of the golden section applied within specific parameters allows for nine compositions. The relief represents one possible arrangement of these nine compositions.

Cuernavaca 1

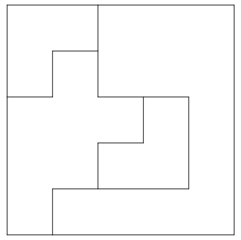
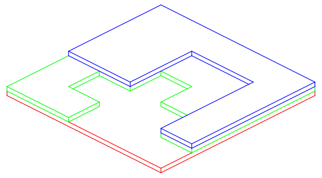




Cuernavaca 2

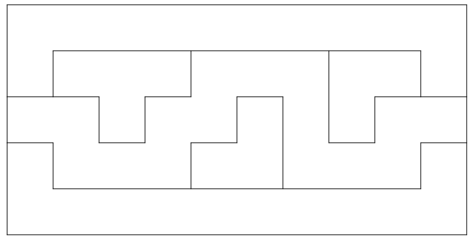
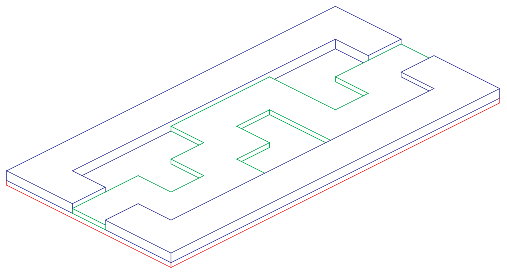



Cuernavaca 3

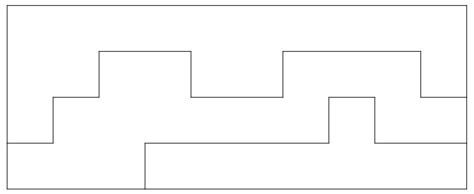
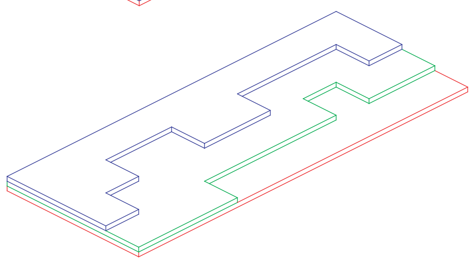
The Cuernavaca reliefs were originally assembled in three layers, using glass squares. Attempts to cast the pieces in Bronze were unsuccessful, and the final reliefs were machined in 1991 out of sheet bronze in Albuquerque, New Mexico. Each layer was patinated separately before assemblage.

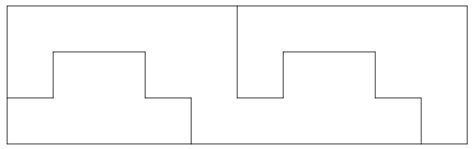
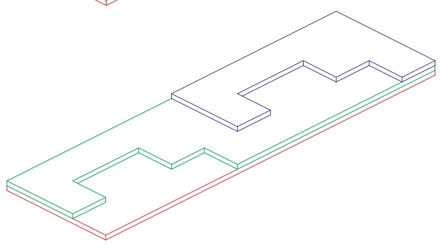
Cuernavaca 4

Serpent 1

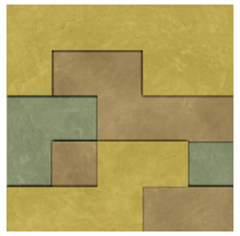
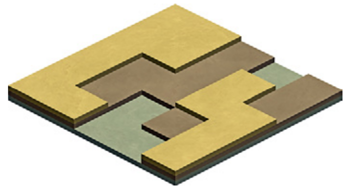



Serpent 2

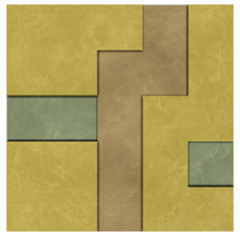
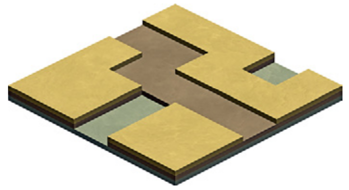
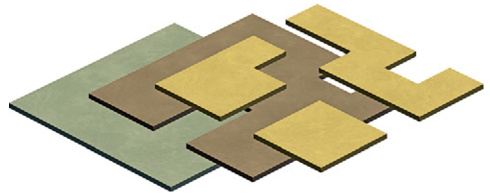



Serpent 3

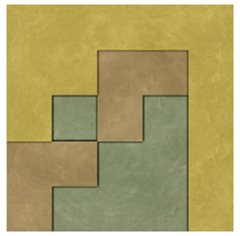
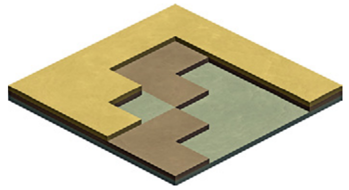
No. 67 / Cuernavaca / Serpent


Cuernavaca 1

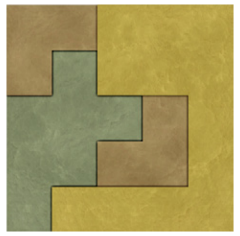
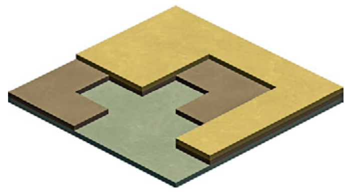




Cuernavaca 2

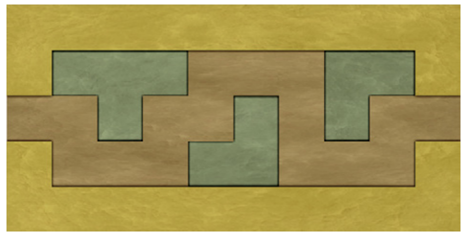
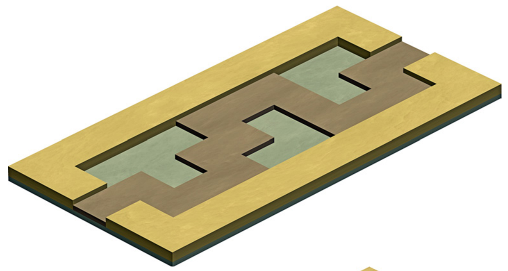



Cuernavaca 3

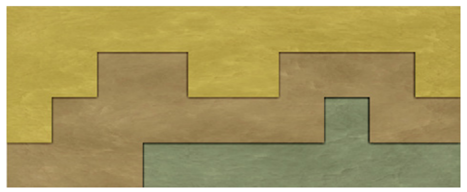
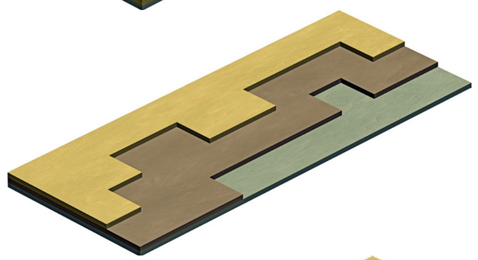
The Cuernavaca, Serpent and Olmec reliefs are arrangements of identical squares on three layers. The work was started in Cuernavaca, Morelos in the summer of 1986 and was completed in Taxco, Guerrero, in the winter of 1989.

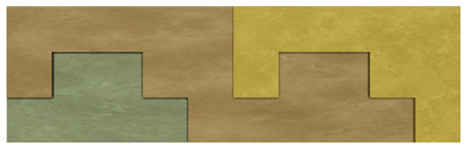
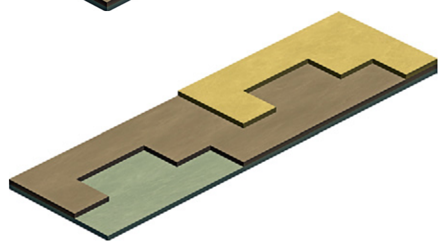
Cuernavaca 4

Serpent 1

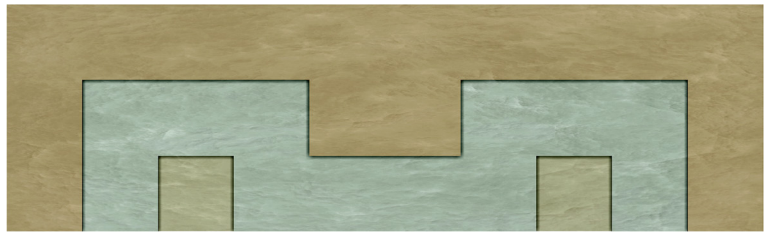



Serpent 2

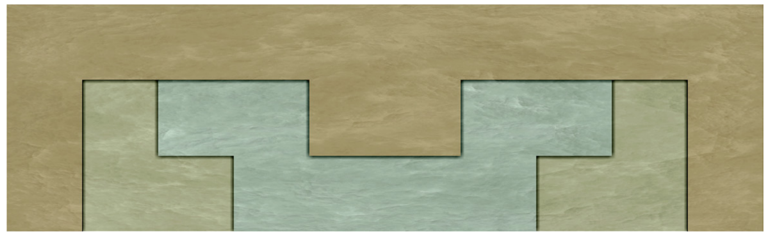



Serpent 3

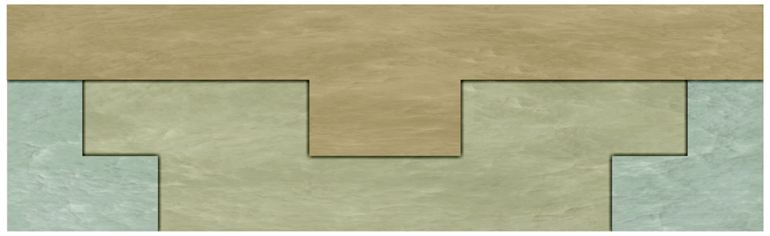
No. 67 / Cuernavaca / Serpent



Olmec 1



Olmec 2



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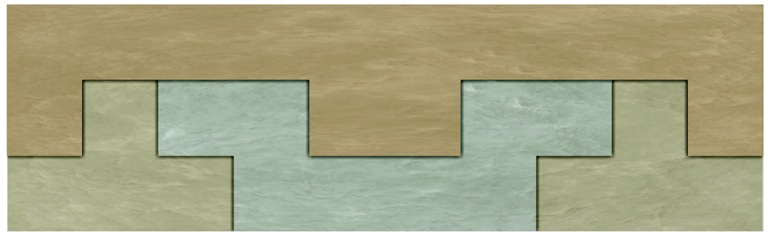

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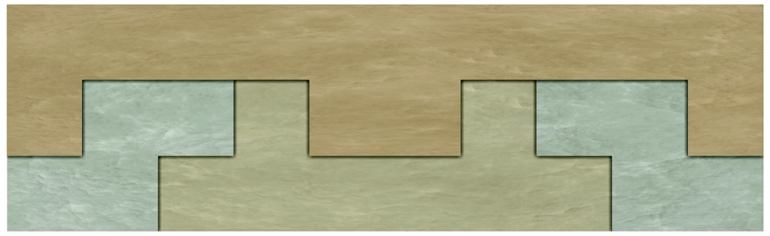
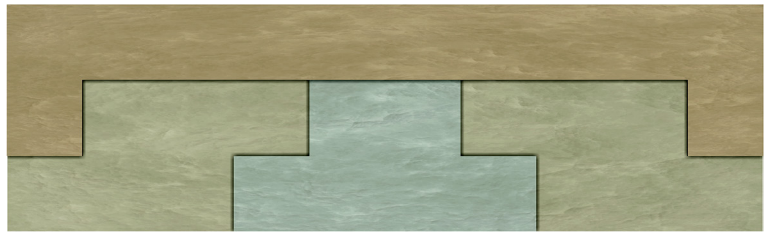
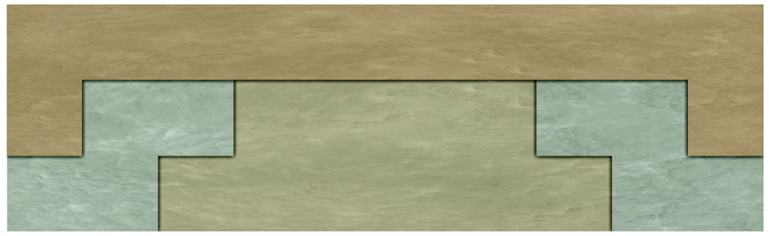


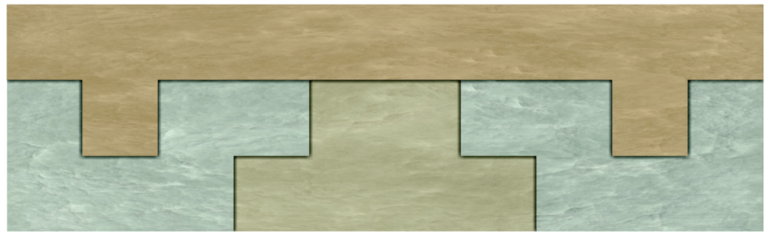
Olmec 5



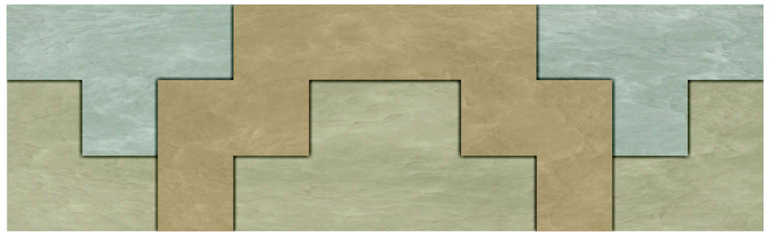
Olmec 6



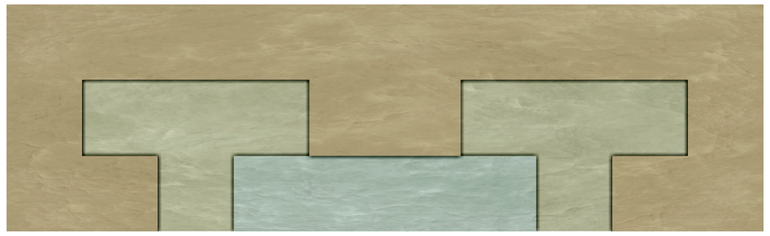
Olmec 7



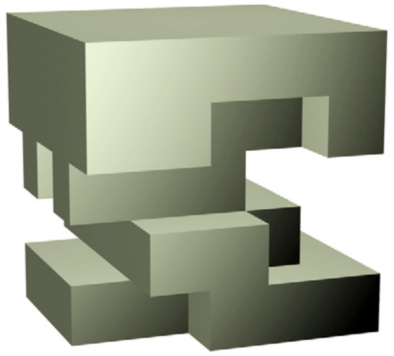
Olmec 8

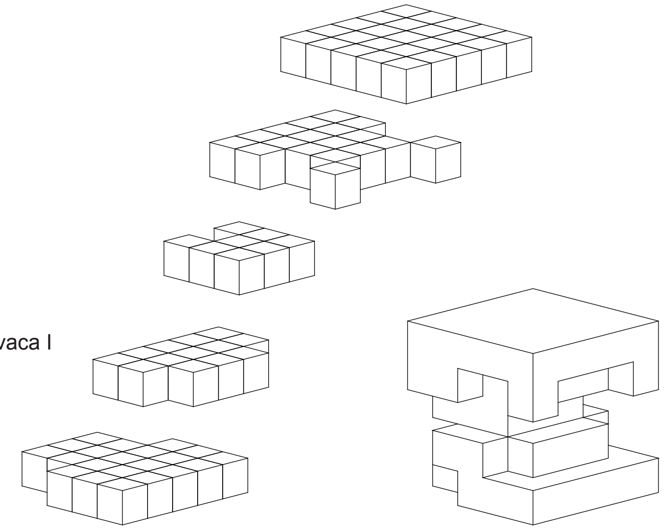


Olmec 9

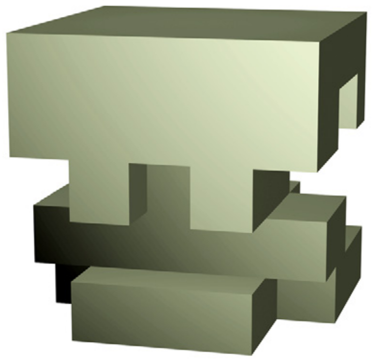


Olmec 10

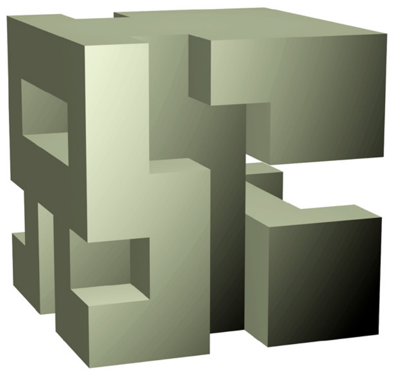




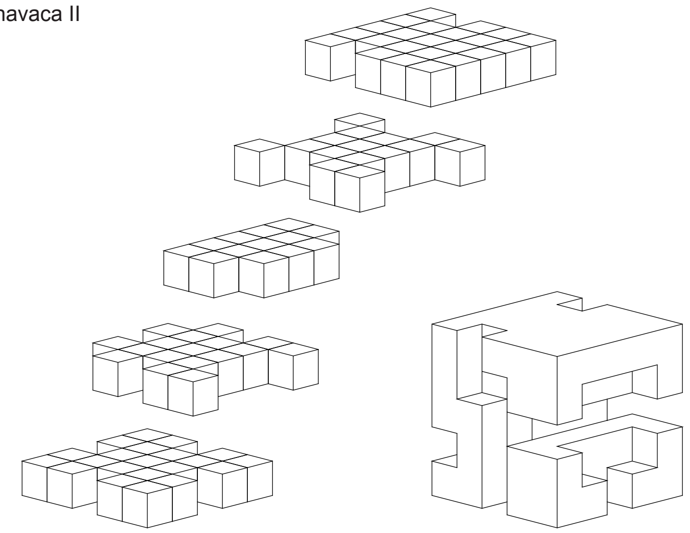
Cuernavaca I

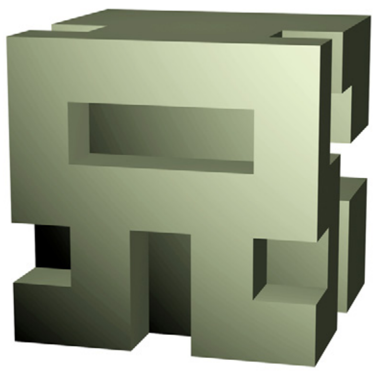


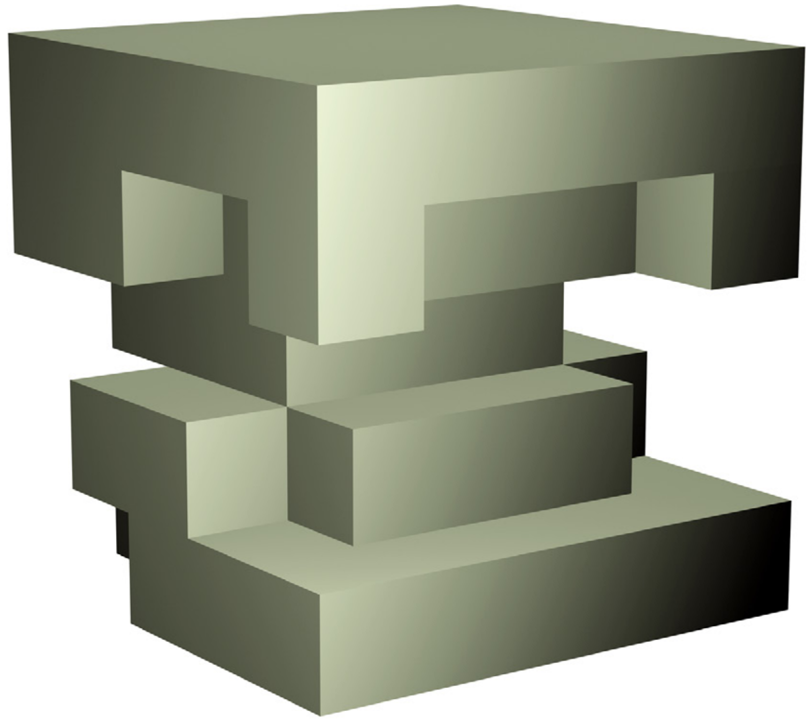
Each temple fits into a cube divided into 125 identical subunits. Five individual layers make up each composition. The two pieces were originally modeled as maquettes in clay and cast in bronze during the summer of 1986, following an invitation from the Cuernavaca Borda Cultural Center, Lourdes Alvarez-Delgado, Director. The final pieces were re-done in plywood and cast in Santa Fe, New Mexico, 1991.



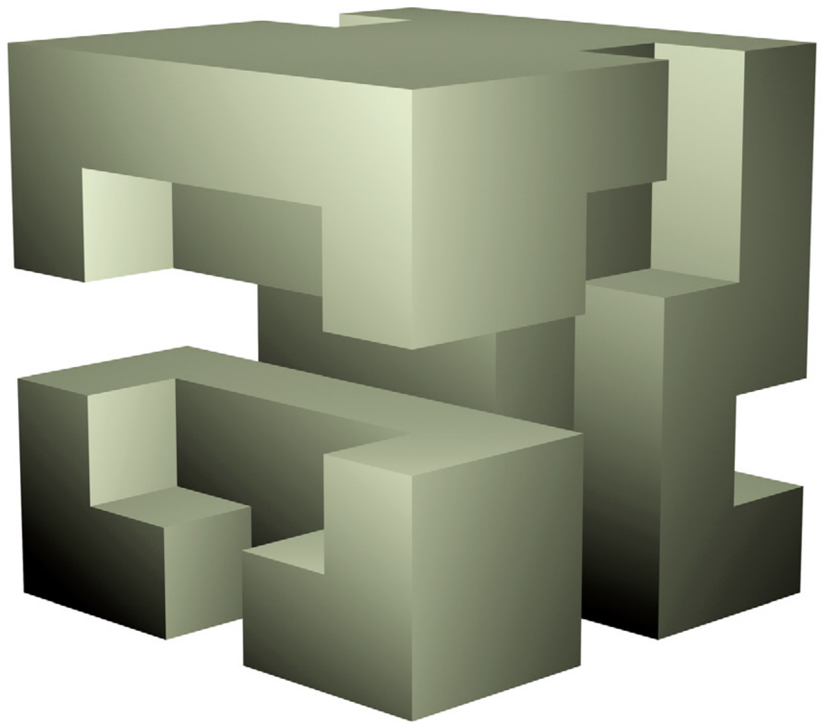
Cuernavaca II





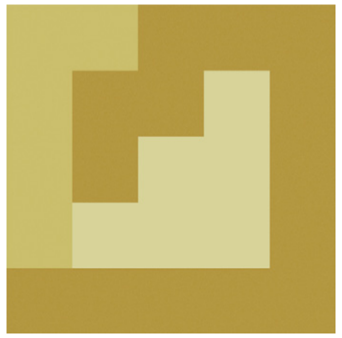


Cuernavaca I



Cuernavaca II

No. 69 / Two Temple / 1986



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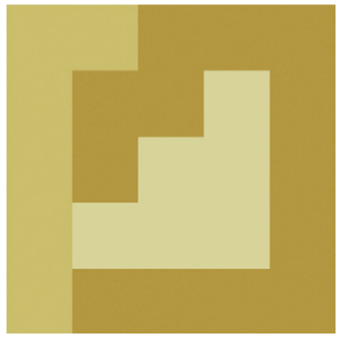

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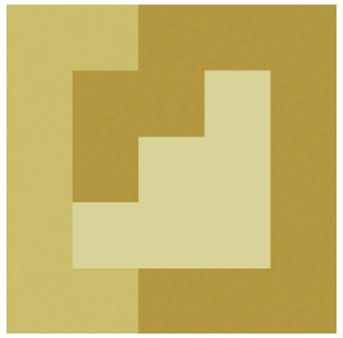
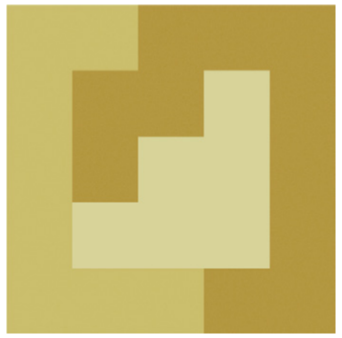


#7

Cuernavaca 5 - 14 continues the series of 1986. Plywood pieces were cut out, sealed with polymer and stained, using thin layers of oils. The work was completed at Rockland Community College, NY, summer of 1988.

#8



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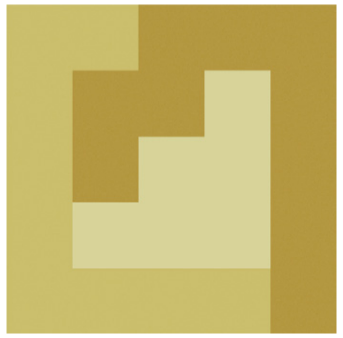

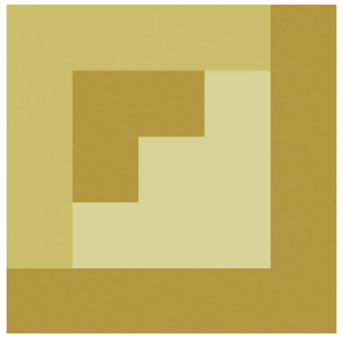

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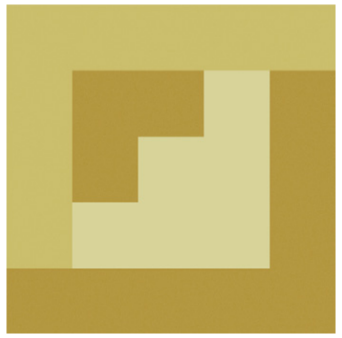

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#12

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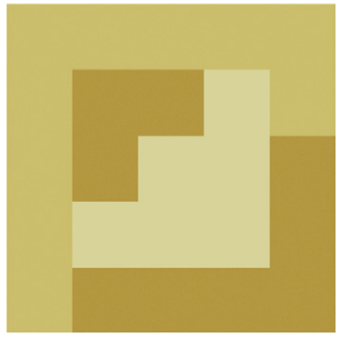

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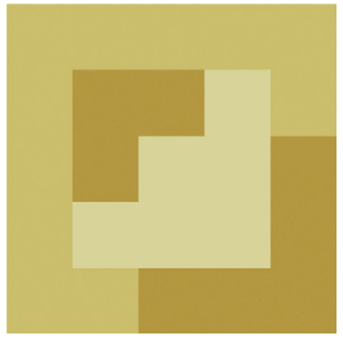
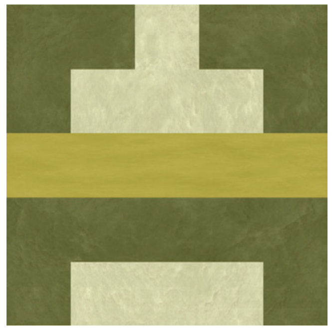


No.70 / Cuernavaca 5 - 14



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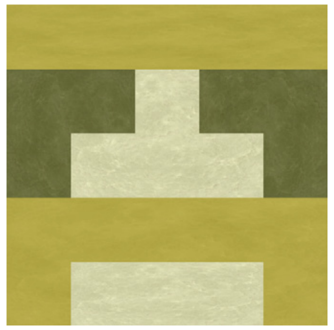

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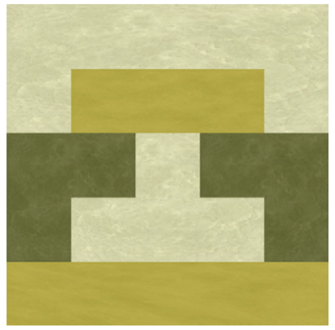

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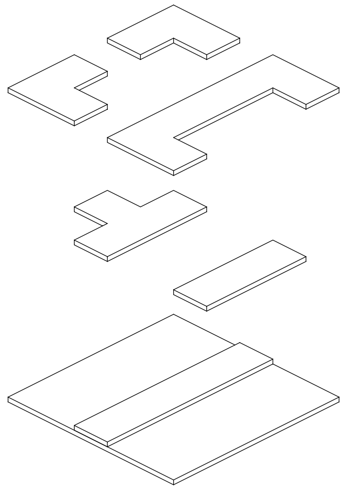

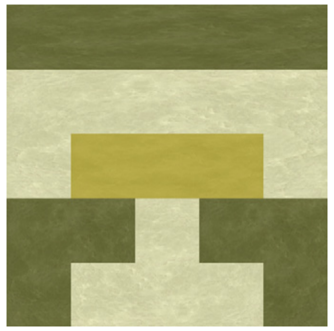

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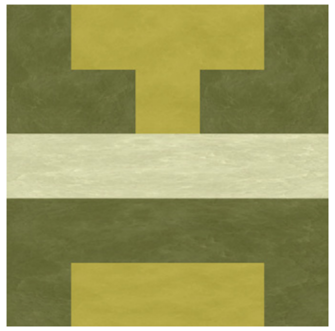
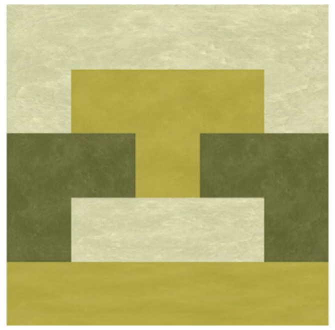


#5

Chichen Itza, Las Monjas 2001



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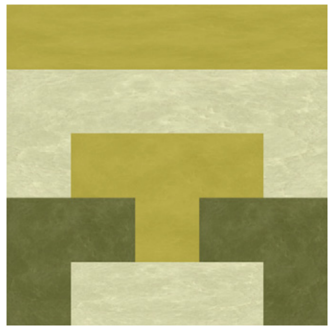

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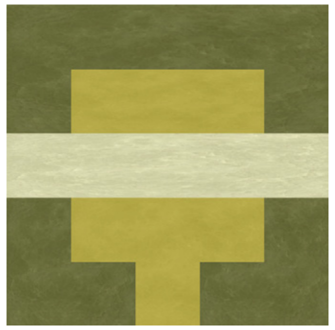
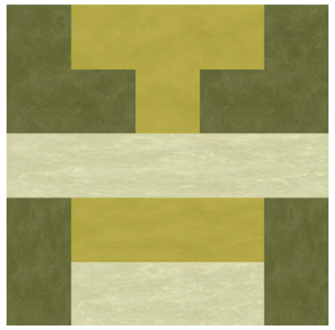


No. 71 / Waiting for M.



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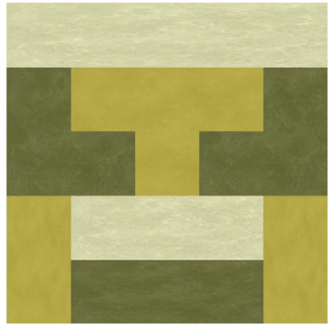

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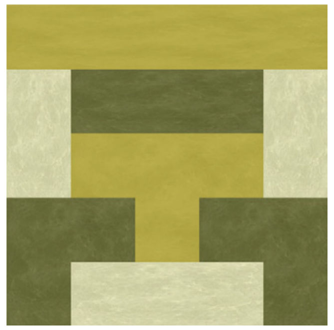

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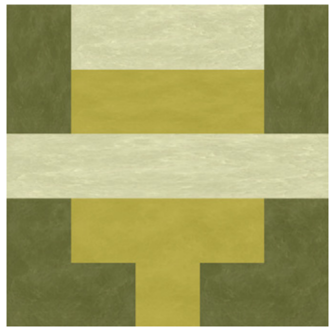

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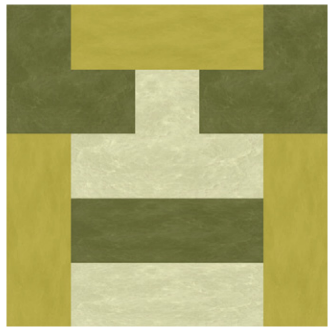

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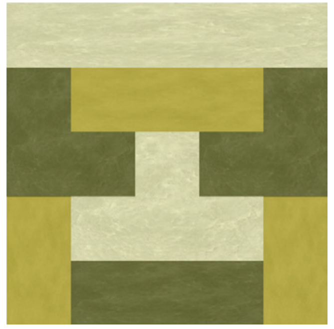

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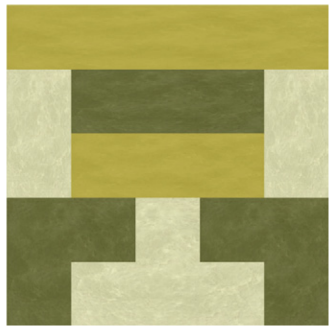

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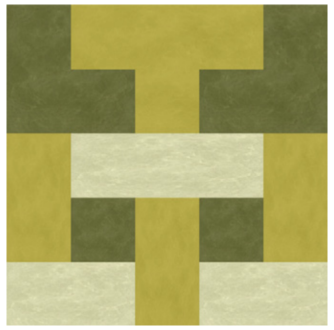

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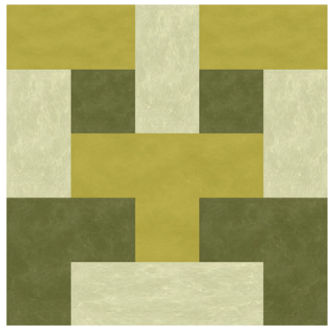
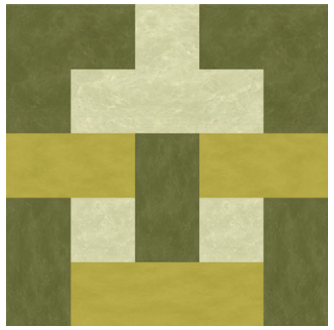


#17

"Waiting for M" was completed at Rockland Community College, Suffern, NY, 1988.

#18



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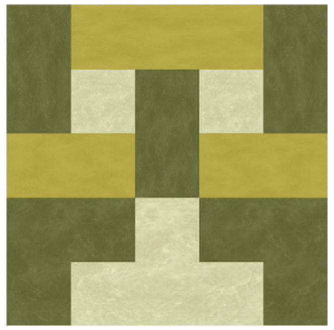
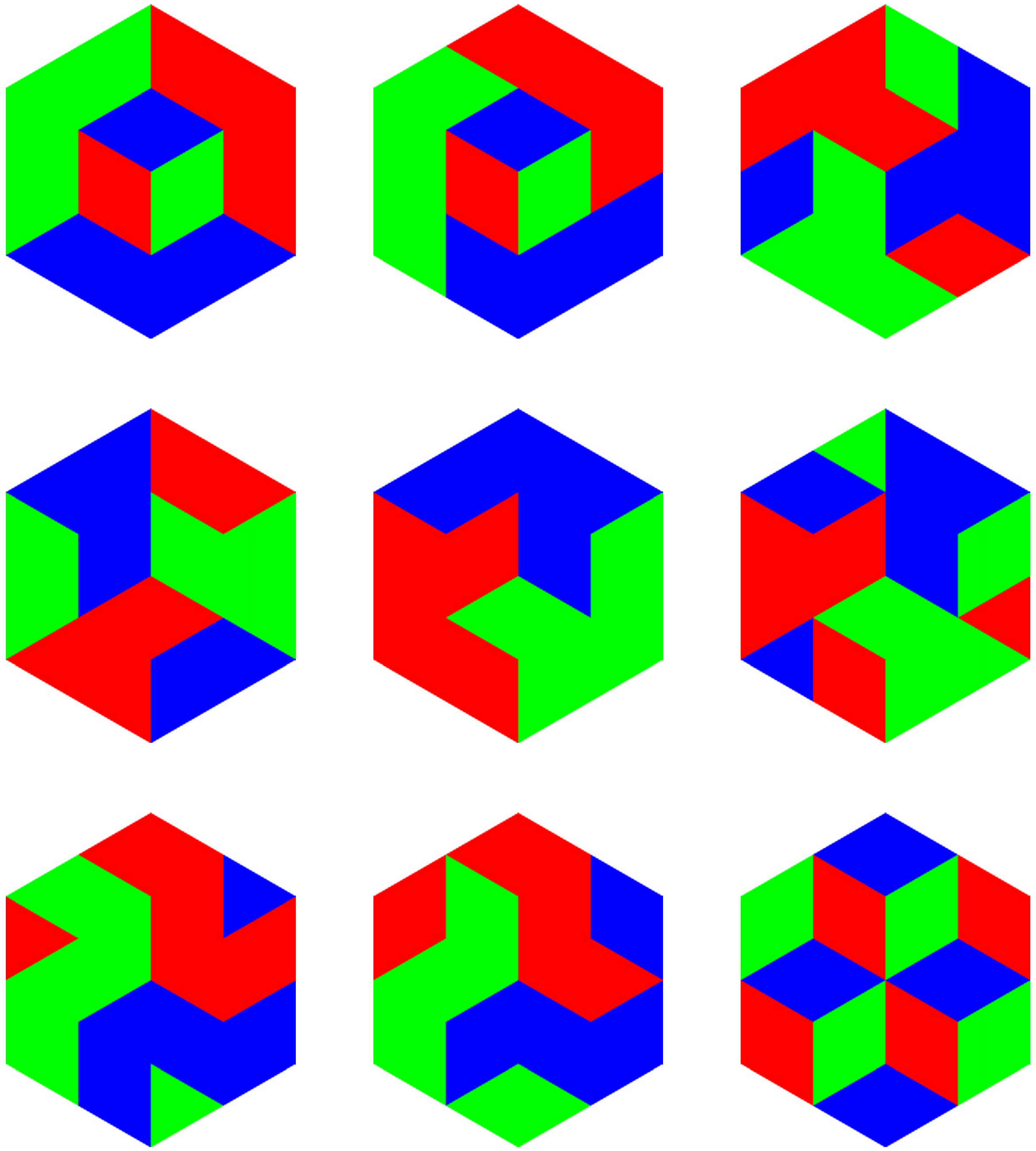
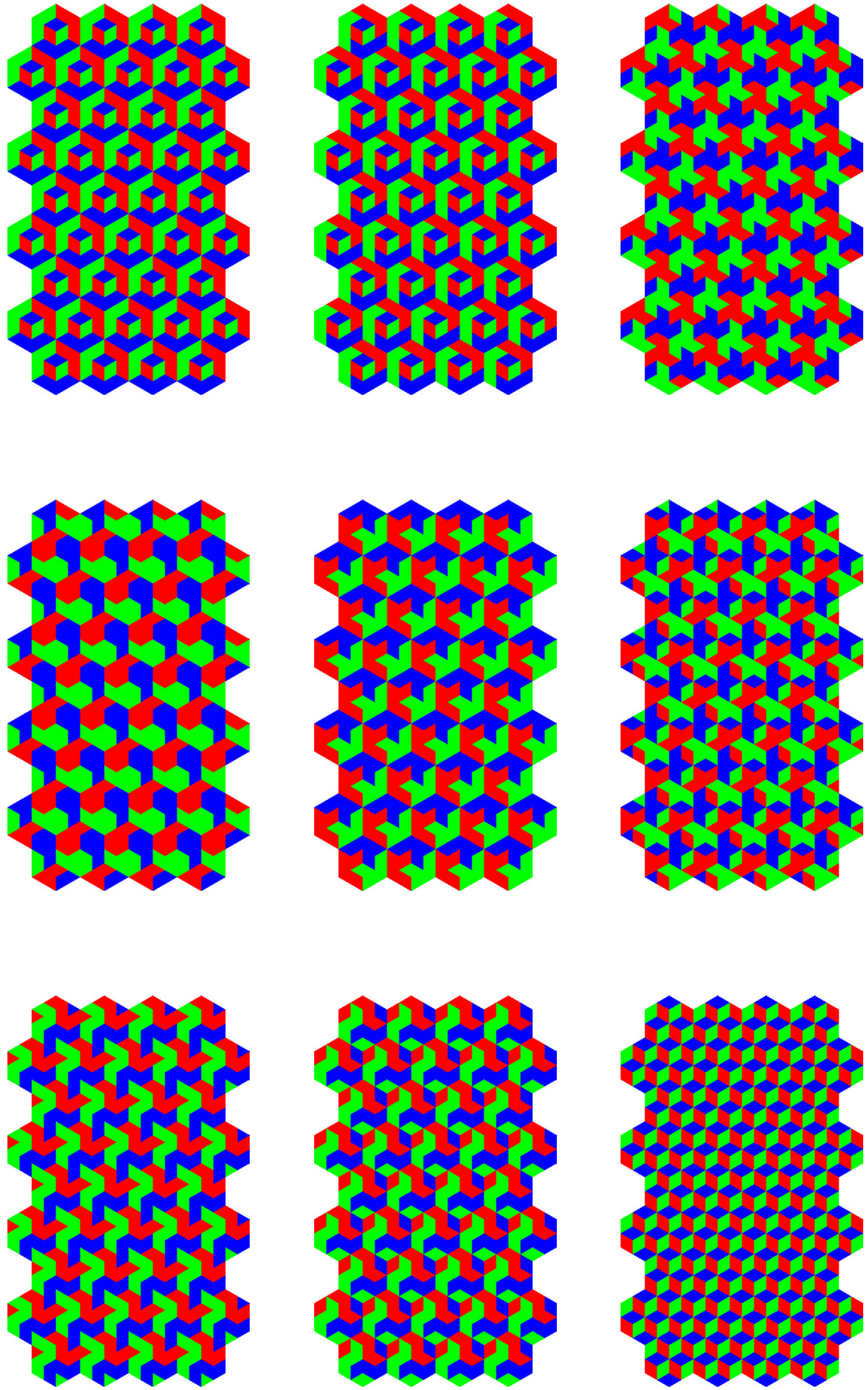


No. 71 / Waiting for M.

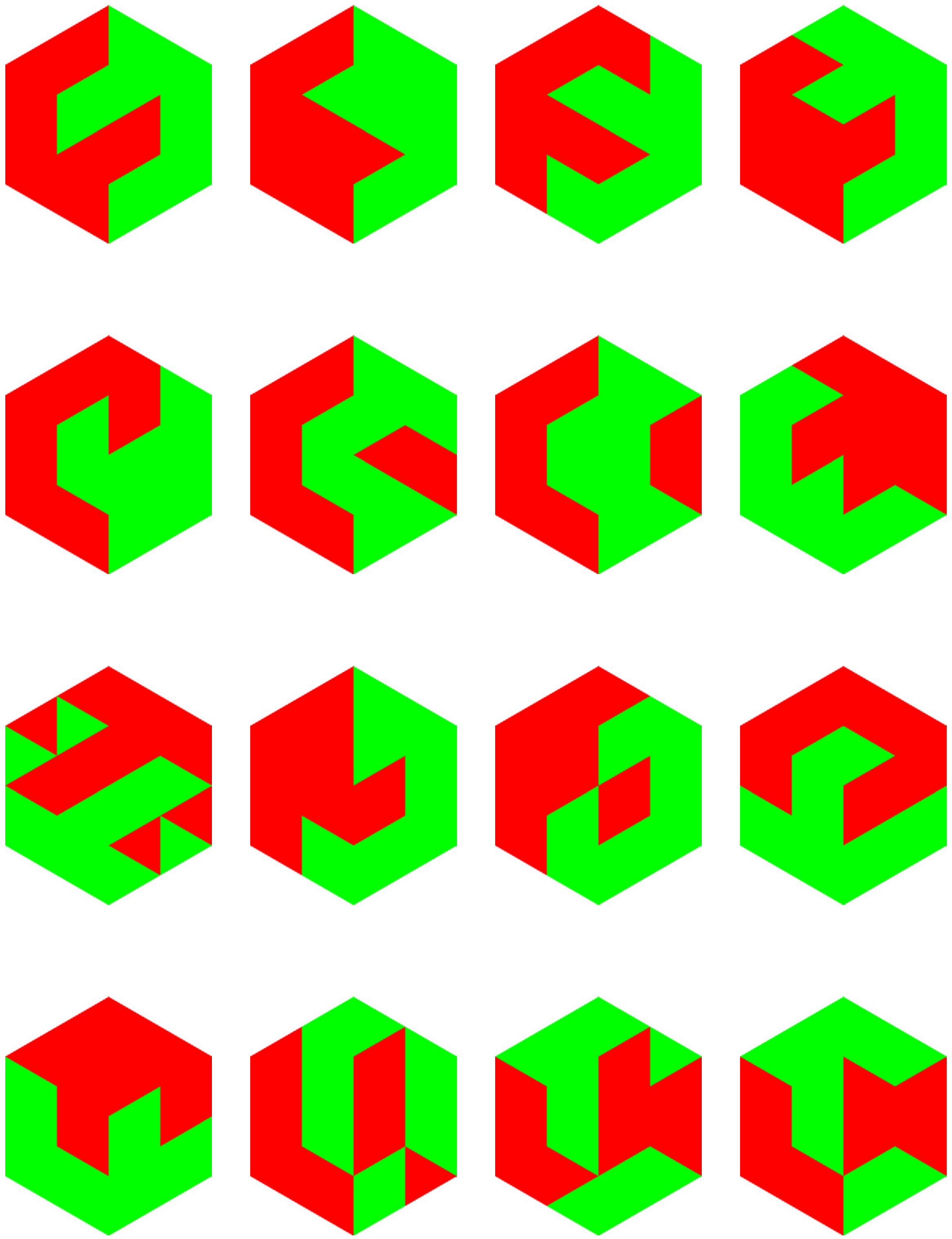
Balamku 2001





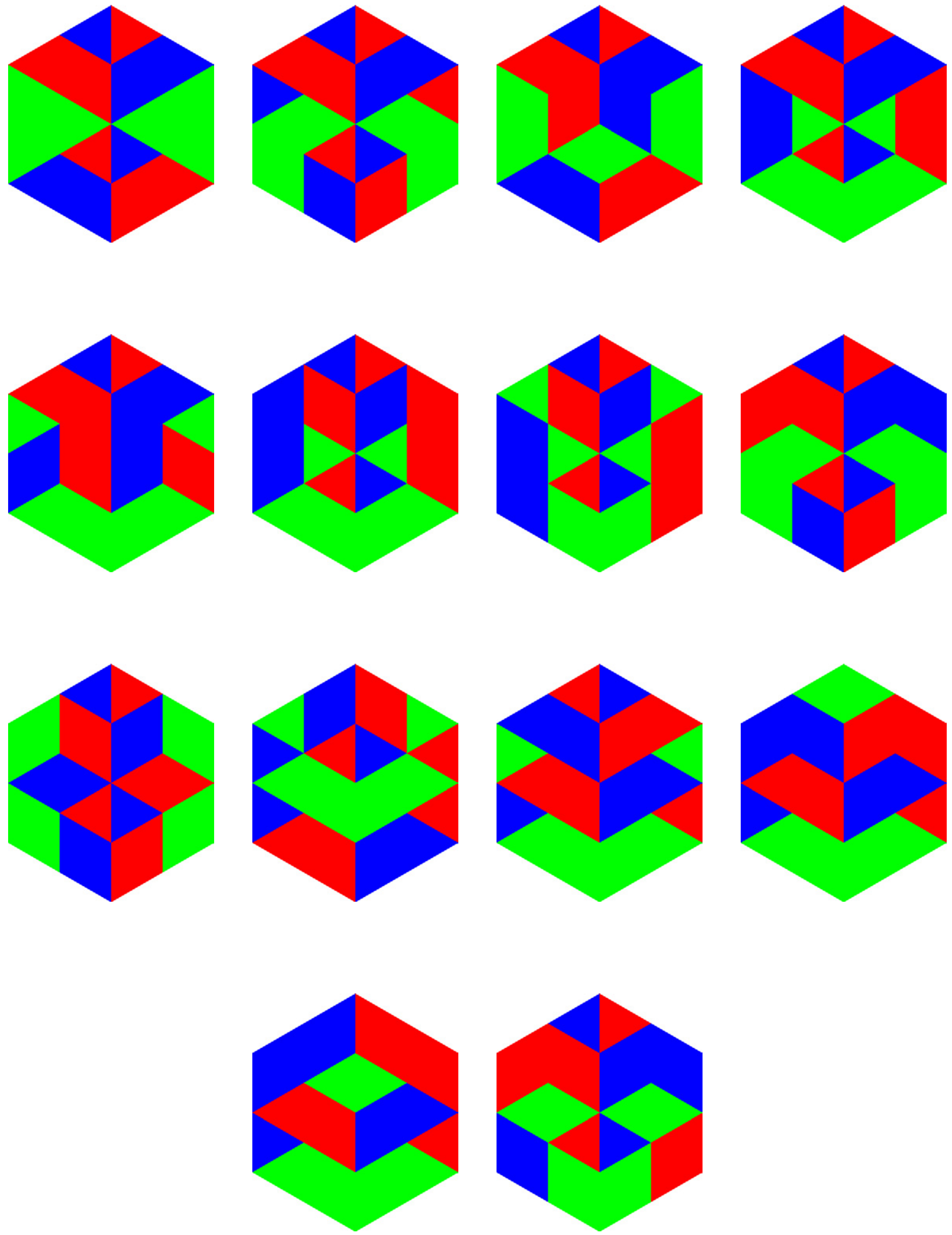
A hexagon divides into three parallelograms, which in turn divide into two equilateral triangles, which each subdivides into four. Each hexagon is used as a fundamental region and applying translation as a symmetry operation results in the nine pattern.

No. 72 / Hex. A1-9 / 1988



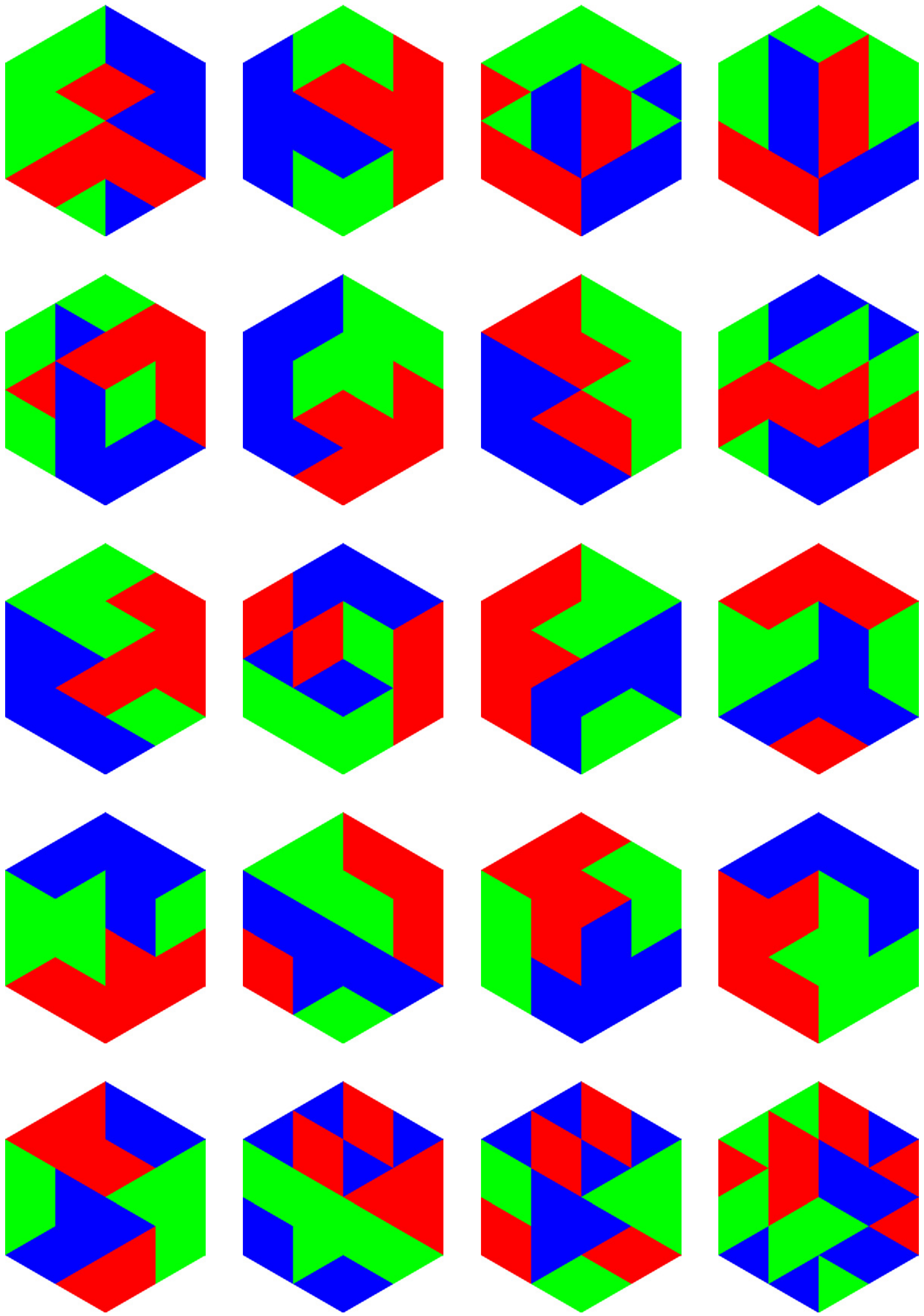
In the B series sixteen hexagons are divided into two equal areas represented in green and red.

No. 72 / Hex. B1-16 / 1988



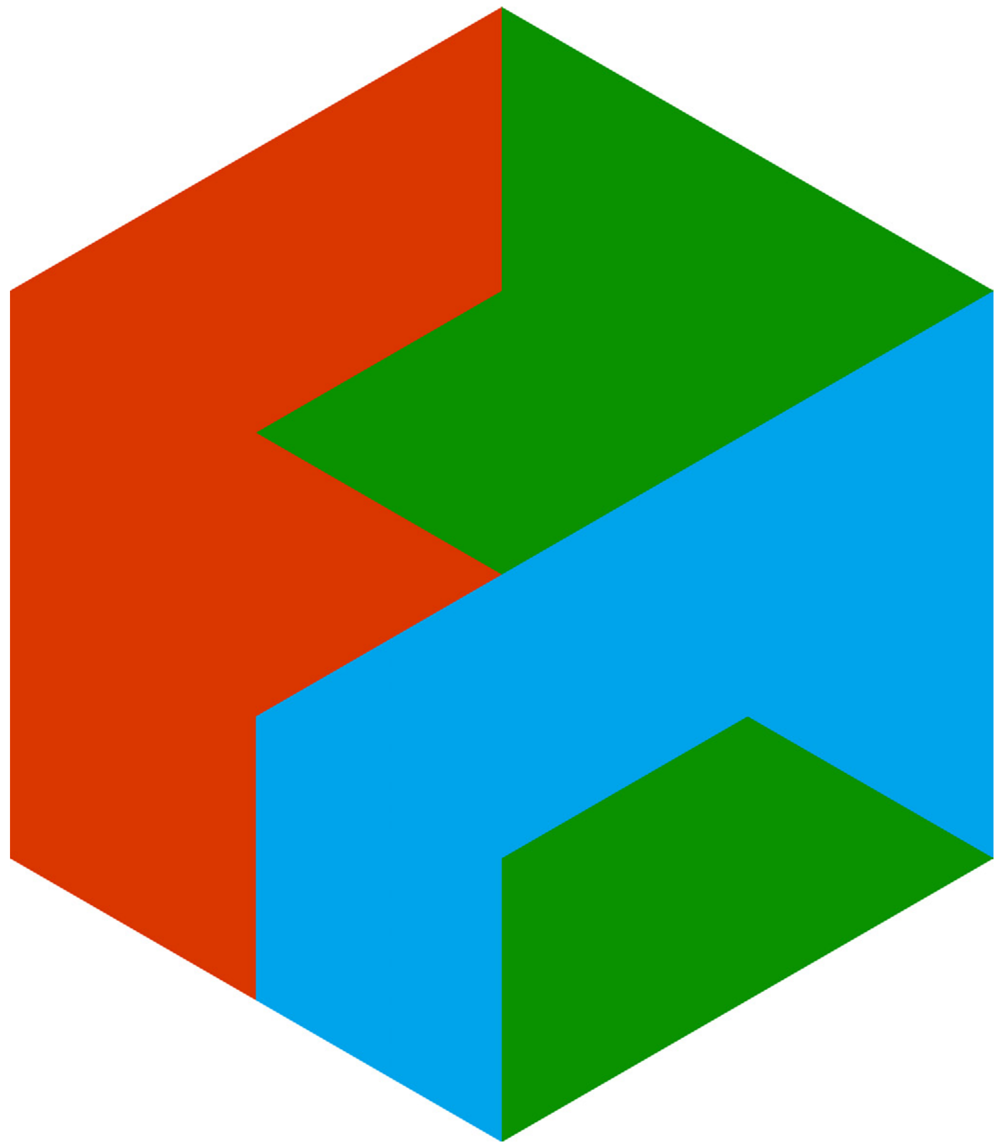
In the C series fourteen hexagons are divided into three equal areas colored blue, green, red.

No. 72 / Hex. C1-14 / 1988

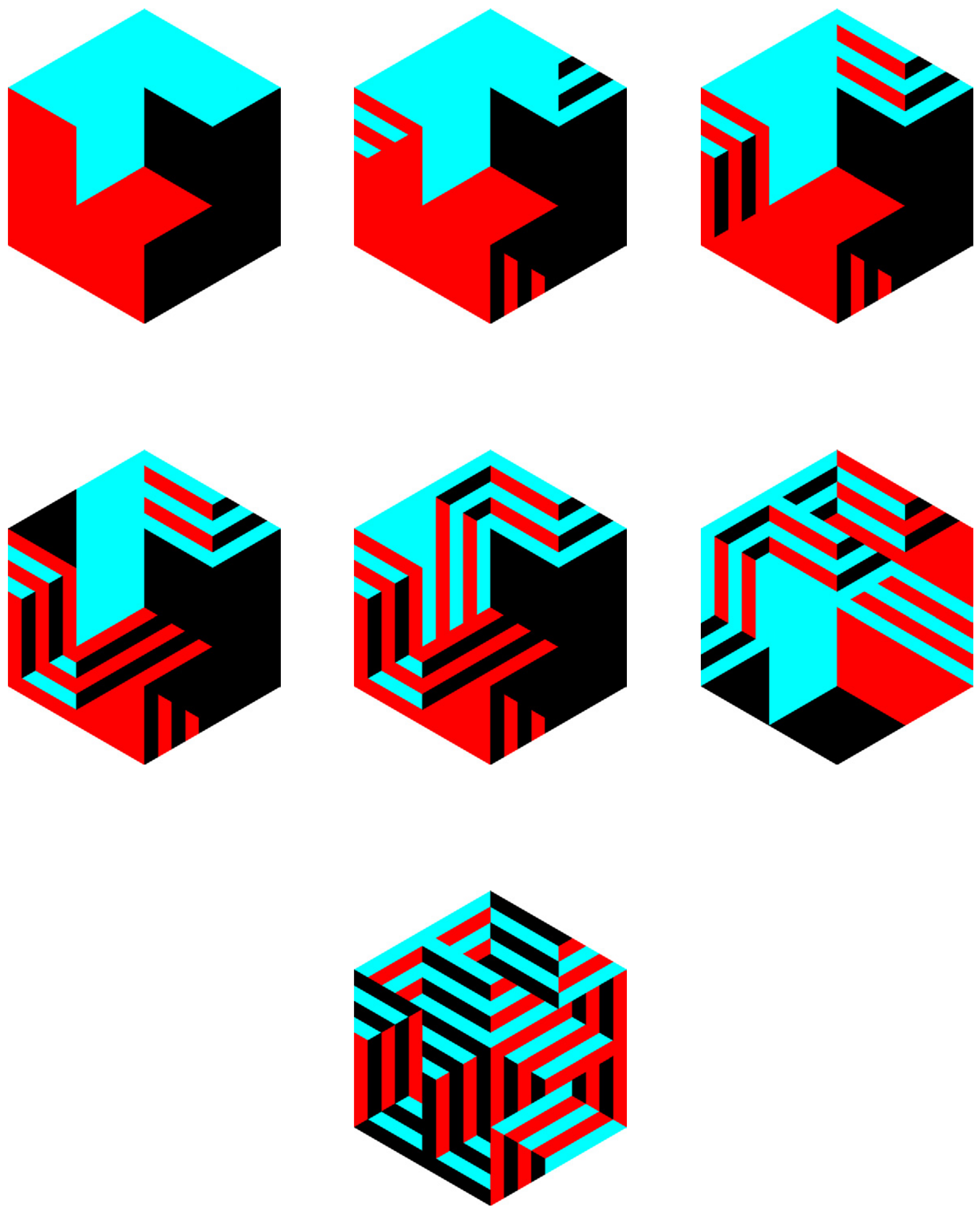


In the D series twenty hexagons are divided into three equal areas colored blue, green and red.

No. 72 / Hex. D1-20 / 1988



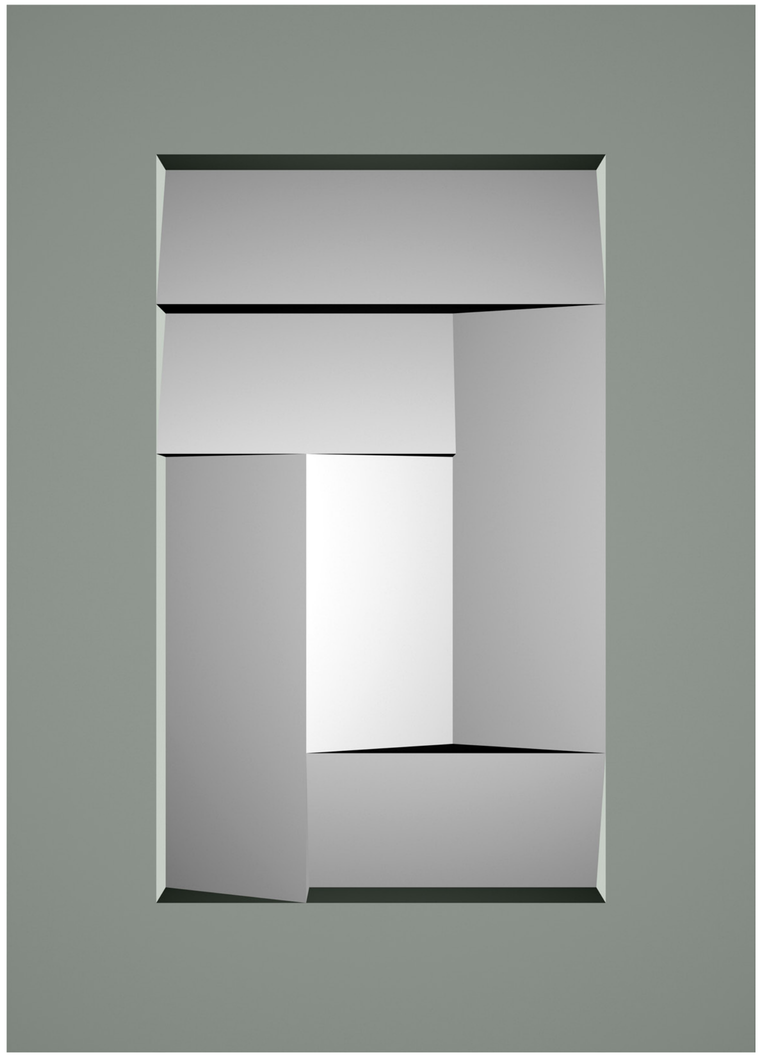
No. 72 / Hex. D11 / 1988



The E series follows the pre-Columbian concept of double pyramids and multiple platforms.

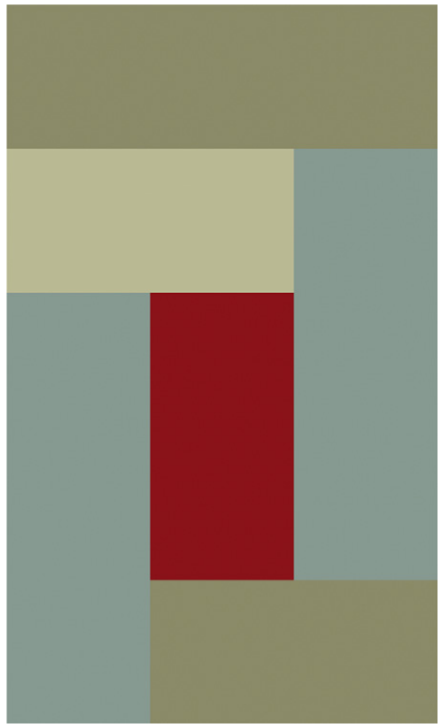
No. 72 / Hex. E1-7 / 1988

No. 72 / Hex. E6 / 1988

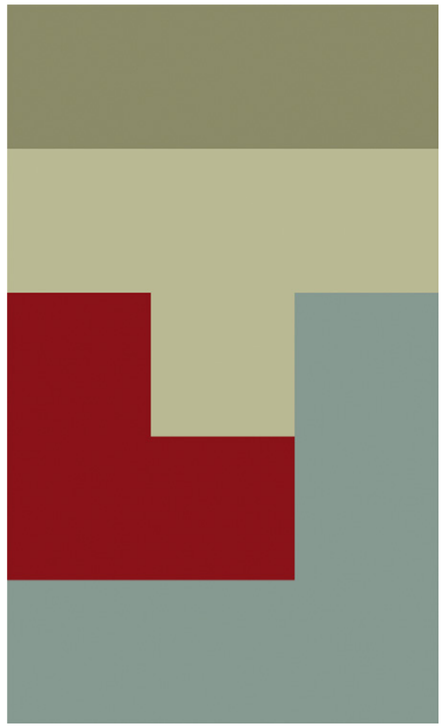


Wooden cubes were cut diagonally into wedges and arranged in this piece into lengths of two and three units. The frame retains the character of blocks. In the final relief the individual elements were milled out of aluminum stock.

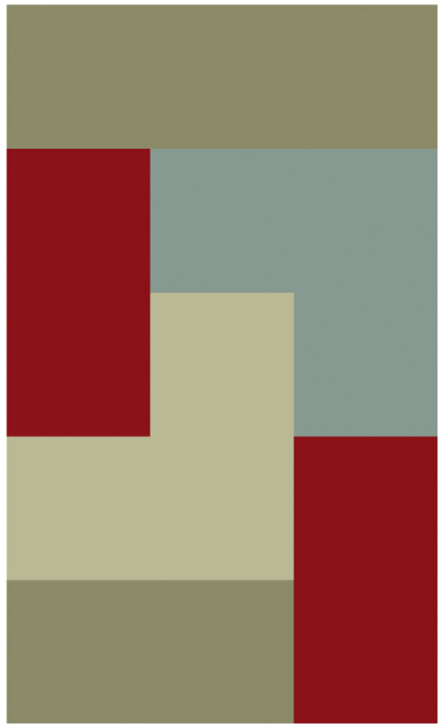
No. 73 / Taxco / relief 1 / 1989 - 1991



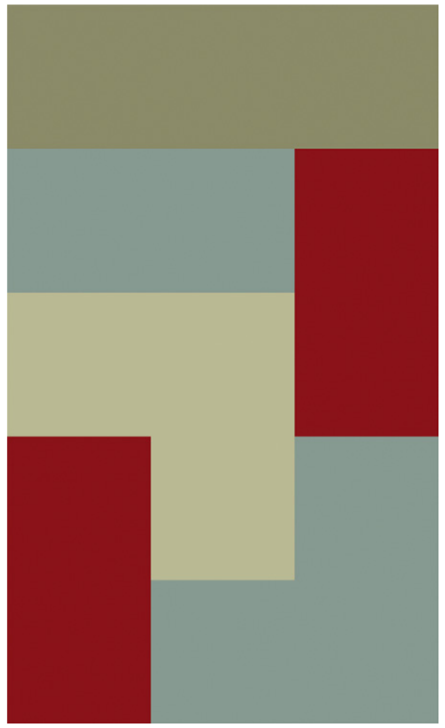
Taxco Mosaic 1



Taxco Mosaic 2



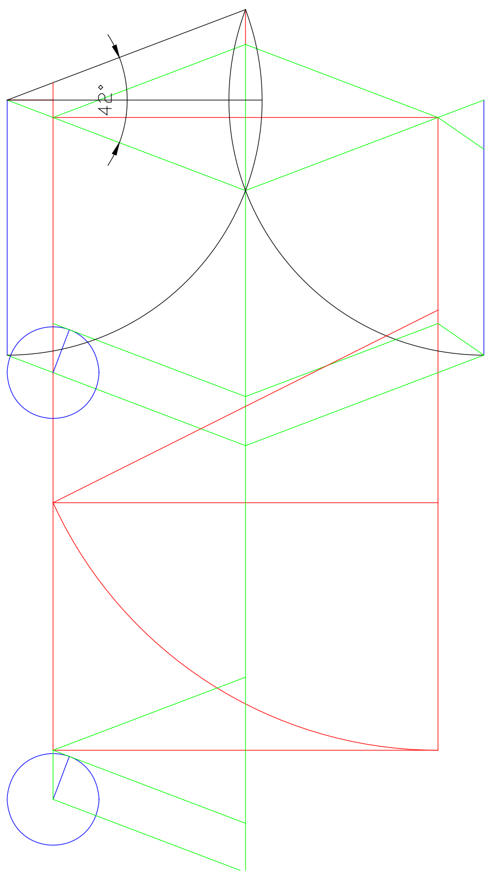
Taxco Mosaic 3



Taxco Mosaic 4

No. 74 / Taxco / mosaics 1 - 4 / 1991

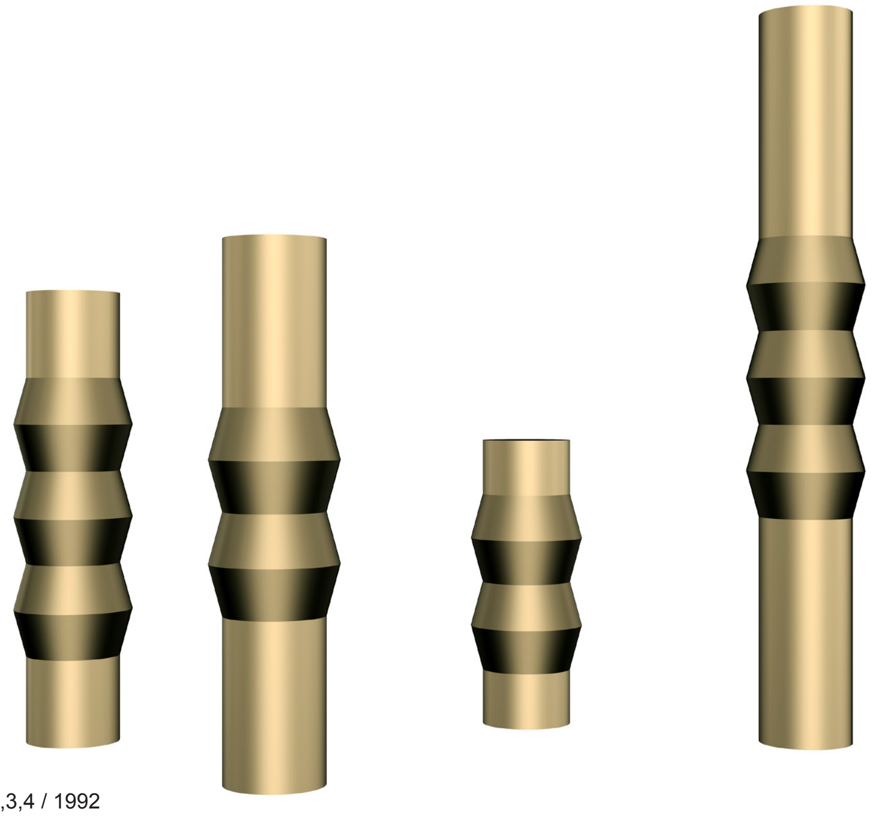
A series of photographs by Dawn Carr of wooden leftovers served as reference.



No. 75 / Column 1 / 1992

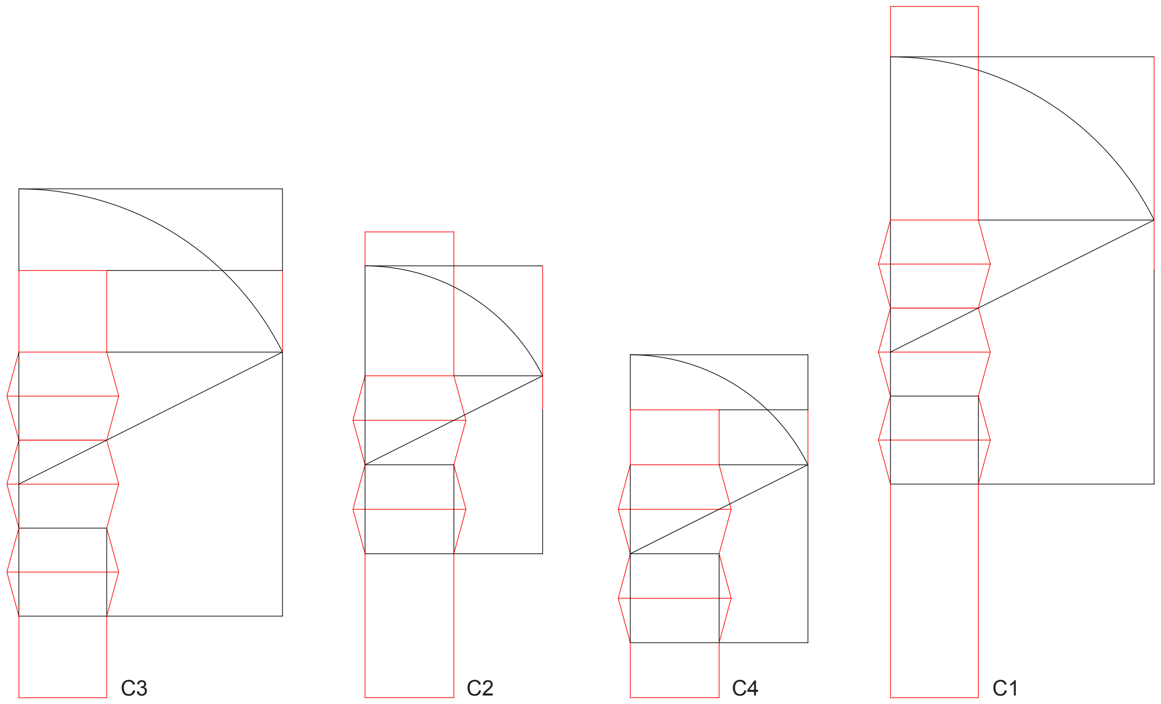
No. 74 / Column 2 / 1992

No. 75 / Column 3 / 1992

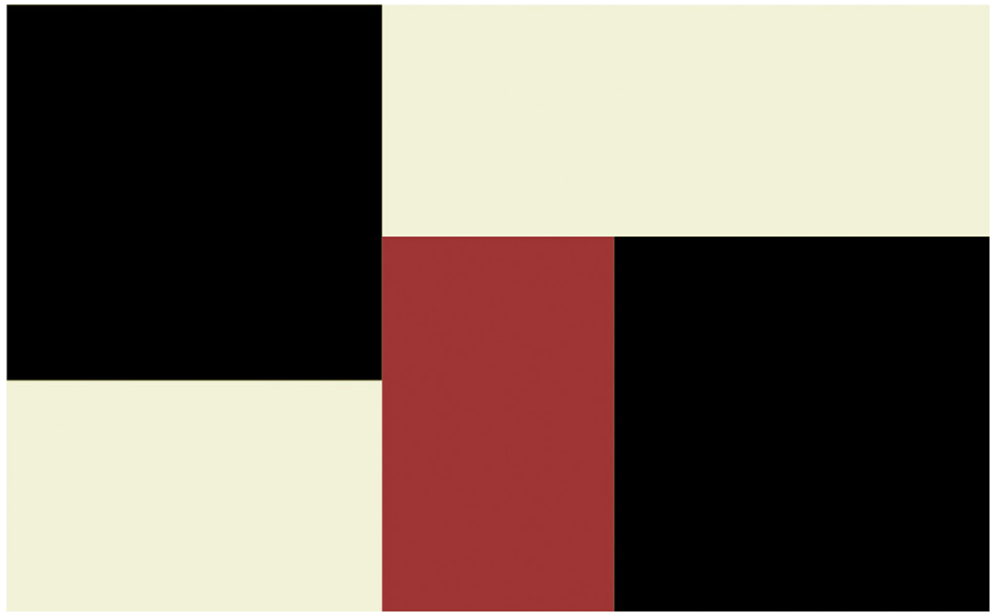


No. 76 / C1,2,3,4 / 1992

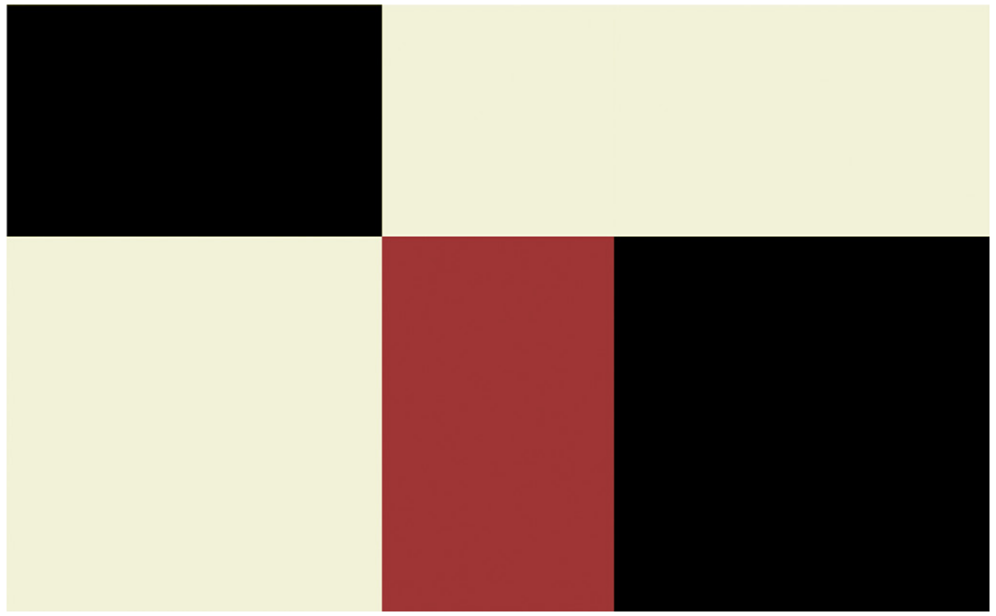
The smaller radius of a cone section equals its height. The area over this radius times Φ is the area over the larger radius. The height of the combined cone sections is taken as one side of a square. For C1 and C2 the long side of the golden rectangle constructed over theses squares becomes the combined height for the respective two cylinders, for C3 and C4 it is the short side.



No. 76 / C2 / 1992

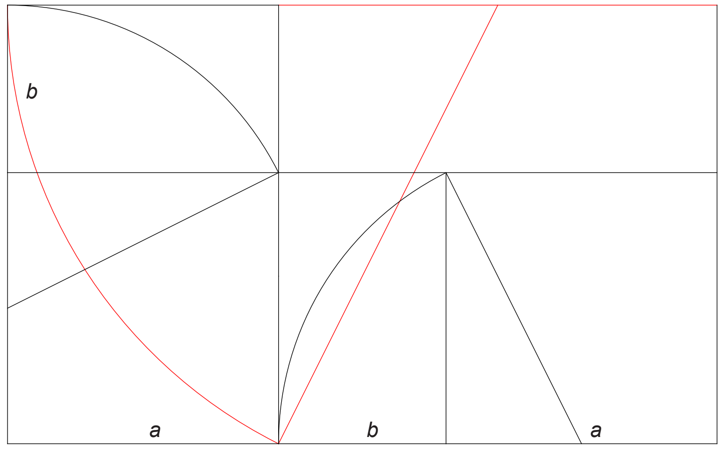


Facade 1

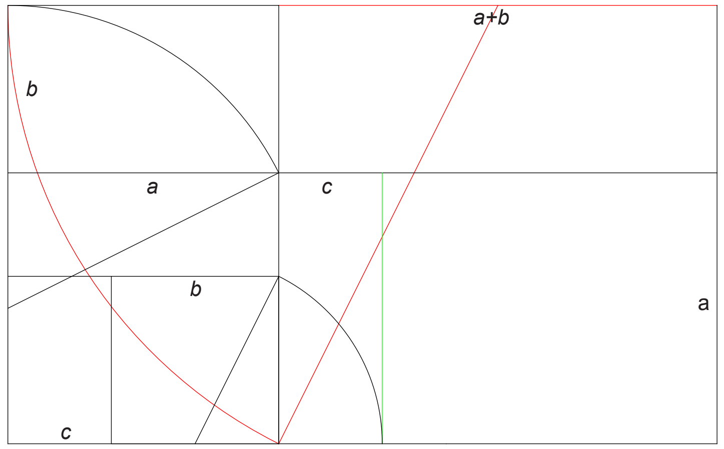


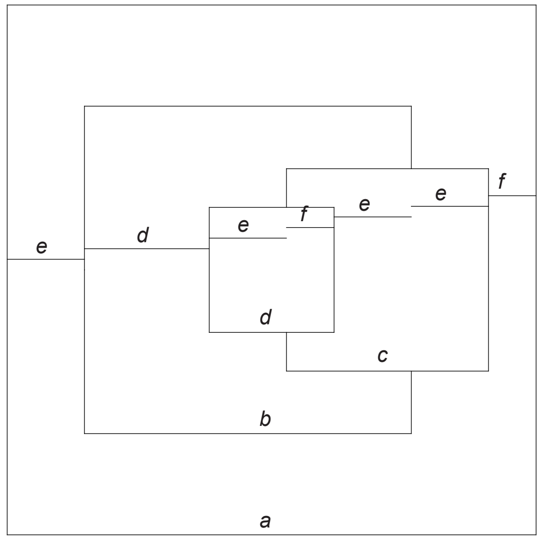
Facade 3

Facade 2



Facade 4

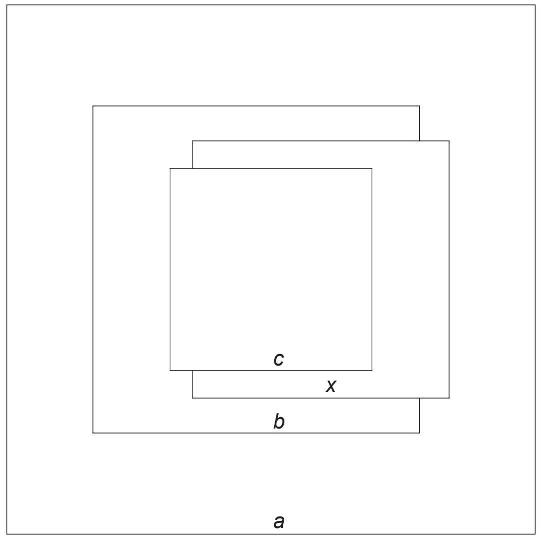




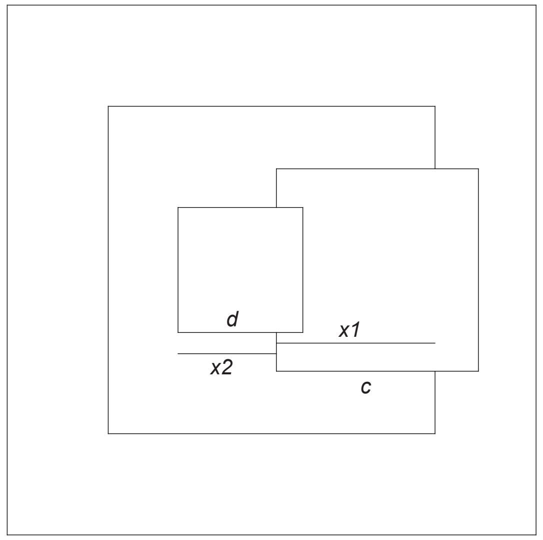
Four Squares 1

Dimensions and positions of the squares are controlled by Φ, in that *a* relates to *b* as *b* to *c* and *c* to *d* etc.

Four Squares 2



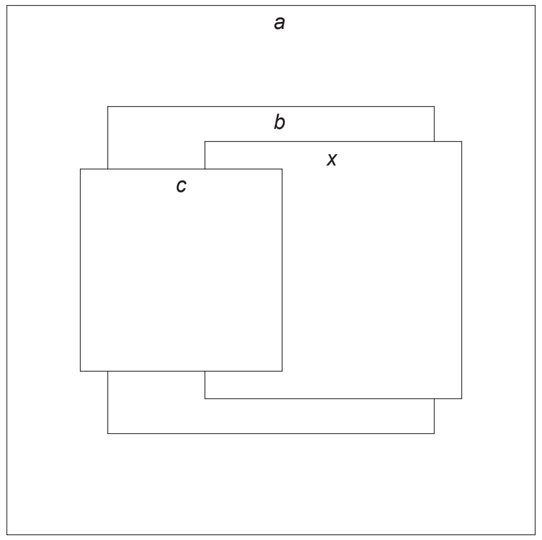
b^2 divided by Φ results in x^2. The width *bx* is centered in square *a*, as is square *c*.



Four Squares 3

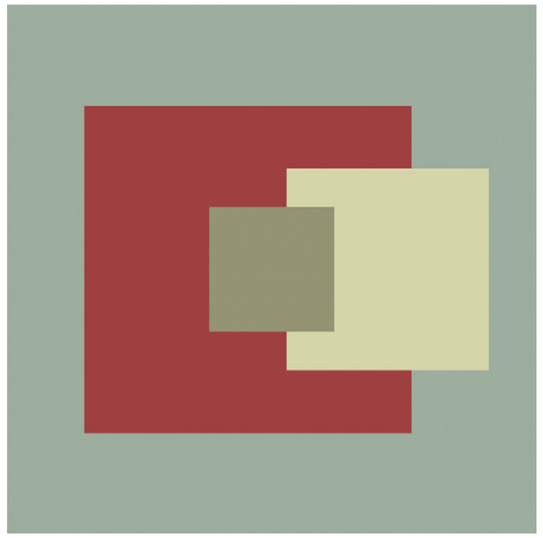
(x1+x2) relates to *x1* as *x1* does to *x2*. c^2 divided by Φ leads to $(x1)^2$ etc. The position of *x1 and x2 is* determined as shown.

Four Squares 4



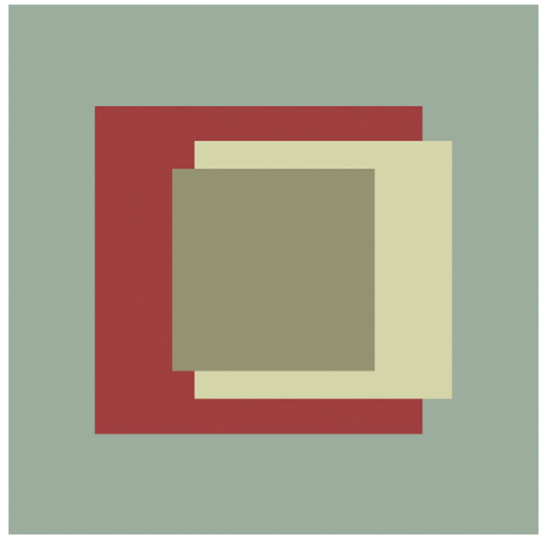
Square *x* intersects *c* by the ratio of Φ. The width *cx* is centered in square *a* as is *b*.

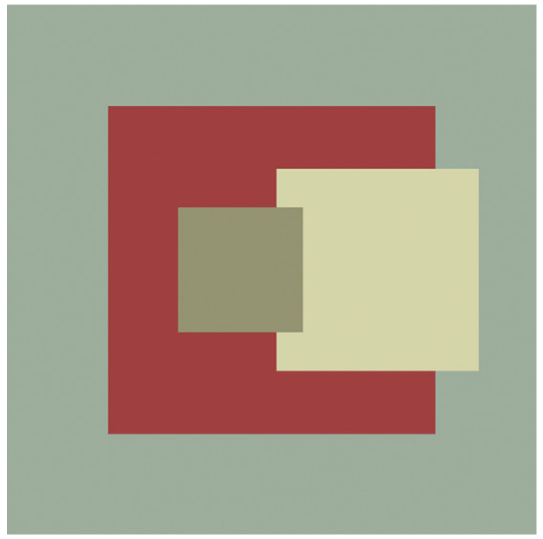
No. 78 / 1-4 / 1992



Four Squares 1

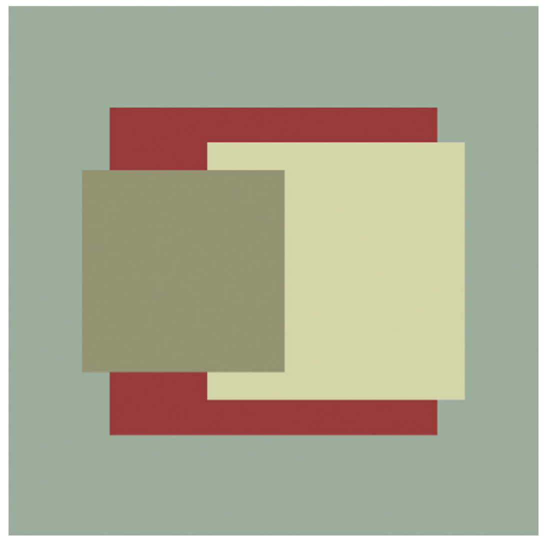
Four Squares 2



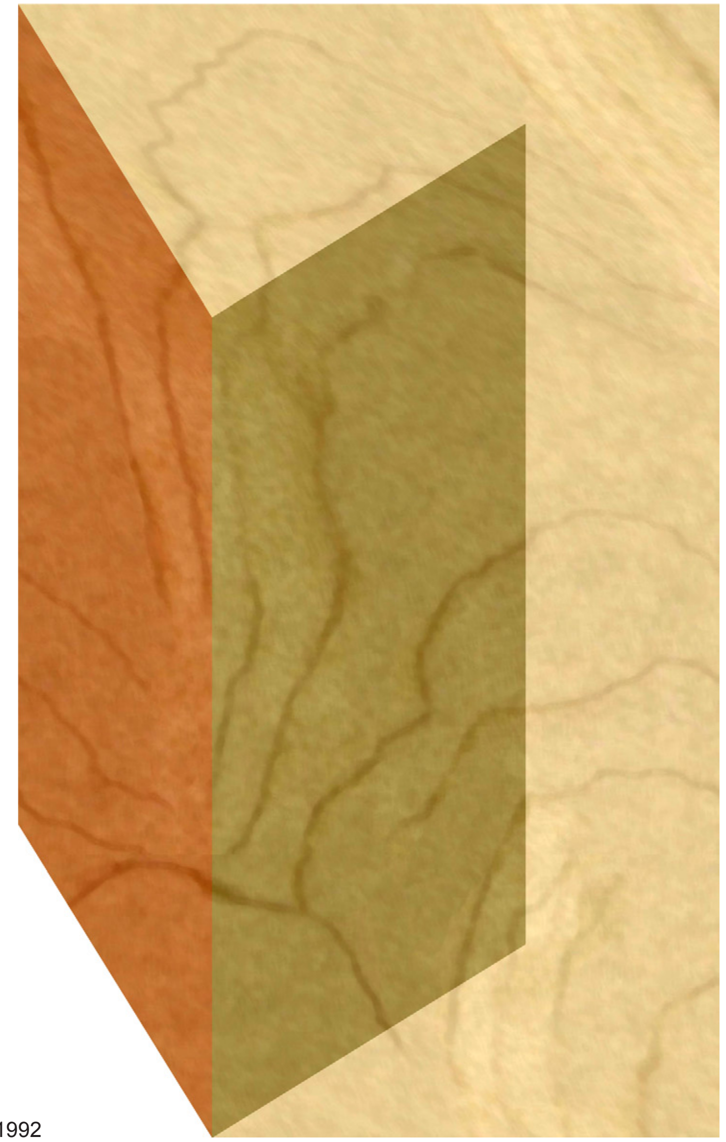


Four Squares 3

Four Squares 4

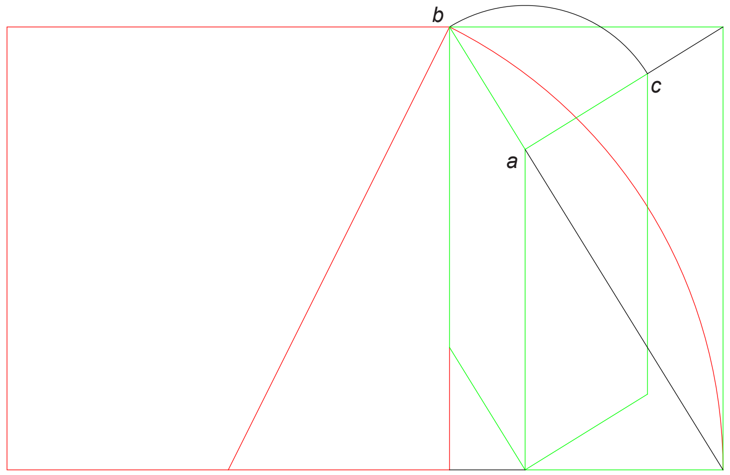


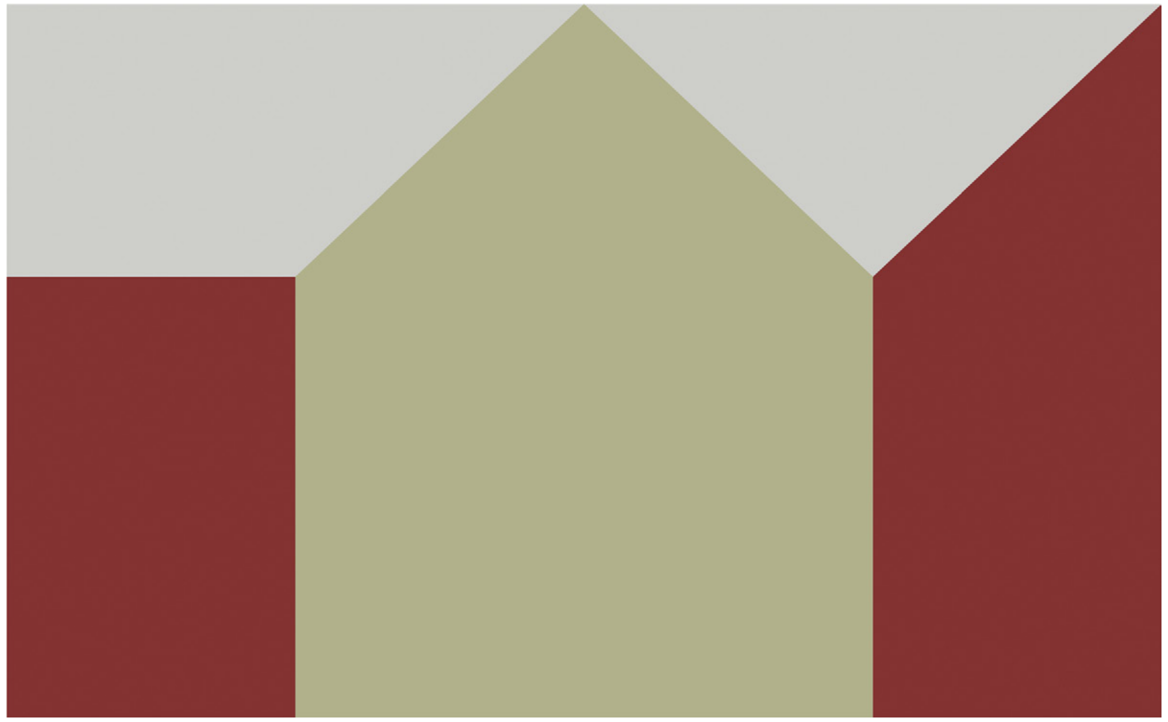
No. 78 / 1-4 / 1992



No. 79 / Santa Fe 1 / 1992

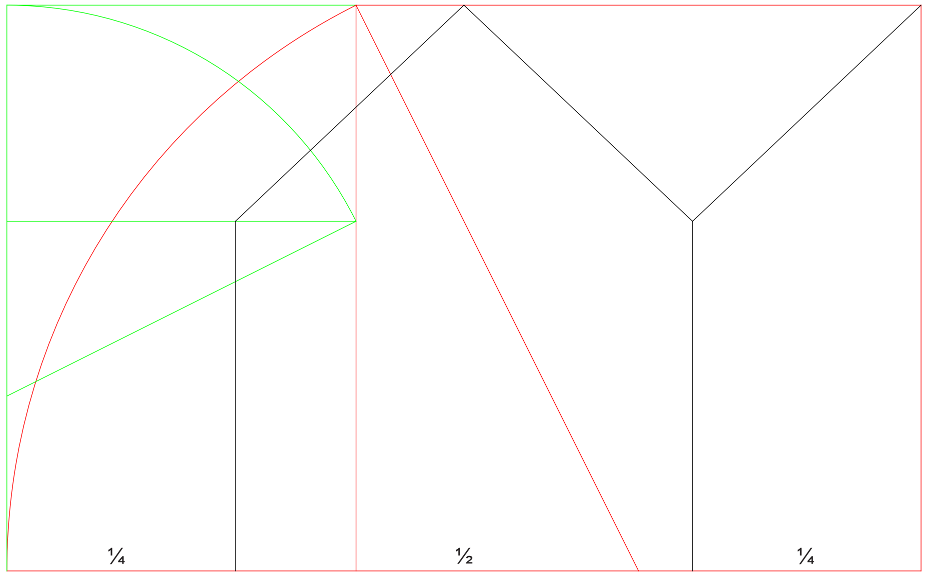
A diagonal runs from top left to bottom right of the composition. From the top right a perpendicular intersects the diagonal at *a*. The perpendicular is cut at *c* by a circle drawn from *a* over *b*.

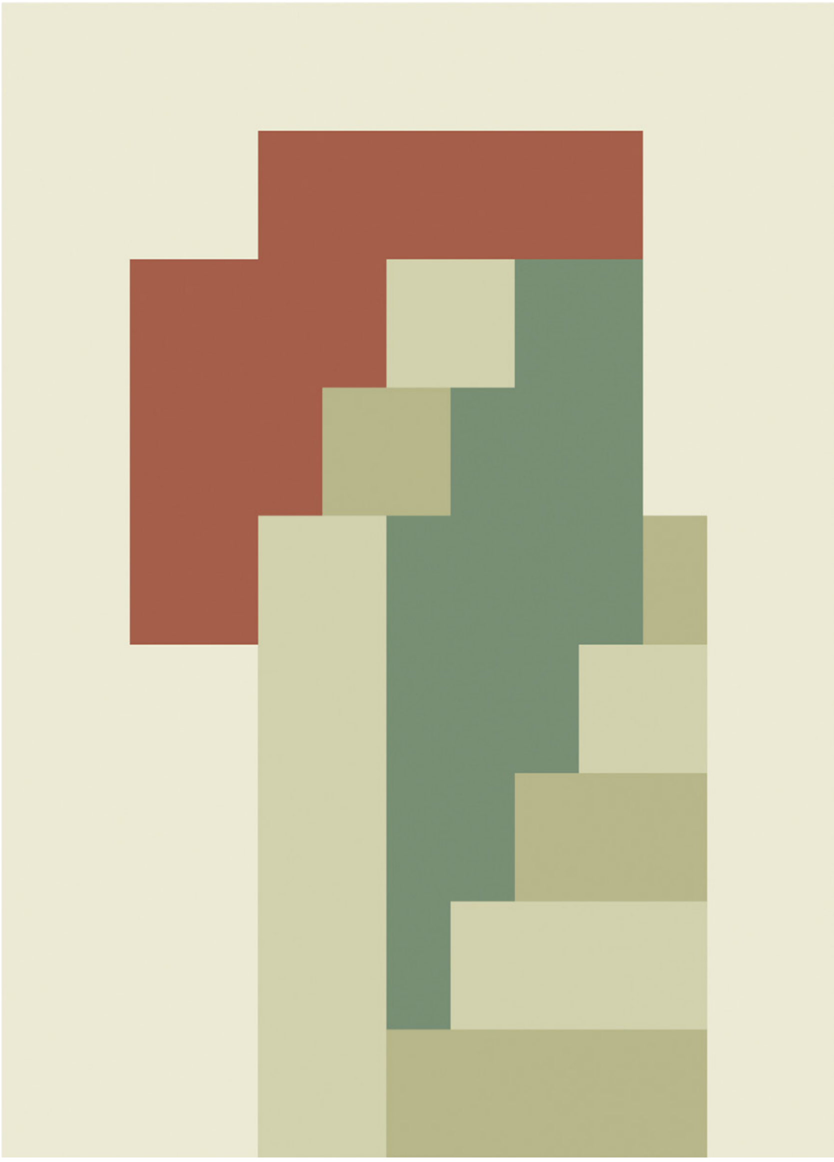




No. 79 / Santa Fe 2 / 1992

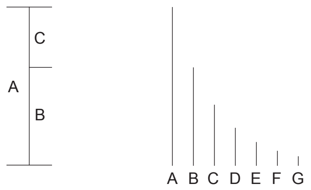
The rectangle is divided vertically by Φ, horizontally by 2, of which ¼ each is placed to the left and to the right of the center unit.





No. 79 / Santa Fe 3 / 1992

No. 79 / Santa Fe 4 / 1992



Dividing the height of a square to gain three proportions related by the golden section allows for two possibilities:

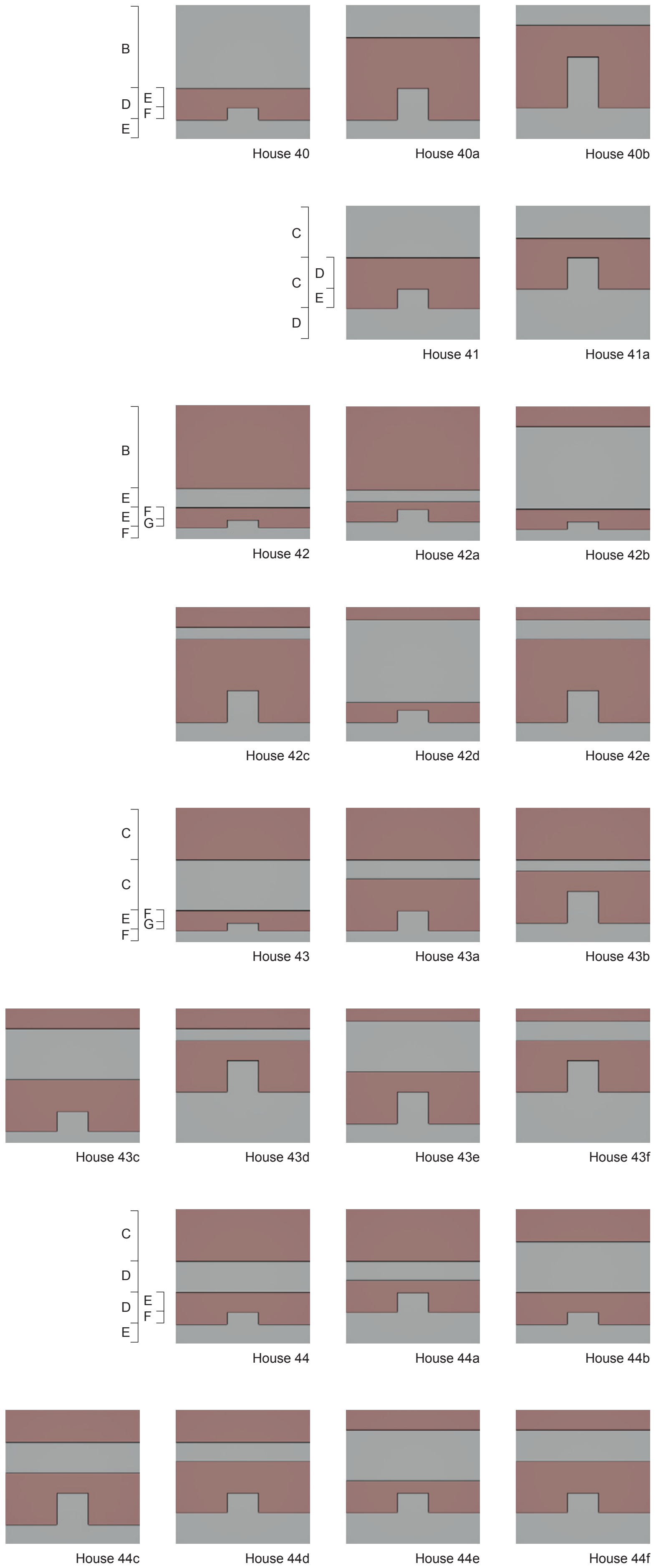
(B,D,E)
(C,C,D)

which are represented by houses 40 and 41. The height of the door opening relates to the height of the bottom section by Φ, as does the height of the door opening to the space above it. Accepting these parameters, three combinations exist for house 40, and two exist for house 41.

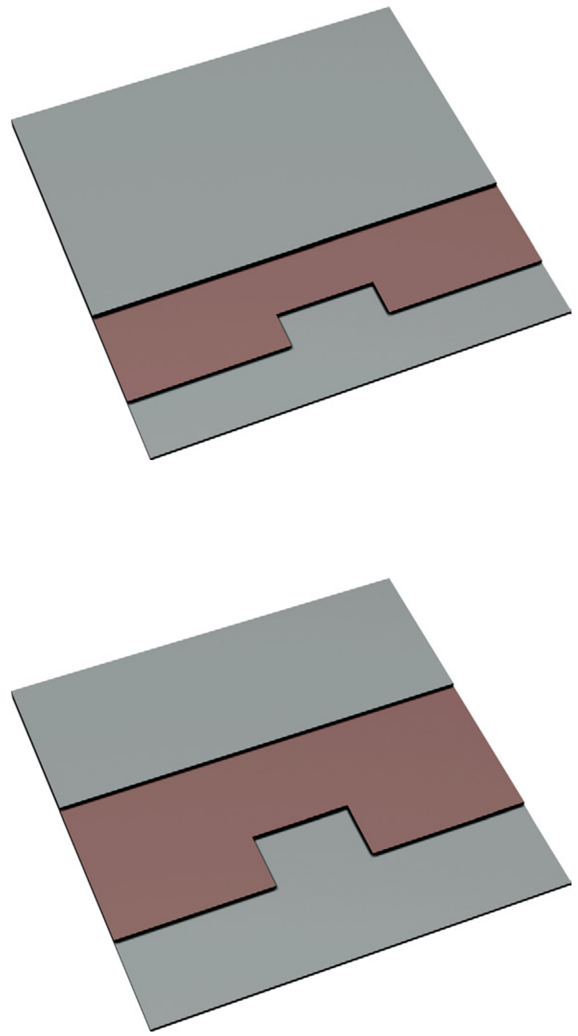
Houses 42, 43 and 44 divide four times vertically. The smallest dimension for the height of the door opening being G, three sets of proportions are:

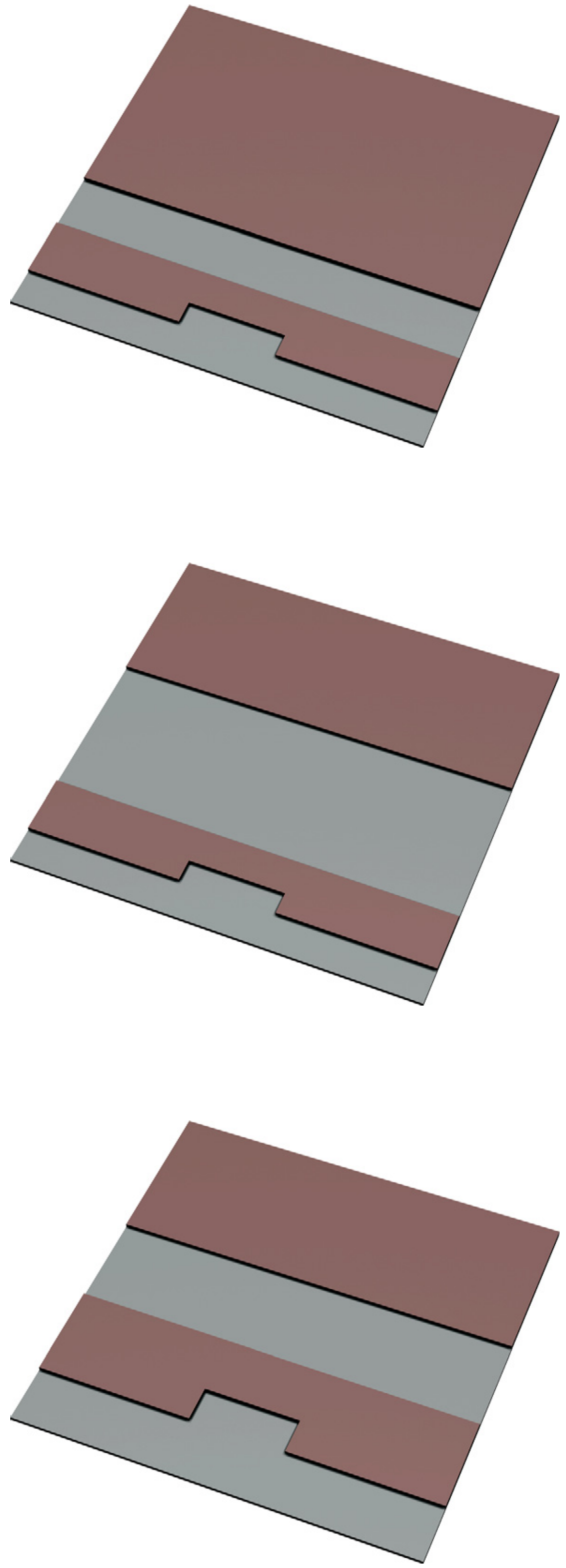
(B,E,E,F)
(C,C,E,F)
(C,D,D,E)

Five variations exist to house 42, and six exist to house 43 and house 44 respectively.



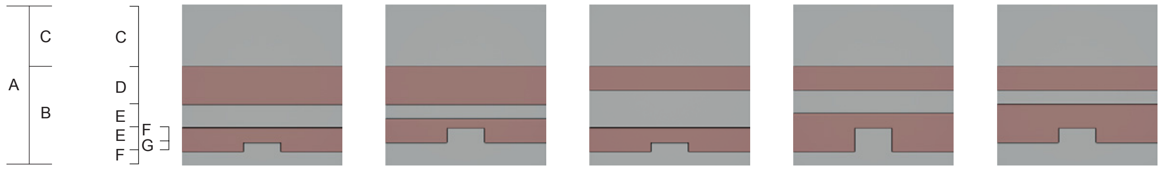
No. 80 / Houses 40 - 44 / 1993



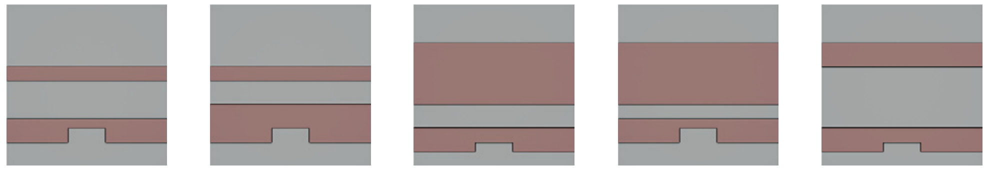


The complete house series, consisting of 62 pieces, each 15 cm. high, were laser-cut out of 3/16” carbon steel in the spring of 1999 in Tulsa, Oklahoma. The respective layers were spot welded, sandblasted and coated with clear and red wax for contrast.

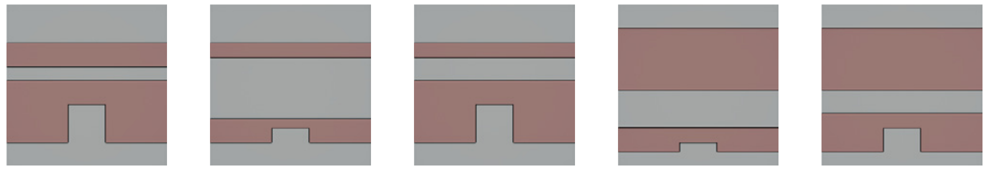
No. 80 / Houses 40, 41, 42, 43, 44



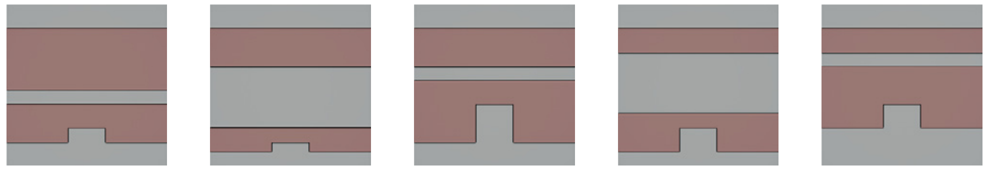
House 47 House 47a House 47b House 47c House 47d



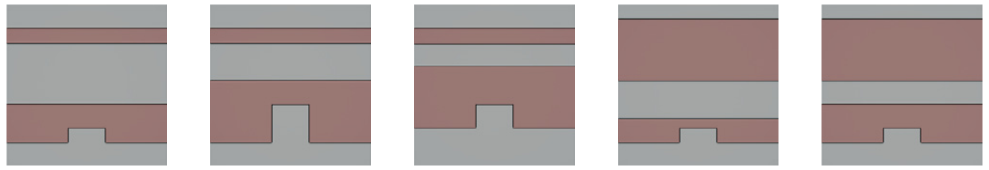
House 47e House 47f House 47g House 47h House 47i



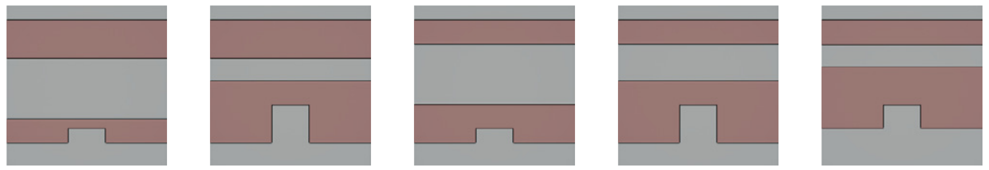
House 47j House 47k House 47l House 47m House 47n



House 47o House 47p House 47q House 47r House 47s



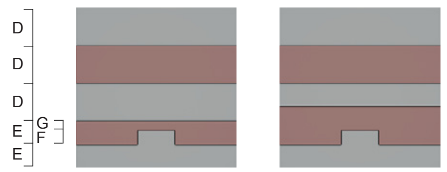
House 47t House 47u House 47v House 47w House 47x



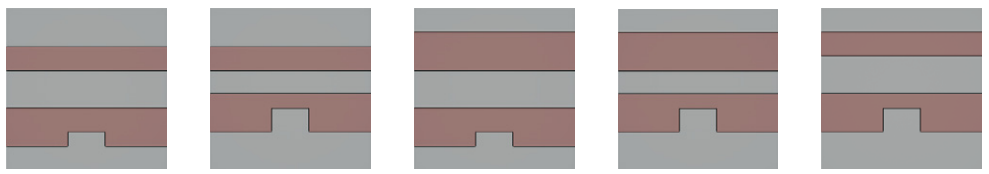
House 47y House 47z House 47za House 47zb House 47zc

House 47 divides five times vertically into:
C, D, E, E, F.
House 48 divides five times vertically into:
D, D, D, E, E.

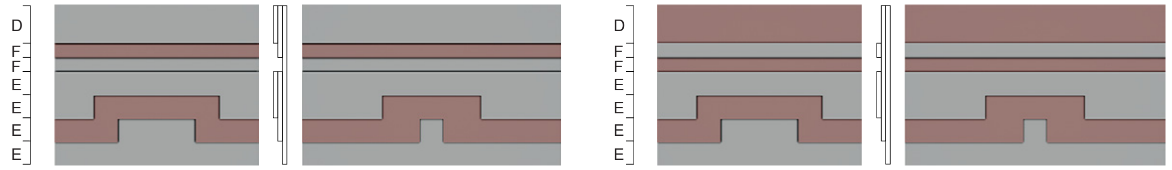
No. 80 / Houses 47 - 48 / 1993



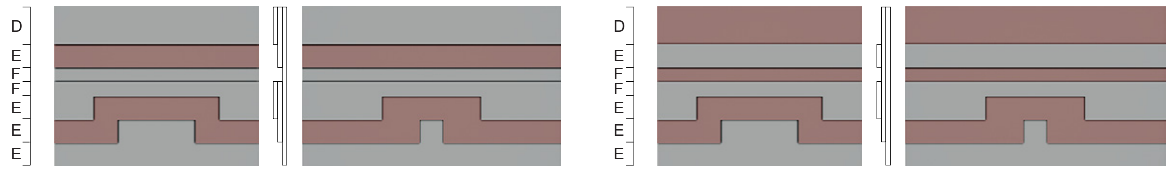
House 48 House 48a



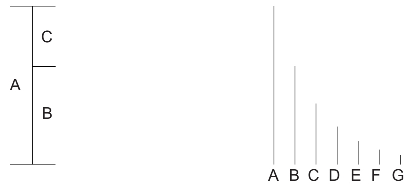
House 48b House 48c House 48d House 48e House 48f

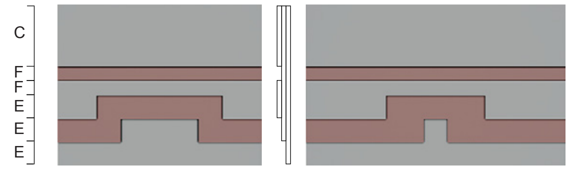


House 36 House 46 House 36a House 46a



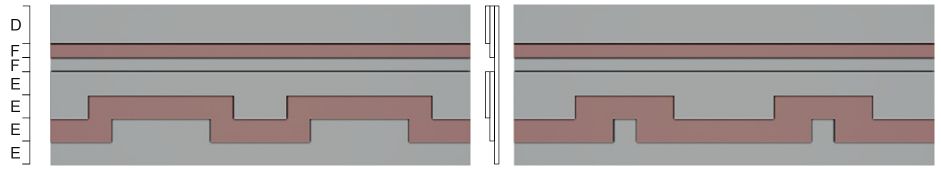
House 36b House 46b House 36c House 46c



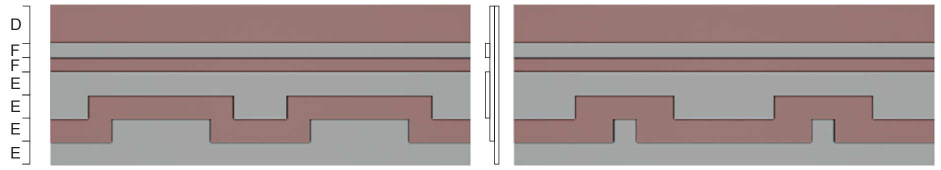


House 36d House 46d

No. 80 / Houses 35, 36, 45, 46



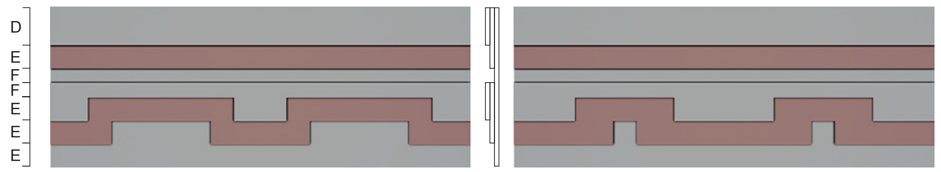
House 35 House 45



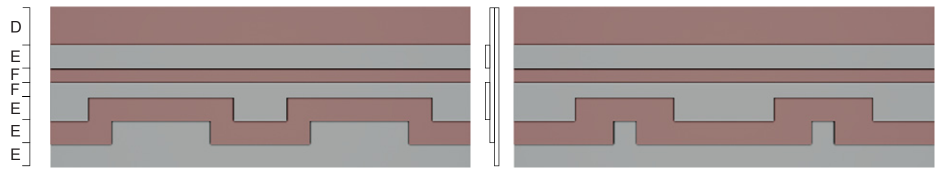
House 35a House 45a

The concept for the compositions is in reference to pre-Columbian temple facades.

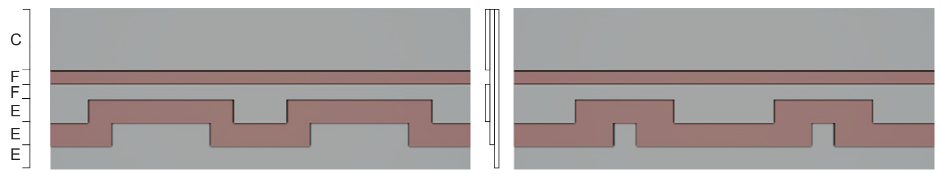
Houses 35, 36 were designed in 1985 and 45, 46 in 1993.



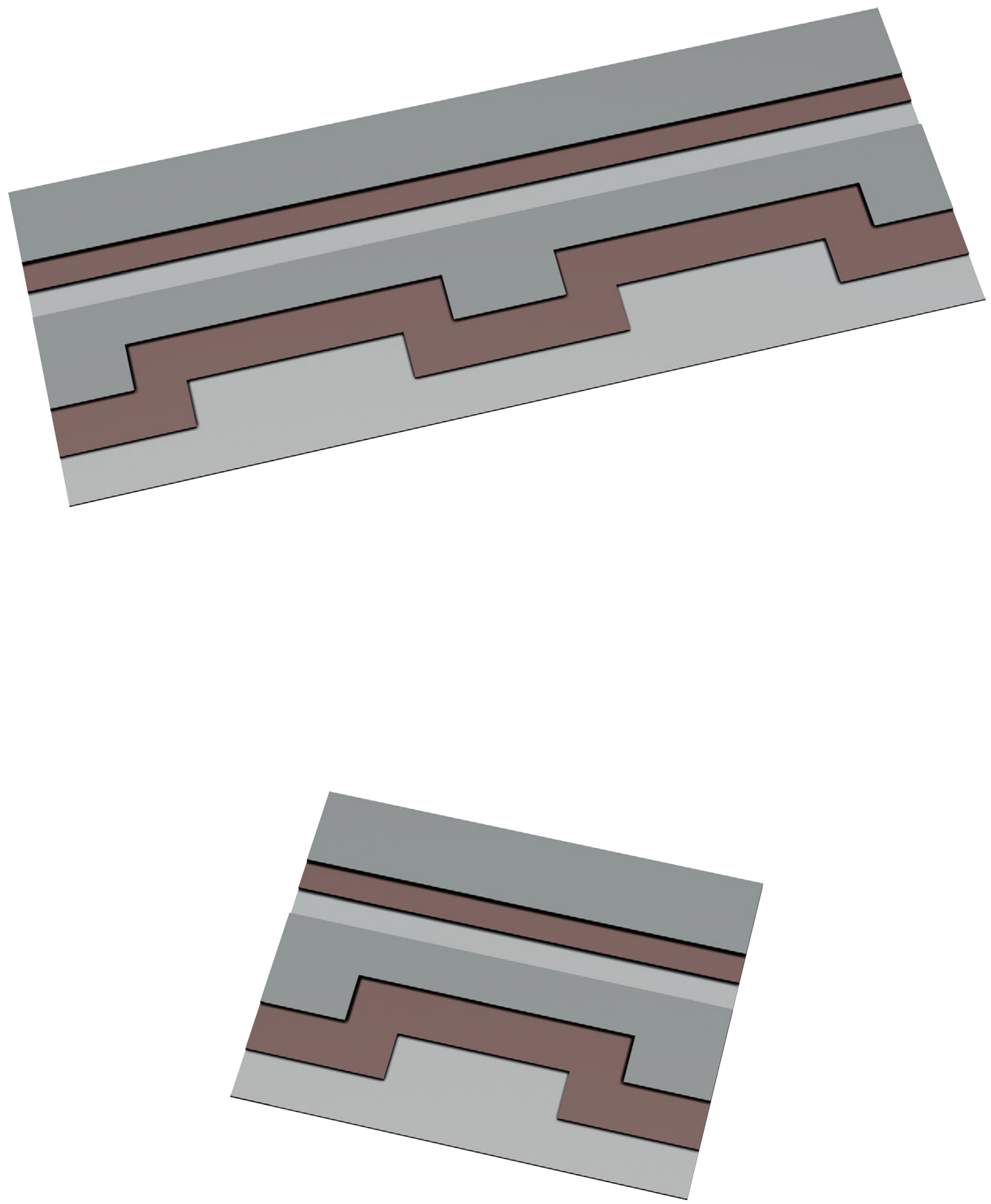
House 35b House 45b



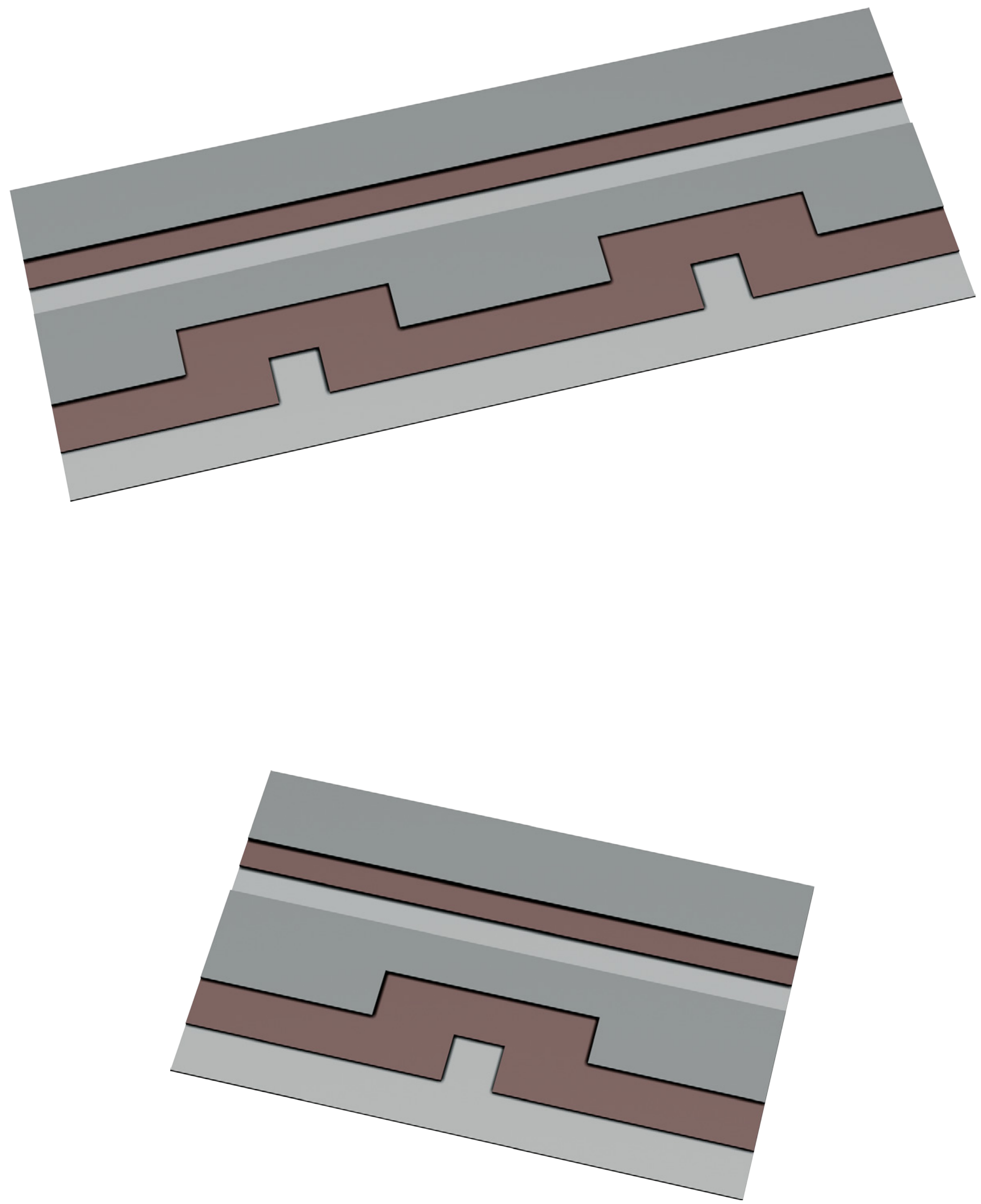
House 36c House 45c



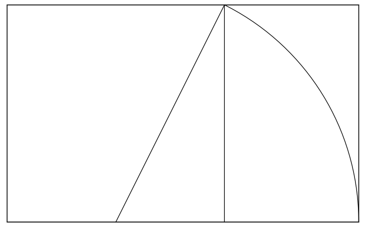
House 35d House 45d

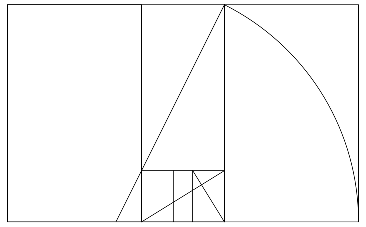


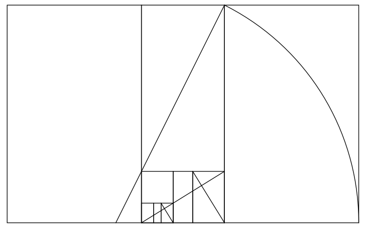
No. 80 / Houses 35, 36

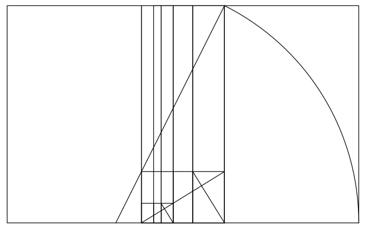


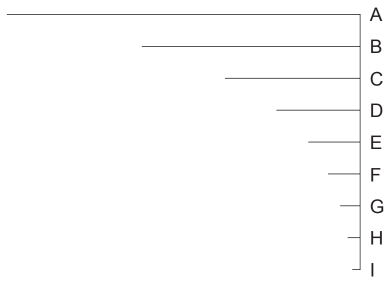
No. 80 / Houses 45, 46











#4 / No.01

#4 / No.02

#4 / No.03

#4 / No.04

#4 / No.05

#4 / No.06

No. 81 / 9 Bars #4 / No.1-6 / 1993

#4 / No.7

#4 / No.8

#4 / No.9

#4 / No.10

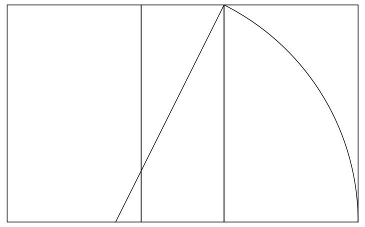
#4 / No.11

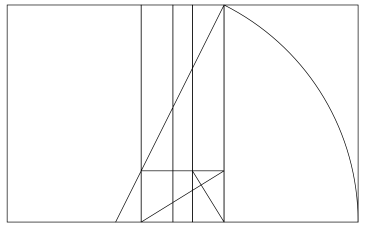
#4 / No.12

The 9 Bars series have their origin in a year-long dialogue with the painter Andreas Brandt during his stay in New York 1975-76. While the sense of order is shared, its application differs.

The area is divided from left to right into nine sections in the order: C-H-I-H-G-H-I-H-C. Applying symmetry, eleven variations are possible, ending with No.12 in the order: H-H-I-C-G-C-I-H-H.

No. 81 / 9 Bars #4 / No.7-12 / 1993





Nine dimensions are placed from left to right in the order: D-F-G-F-G-F-G-F-D. Applying symmetry, eleven variations are possible ending with No.12 in the order: G-D-F-F-G-F-F-D-G.


#18 / No.1


#18 / No.2


#18 / No.3


#18 / No.4


#18 / No.5


#18 / No.6

No. 81 / 9 Bars #18 / No.1-6 / 1993


#18 / No.7


#18 / No.8


#18 / No.9

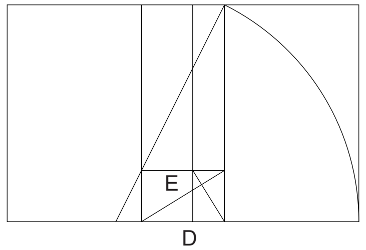

#18 / No.10

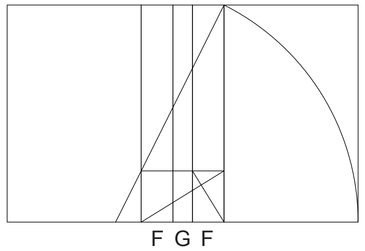

#18 / No.11

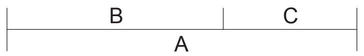

#18 / No.12

Some pieces were cut out of 3/4" plywood, with the colored sections laminated on to the gray background, others were milled out of sheet alluminum. The series was not completed.

No. 81 / 9 Bars #18 / No.7-12 / 1993







#20 / No.1

#20 / No.2

#20 / No.3

#20 / No.4

#20 / No.5

No. 81 / 9 Bars #20 / No.1-6 / 1993

#20 / No.6

#20 / No.7

#20 / No.8

#20 / No.9

#20 / No.10

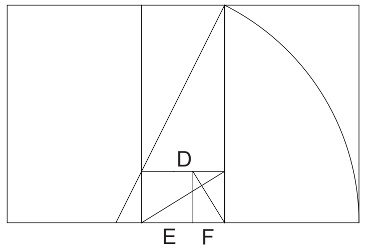
In #20 twelve symmetrical compositions are constructed out of:

(1 x D) +
(2 x E) +
(4 x F) +
(2 x G) = A

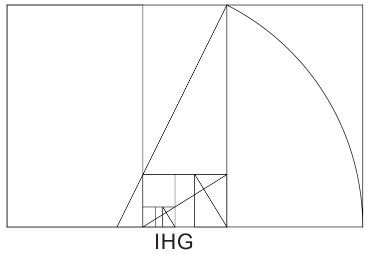
#20 / No.11

#20 / No.12

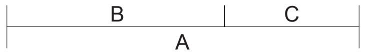
No. 81 / 9 Bars #20 / No.7-12 / 1993



#22 / No.1



#22 / No.2



#22 / No.3

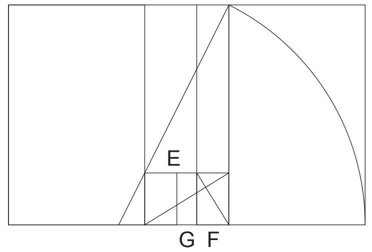
#22 / No.4

The proportions applied to 9 Bars #22 are:
(6 x E) +
(1 x G) +
(2 x H) = A

The arrangement of the spaces for No.1 is: H-E-E-E-G-E-E-E-H.

No. 81 / 9 Bars #22 / No.1-4 / 1993

#24 / No.1



#24 / No.2

#24 / No.3

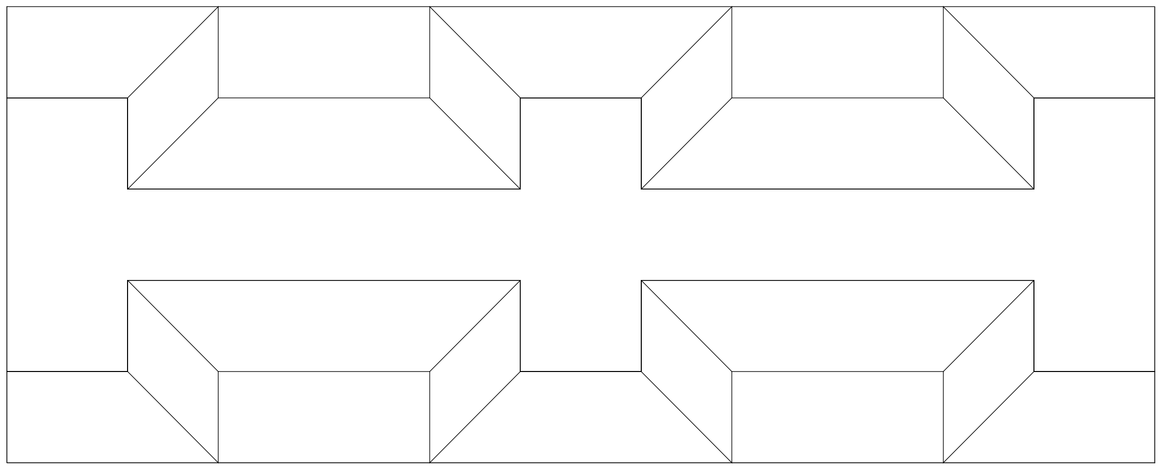
#24 / No.4

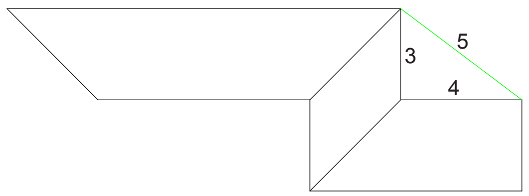
The proportions applied to #24 are:
(4 x E) +
(4 x F) +
(1 x G) = A
beginning with the arrangement: E-E-F-F-G-F-F-E-E.

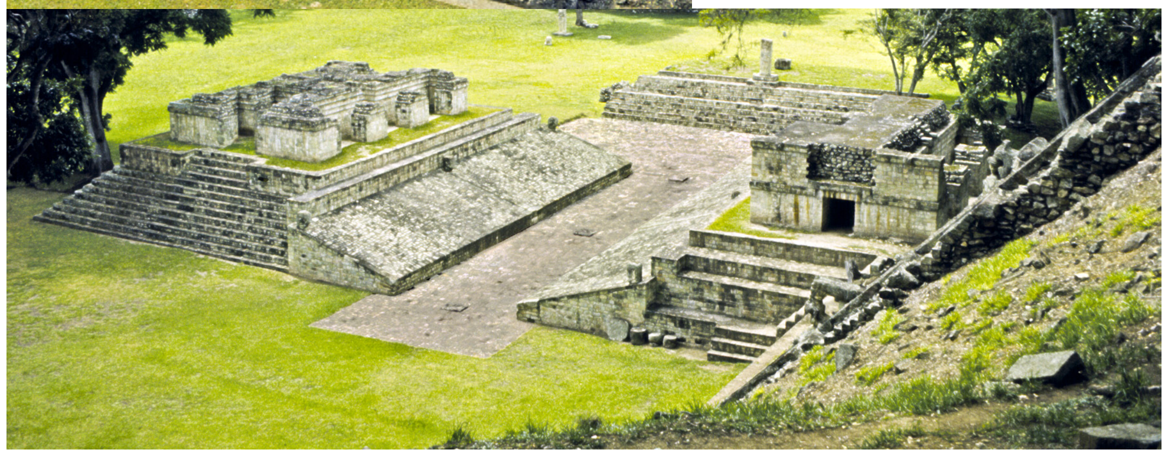
#24 / No.5

#24 / No.6

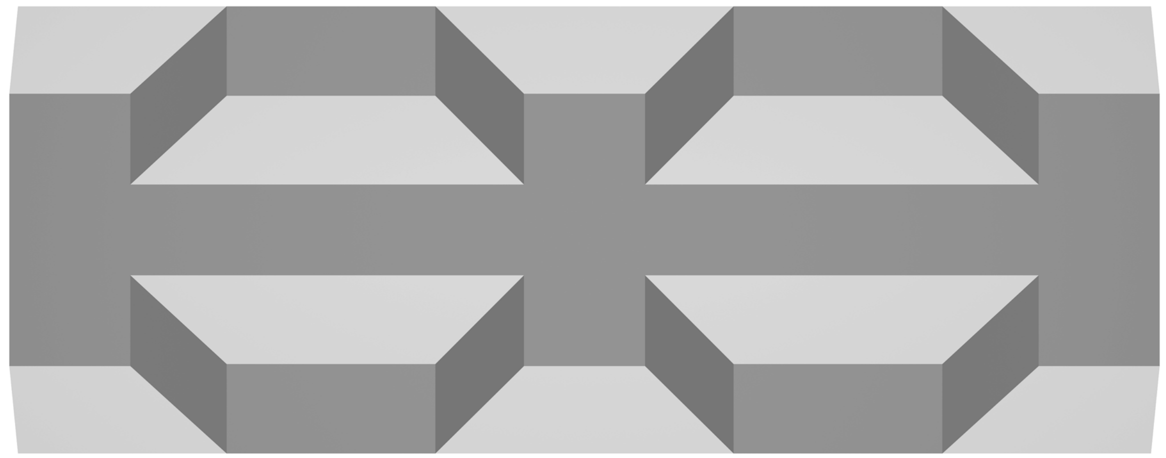
No. 81 / 9 Bars #24 / No.1-6 / 1993



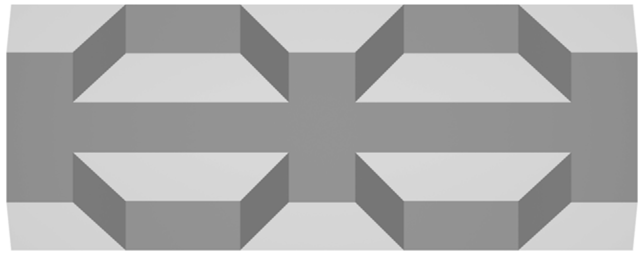




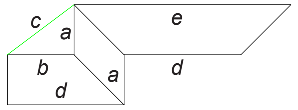
The Pyramid series plays on the concept of double pyramids, the design of ball-courts as seen in Copan and Tikal and construction methods as seen in Palenque. Proportions of a Pythagorean triangle condition the arrangement of the compositions.



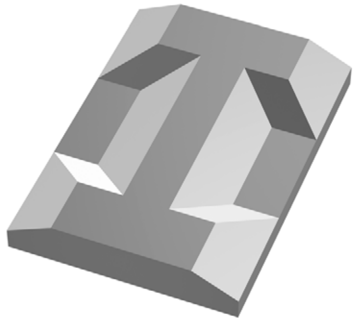
No. 82 / Pyramids / 1983-95

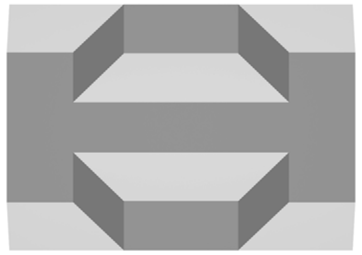


1a



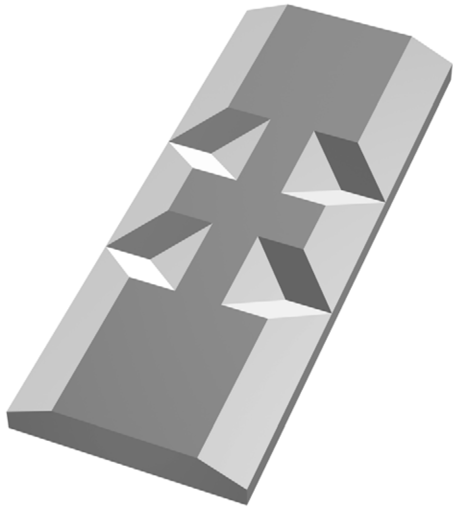
$b = \sqrt{(c^2-a^2)}$
$d = a+b$
$e = 2a+d$

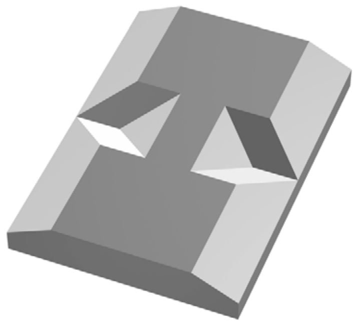




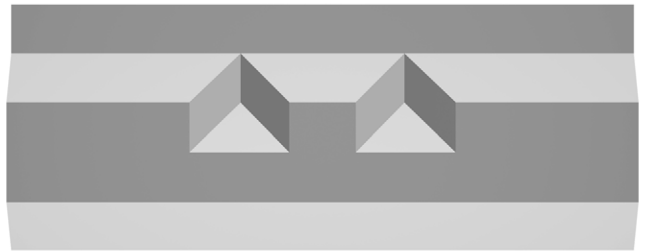
1b

2a

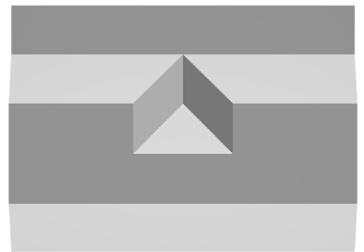




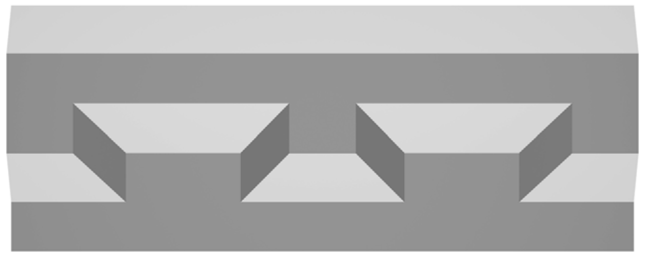
2b



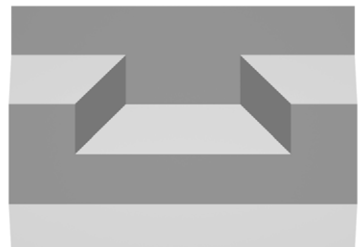
3a



3b

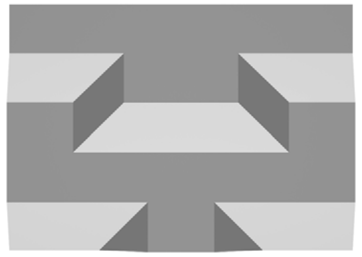


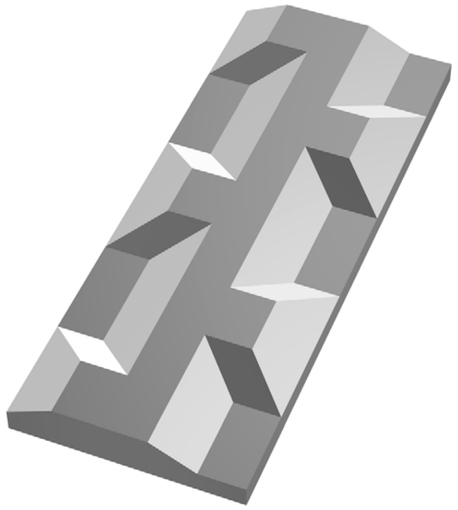
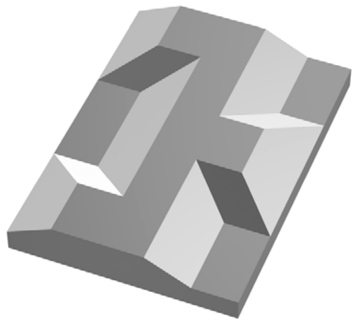
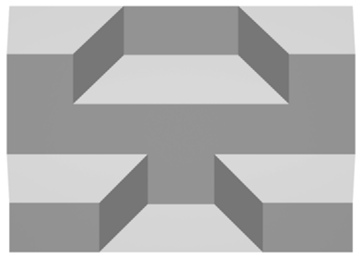
4a



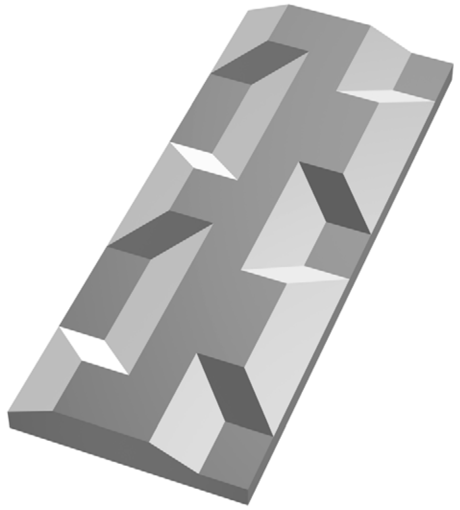
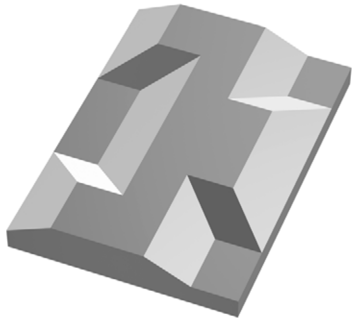
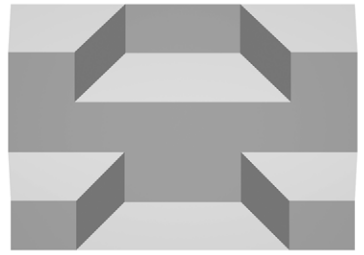
4b


5a

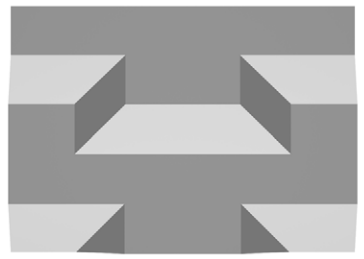


5b


6a



6b

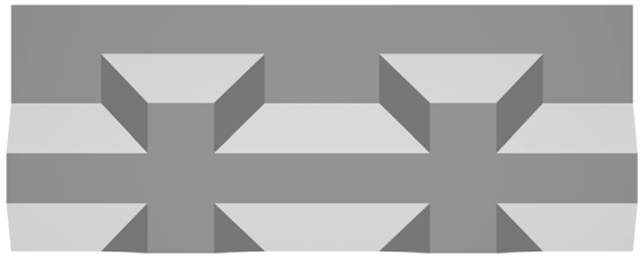
No. 82 / Pyramids / 1983-95


7a



7b


8a

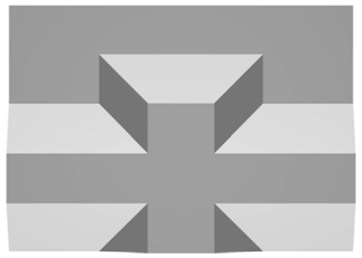


8b

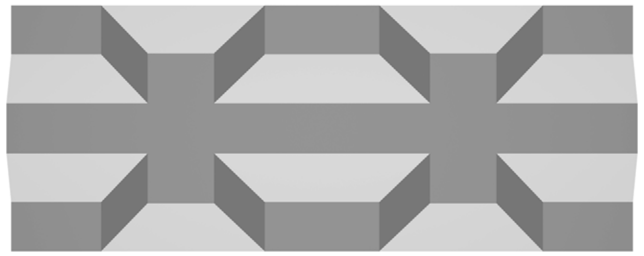
No. 82 / Pyramids / 1983-95



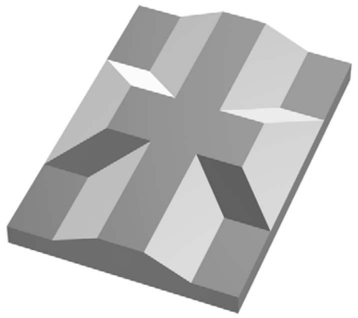
9a

9b

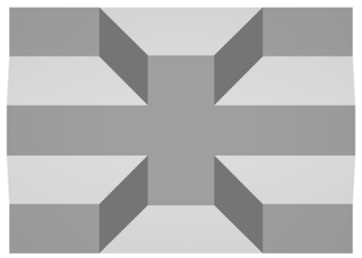


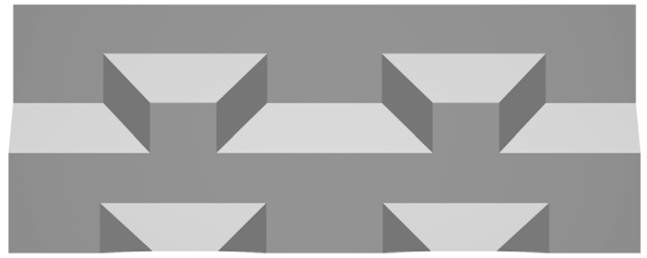


10a

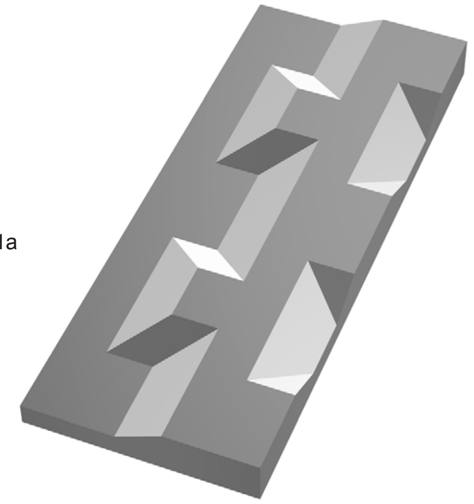


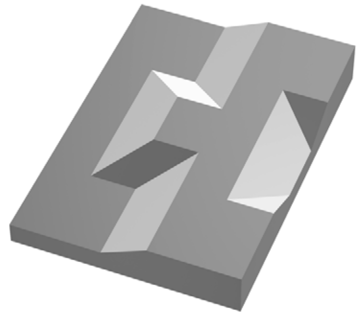
#10b



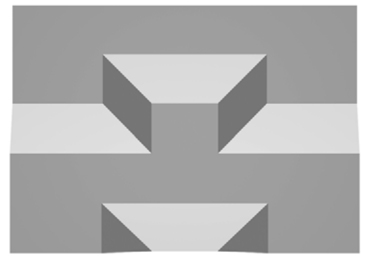


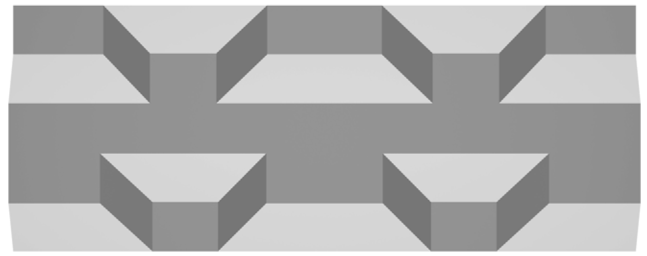
11a



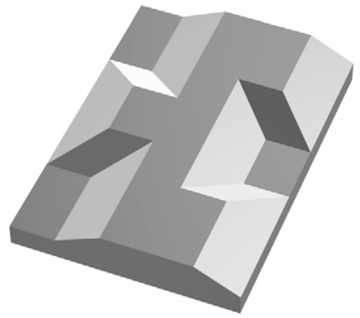


11b



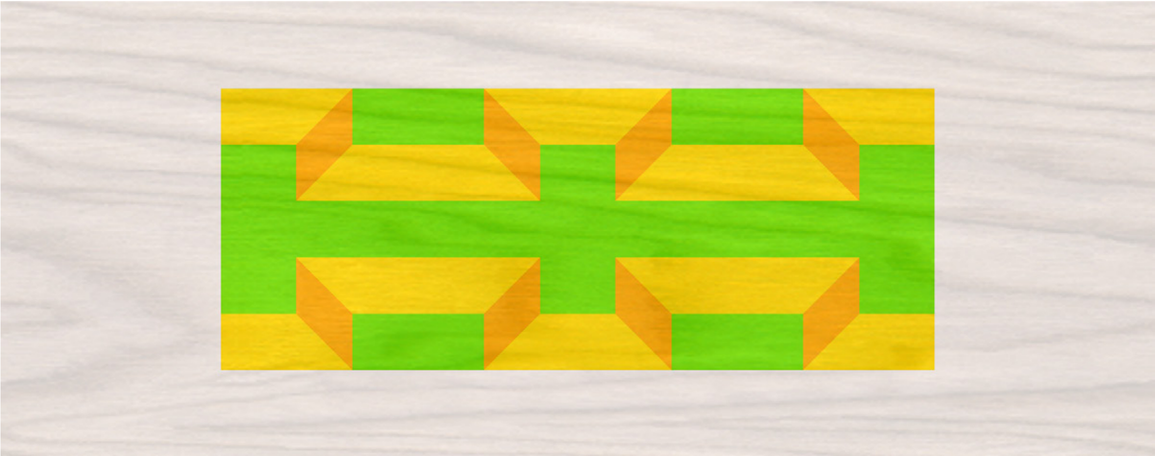


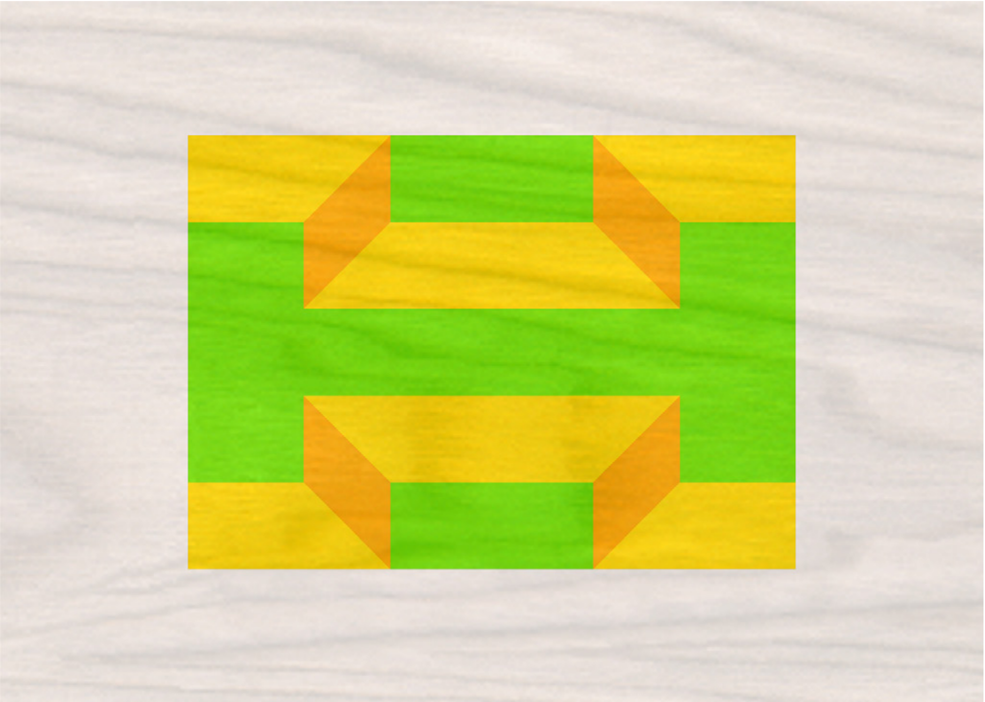
12a



No. 82 / Pyramids / 1983-95

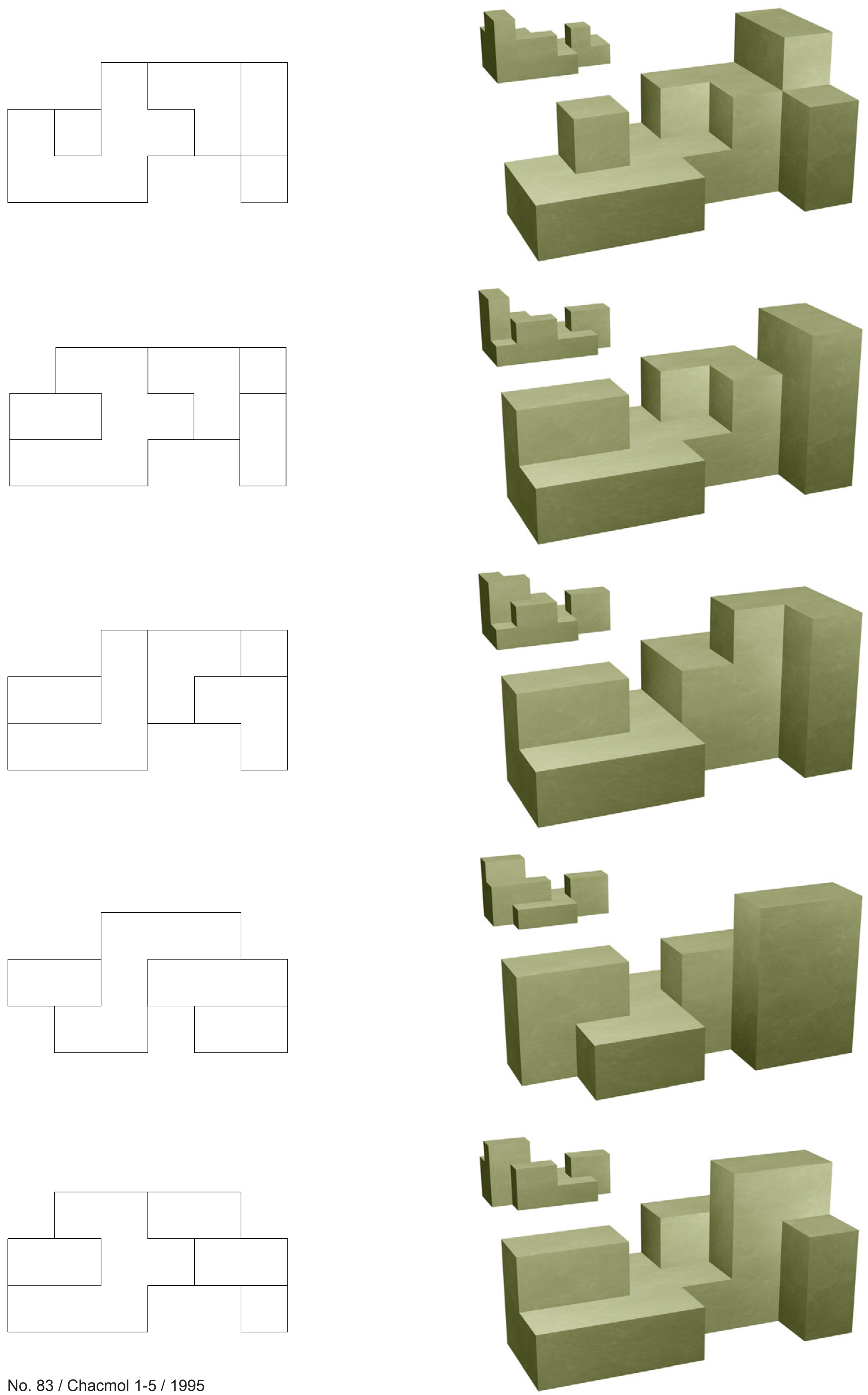
12b



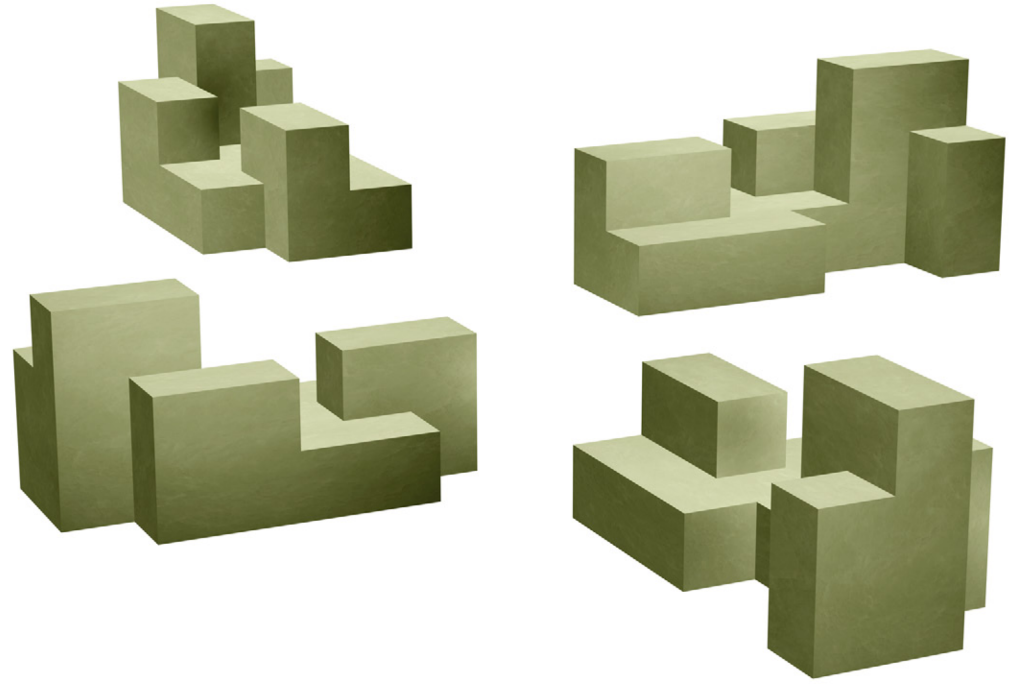


No. 82 / Pyramids-mosaic 1a / 1985-95

No. 82 / Pyramids-mosaic 1b / 1985-95

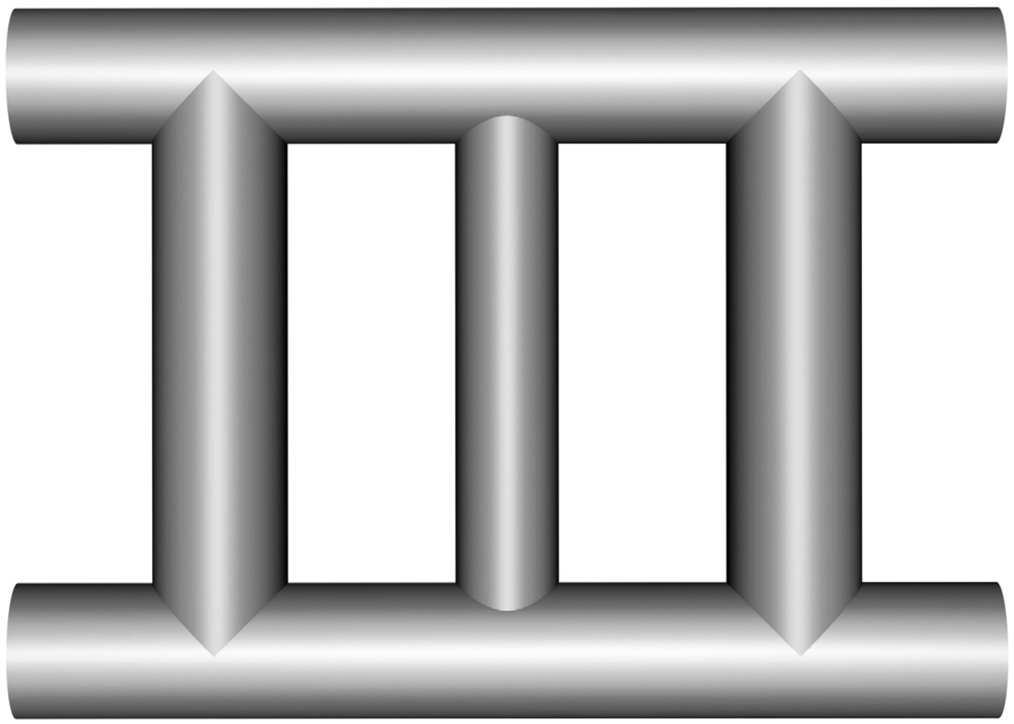


No. 83 / Chacmol 1-5 / 1995



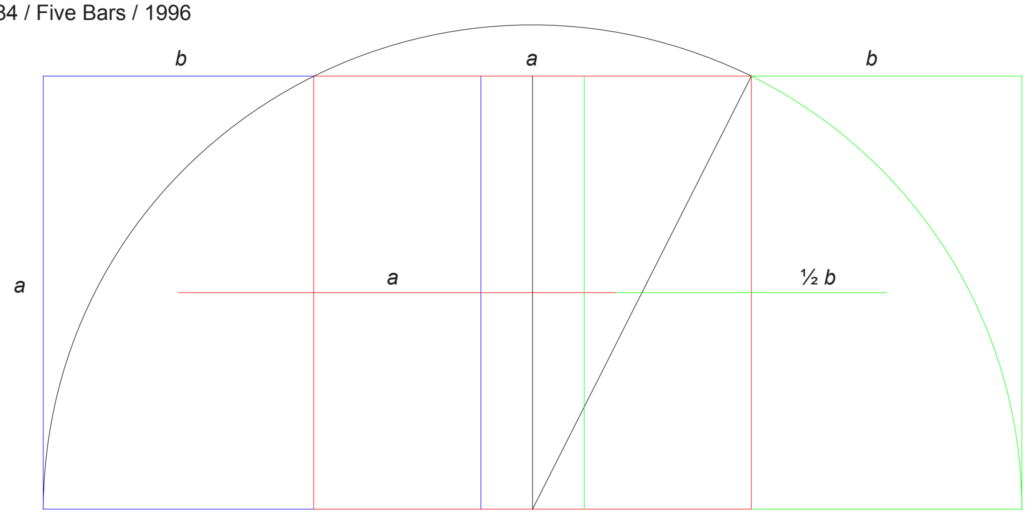
Chacmol / Tula / 1975

No. 83 / Chacmol 5 / 1995



The area between the horizontal bars is $(a+2b)\times a$ and a relates to b by Φ. Copies (blue and green) of the square over a (red) are placed at the endpoints of the semi circle, leaving room for the central vertical bar. Placing the length $(a+b)$ at the center of the red square leaves a distance of ½ b extended over each side, the diameter for the other four bars.

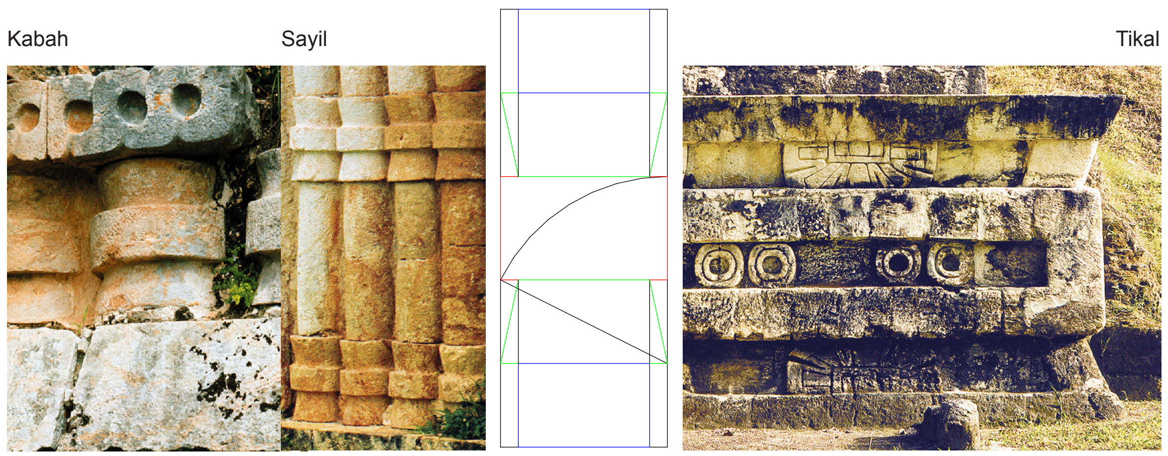
No. 84 / Five Bars / 1996

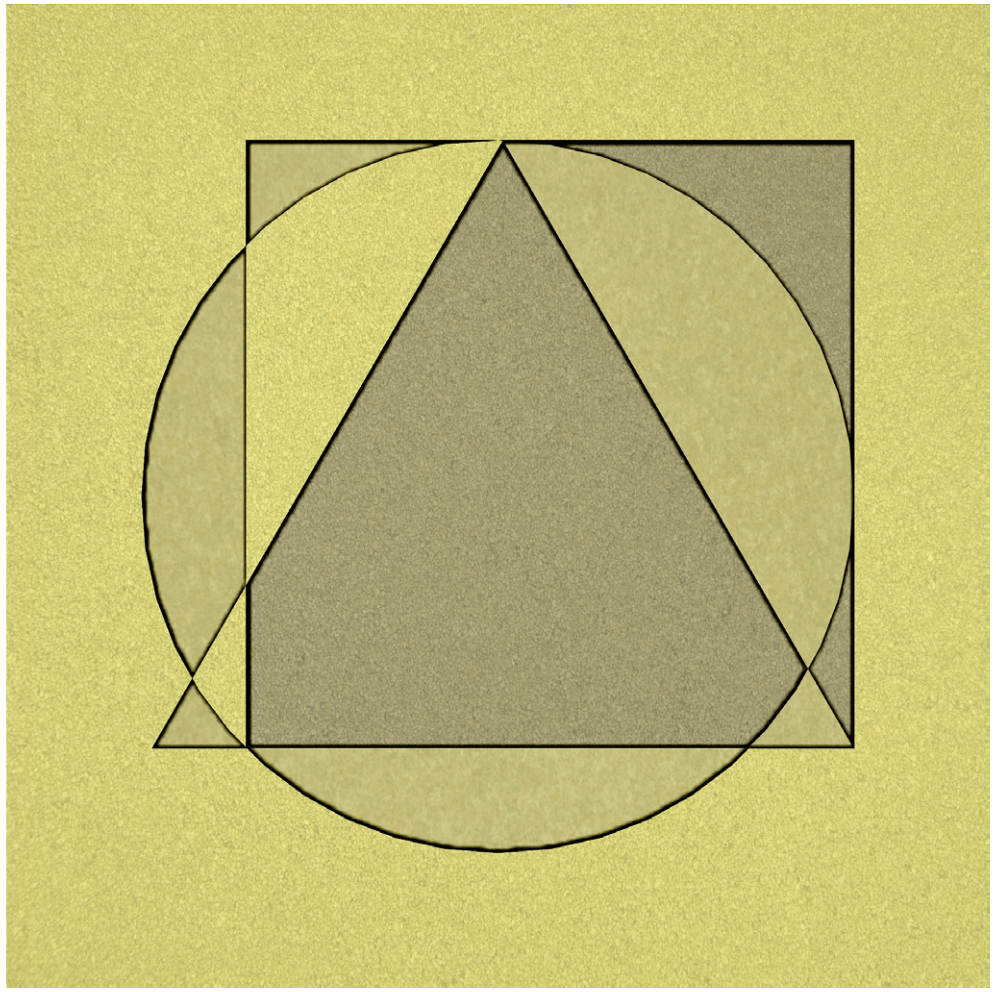


No. 85 / Tollan 1 / 1999

Tollan, place of cattail reeds, with Coatepec, snake mountain, refers in Aztec tradition to a place where civilized life originated. Snake mountain, with a ball court attached, represented the center in every Place of Reeds, or capital city in Mesoamerica. This archetype may be of Olmec origin. In their homeland, the volcanic Tuxtla mountains, surrounded by swamps, the first snake mountain may have been built in a place of reeds on a platform of reeds. A bundle of reeds, tied together in the middle, will take on the shape of an X. The combination of talud, tablero, talud may be an iconographic reference to an ancient building method, thereby letting the initiated know of being in a place of cult and culture.

Kabah Sayil Tikal

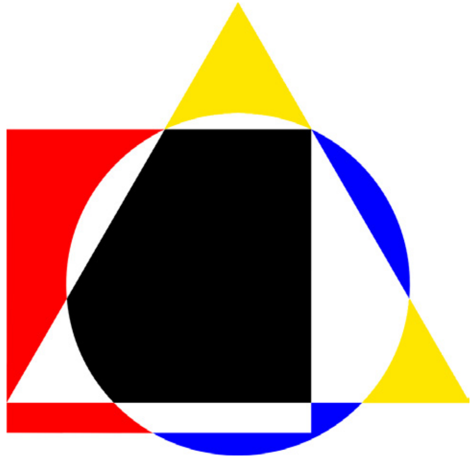


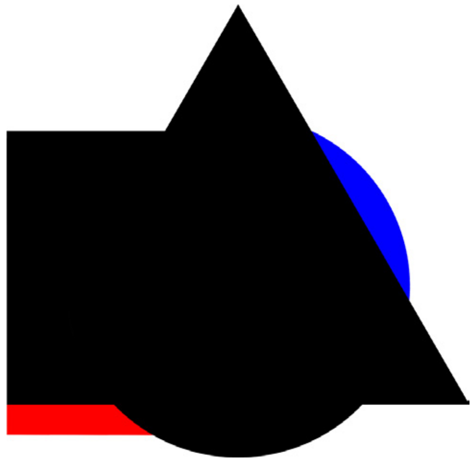


Circle and square are of equal area. An equilateral triangle is sized to touch the top of the circle and the right bottom corner of the square. The base of the square relates to the base of the larger square by Φ. In August 1987 the mainframe computer of the Electrical Technology Department, Rockland Community College, NY served as tool for early experiments with circle, square and triangle but was soon replaced with the first PC acquired by the department using AutoCAD. With my VW camper parked behind the building but under the protective eyes of security, the offer and permission to work in the computer lab at any time, nights included, was gratefully utilized, providing escape from sleeplessness and other problems during a period including two winters.

No. 86 / CST 1 / 1988

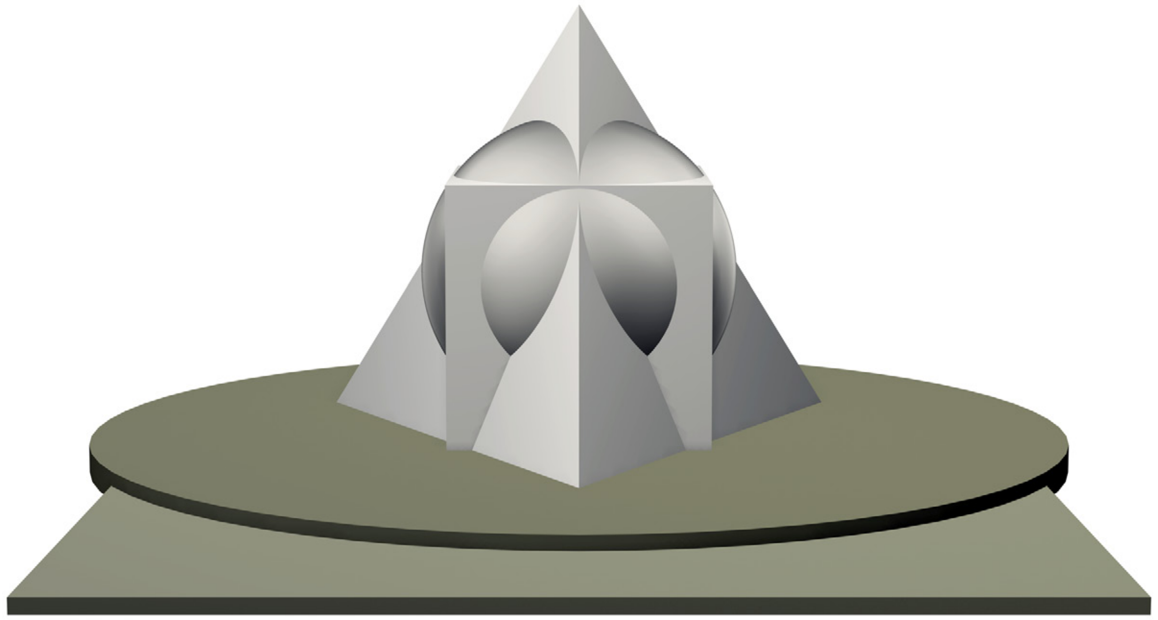
No. 86 / CST 1 / 1988

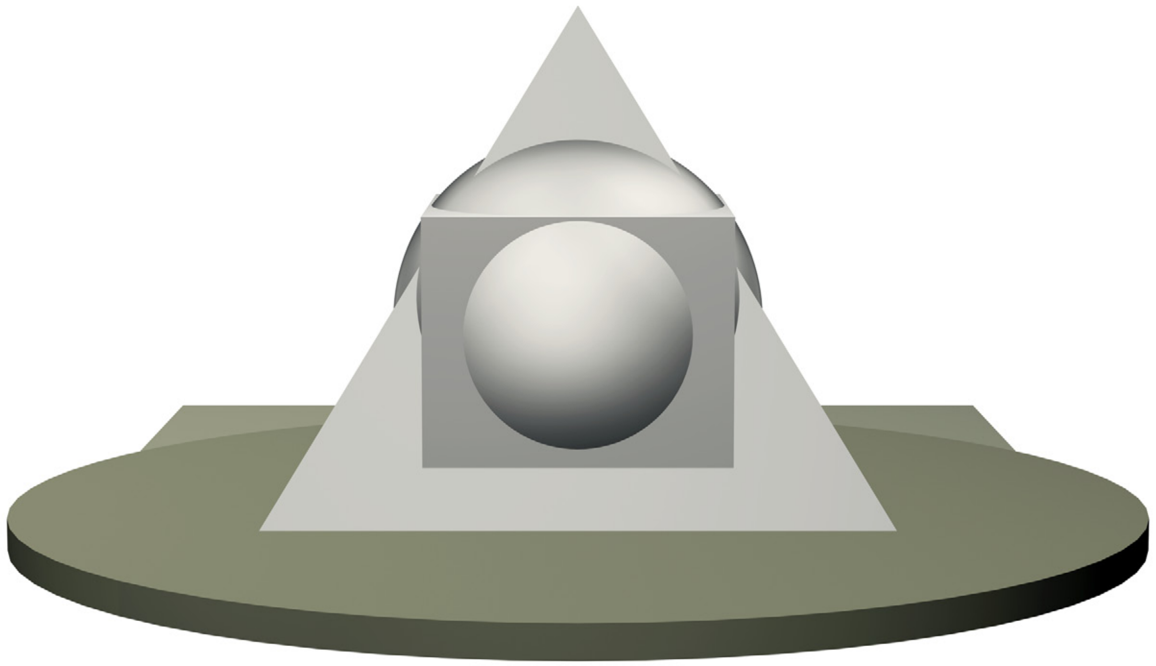


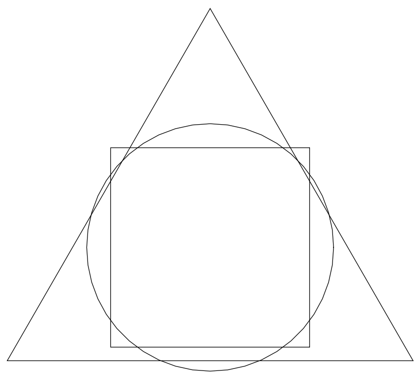


An animation about circle, square, triangle of equal area evolving into a composition of sphere, cube, tetrahedron of equal volume was completed in 1998 while teaching at Northern New Mexico Community College. The images represent some keyframes of the animation.

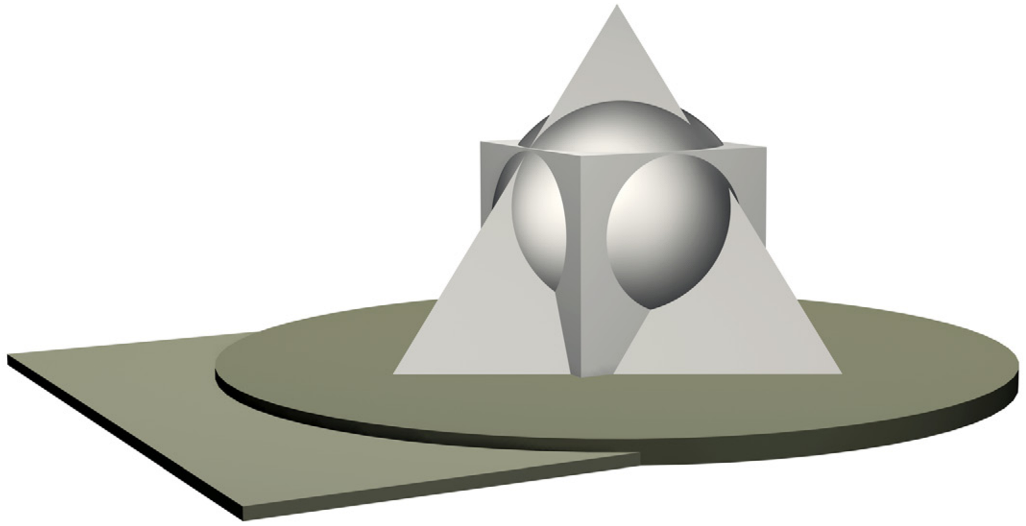
No. 86 / CST - keyframes / 1998

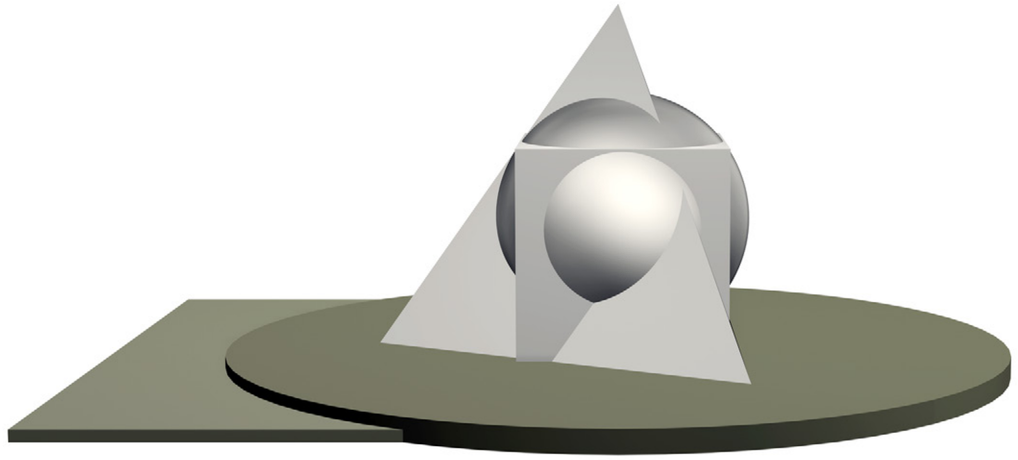


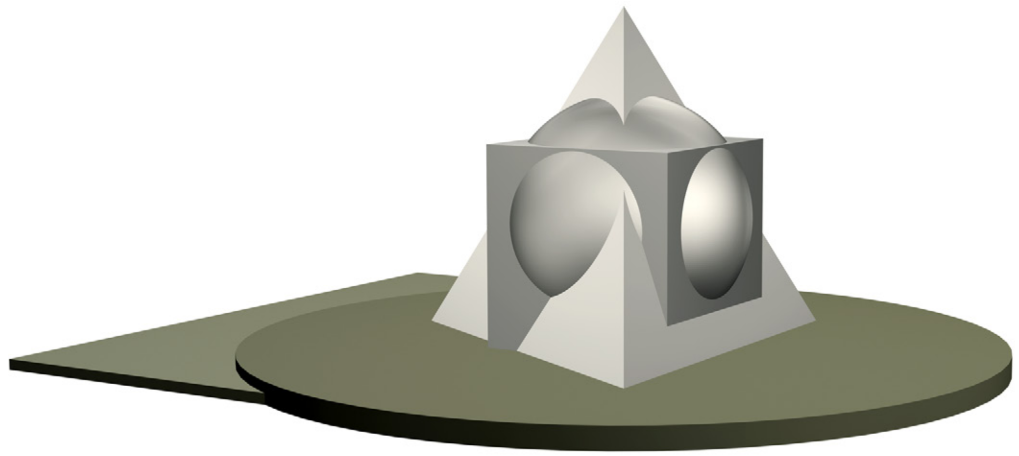




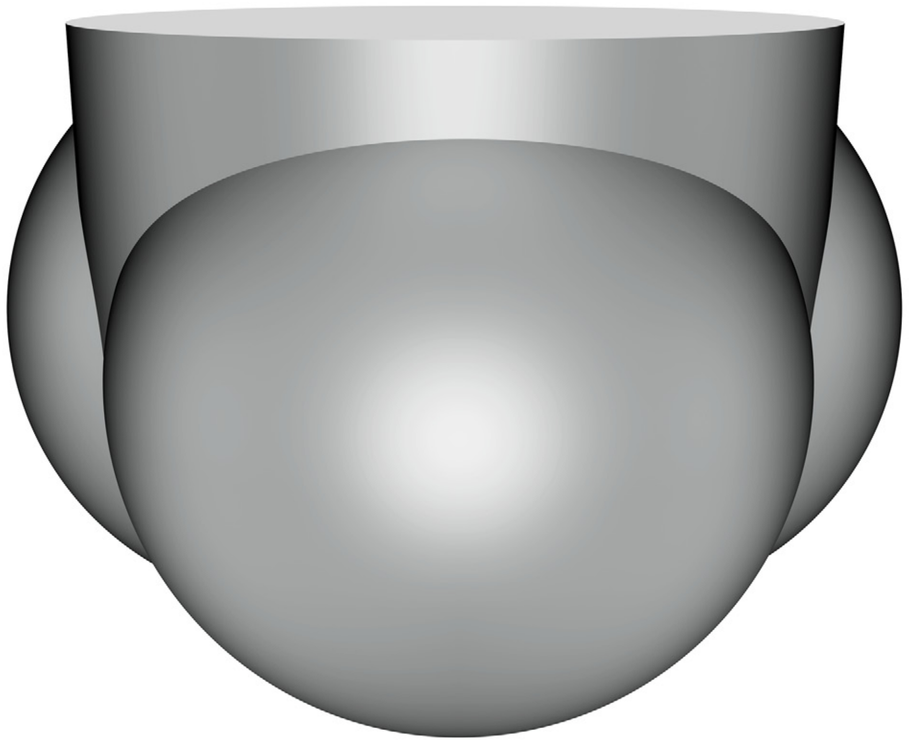
No. 86 / CST / 1998

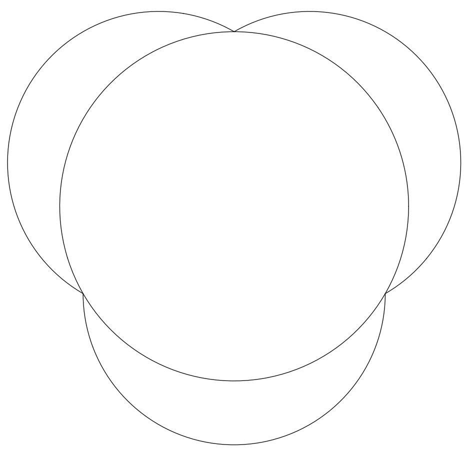




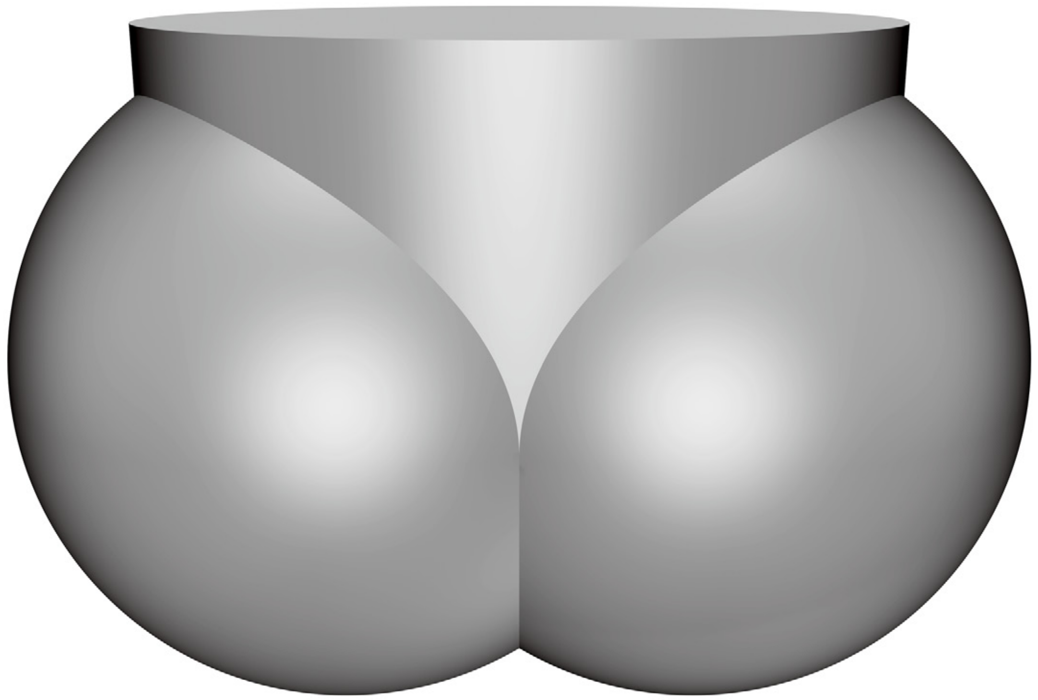


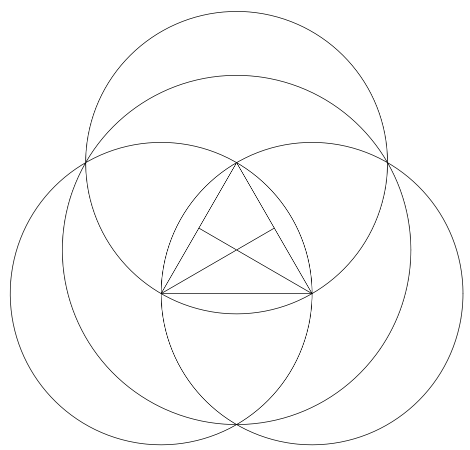
No. 86 / CST / 1998



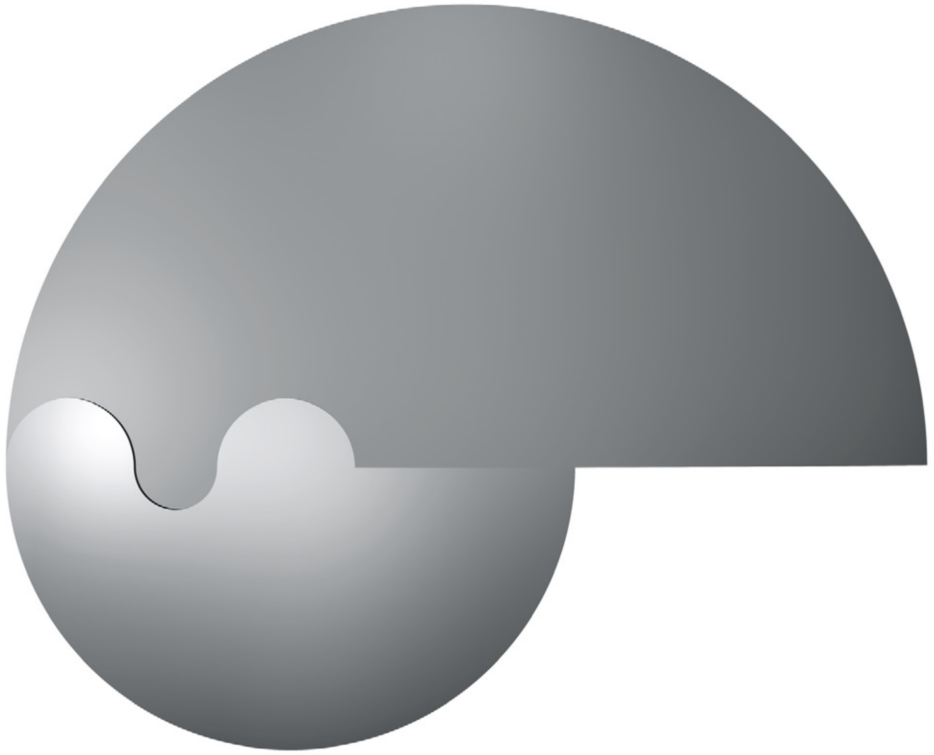


No. 87 / Tripod #2 / 2001

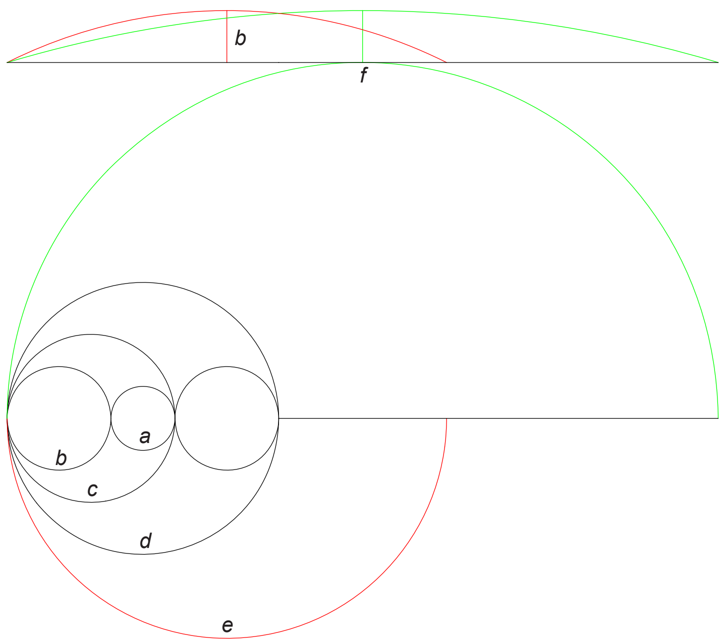




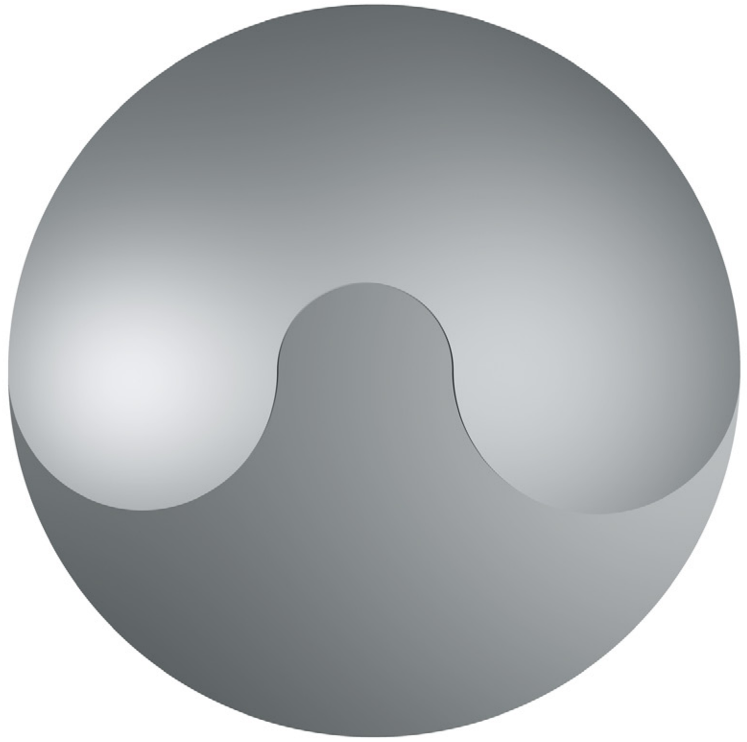
No. 87 / Tripod #2 / 2001

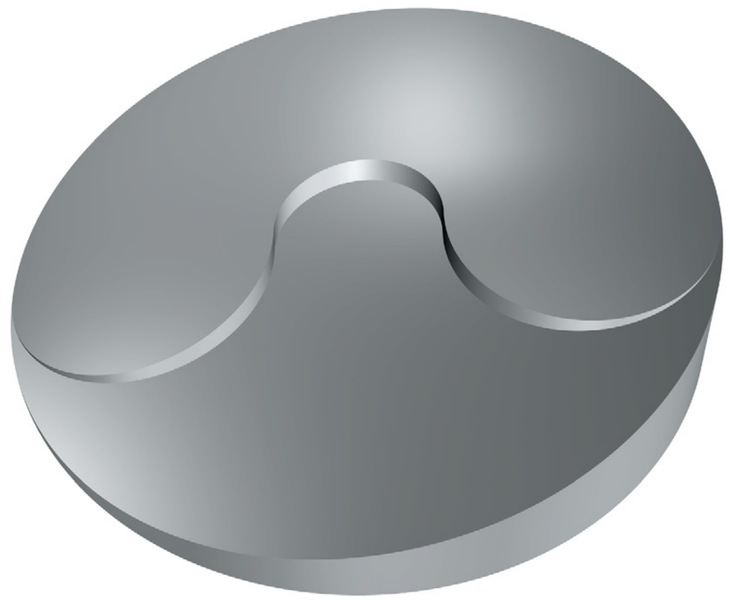


Two interlocking sphere-sections, *e* and *f,* their height equal to *b*, involve six circles related by Φ.

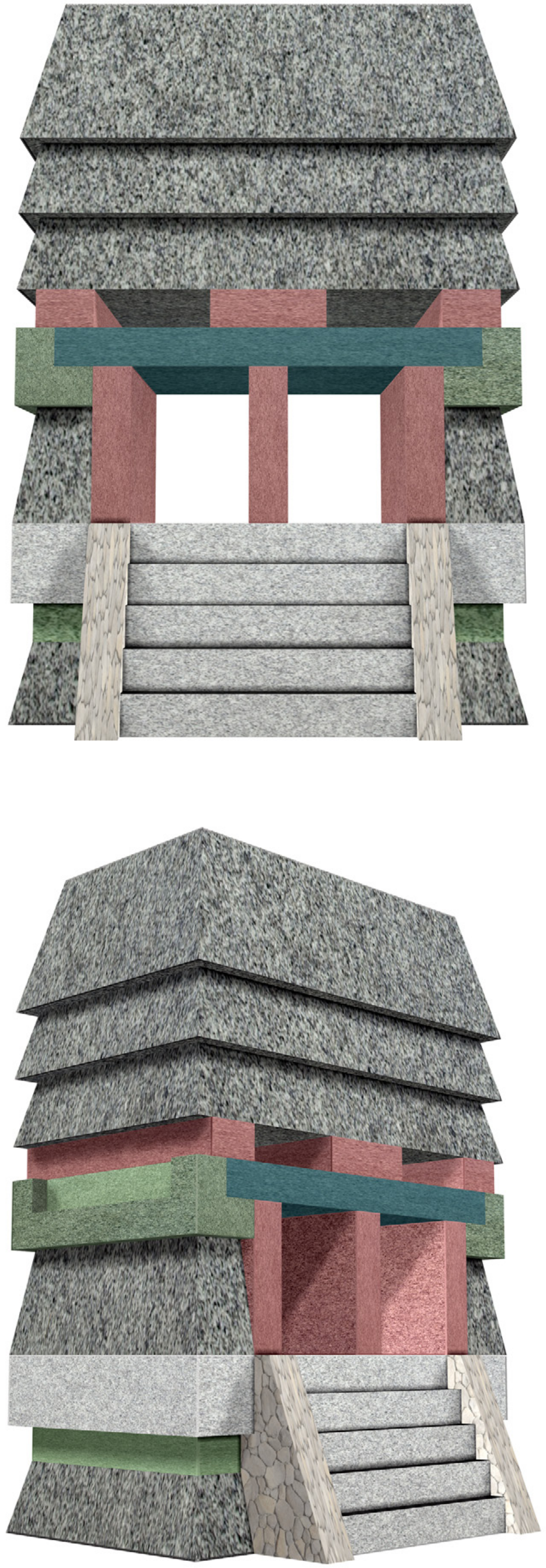


No. 88 / 2002





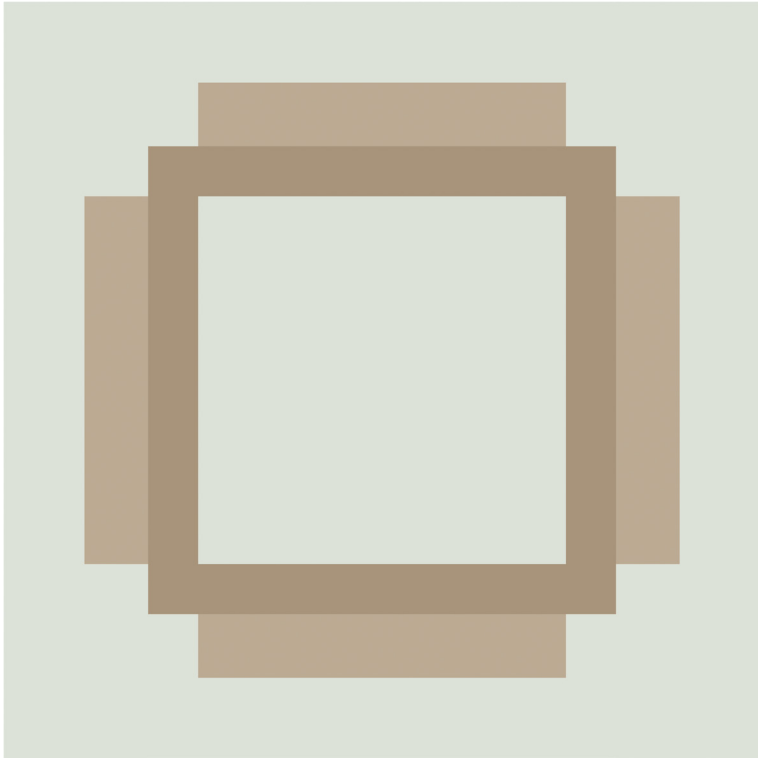
No. 89 / 2002

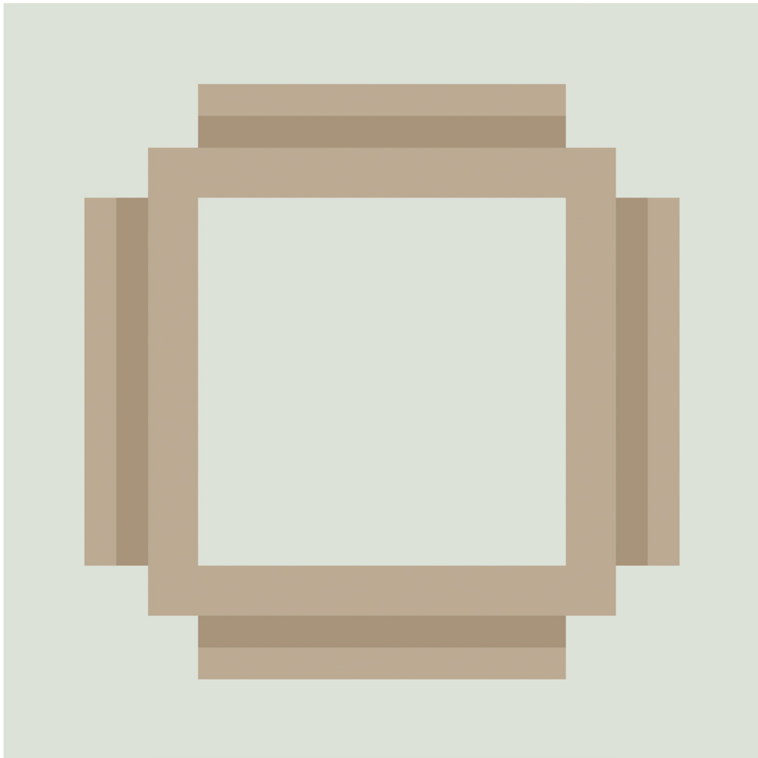


No. 90 / Uxmal 1 / 1991

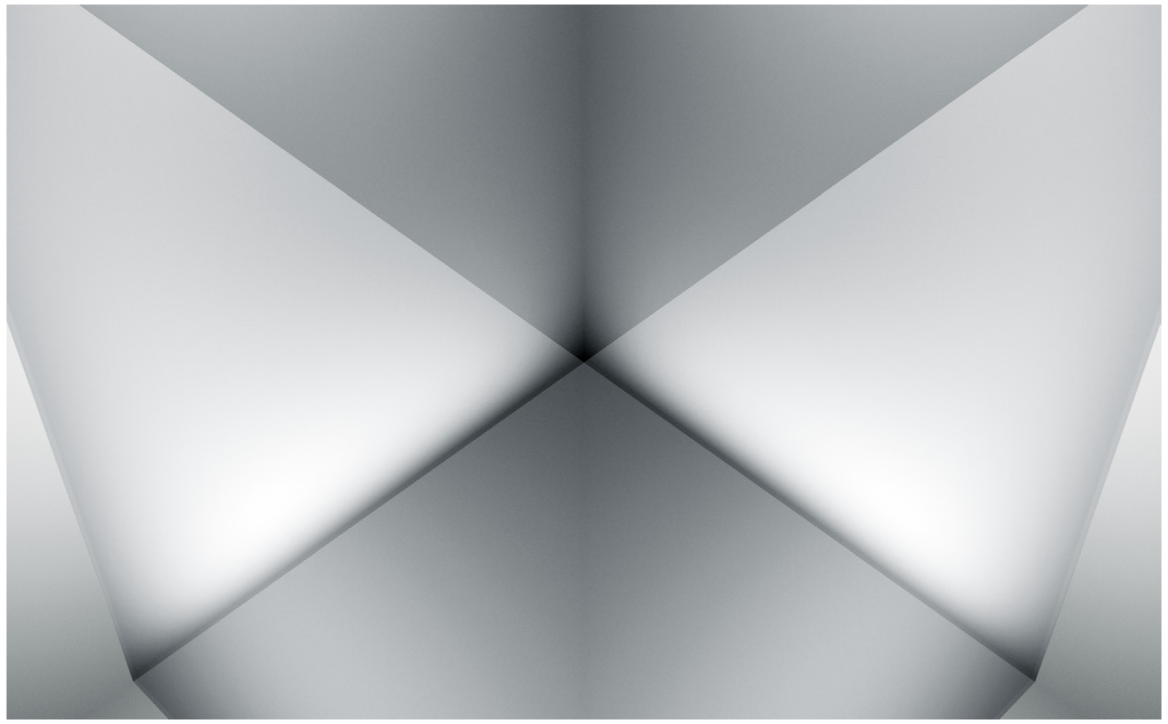
Uxmal / Detail - Nunnery Quadrangle / South Building / 2001

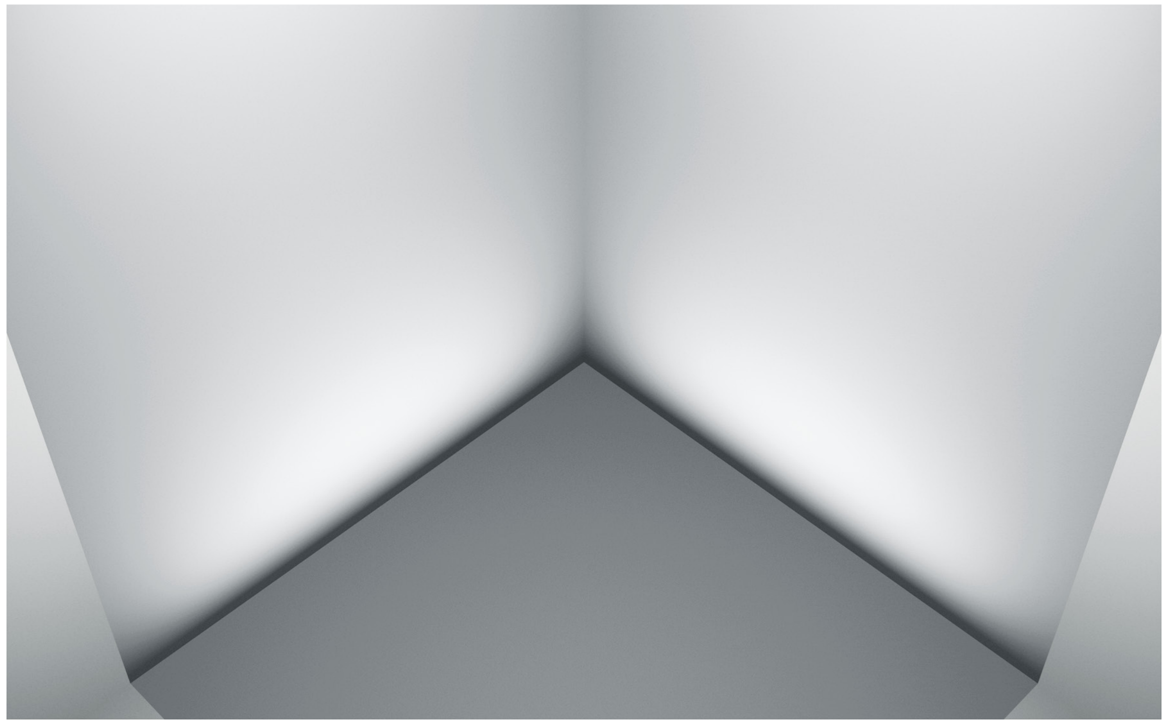
No. 91 / Uxmal 2 / 2003





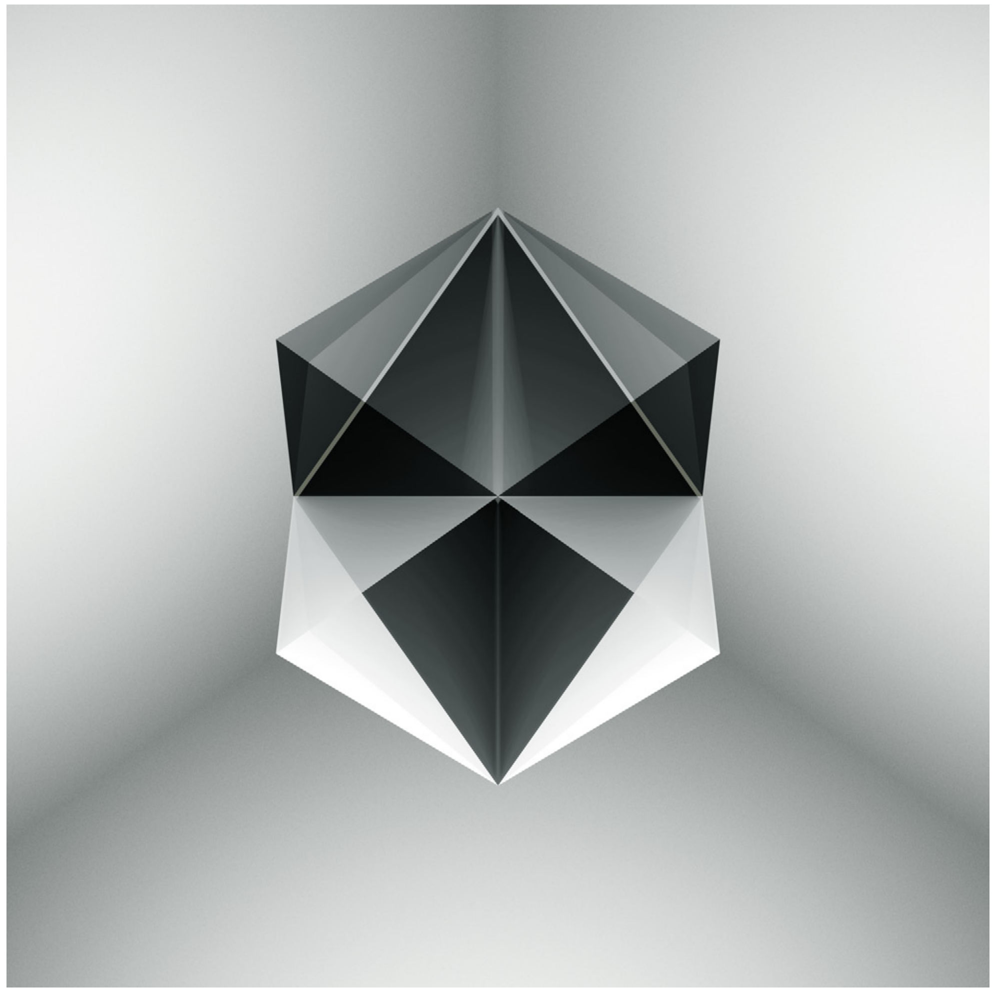
No. 91 / Uxmal 3-4 / 2003





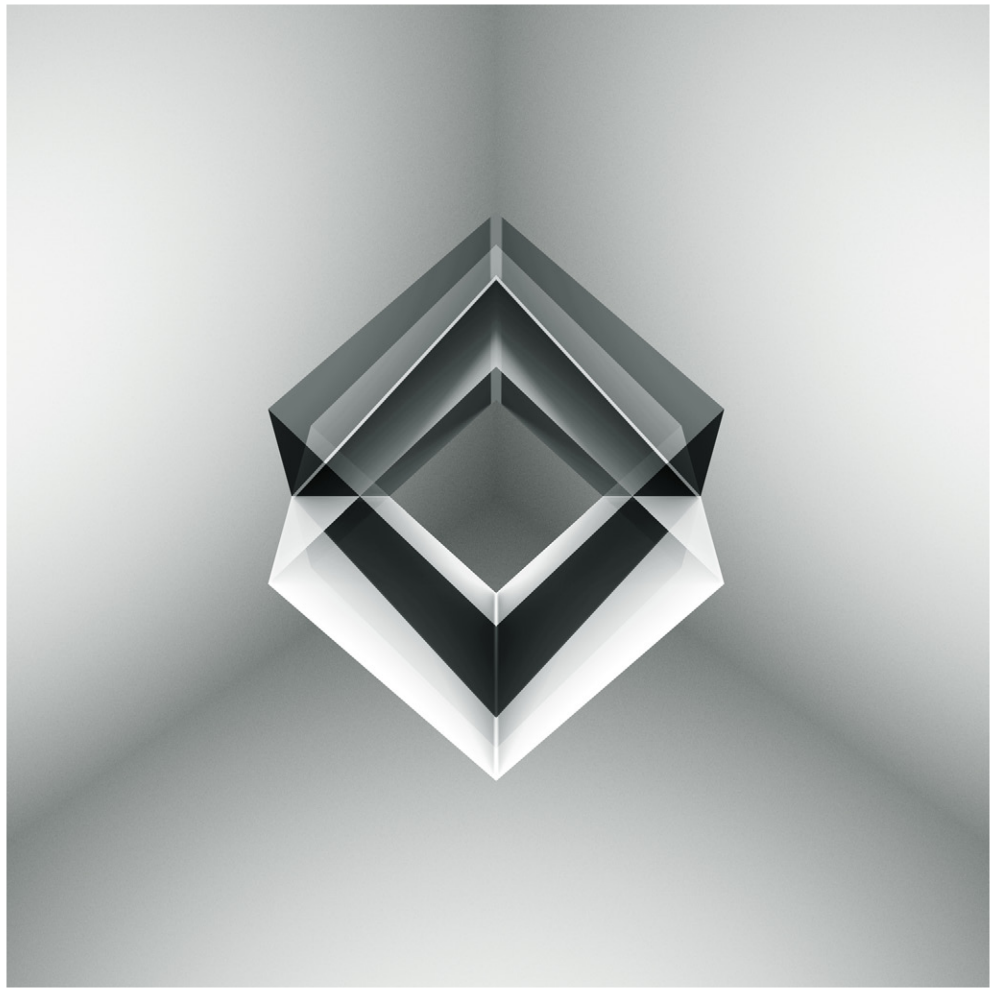
No. 92 / Extruded-square 1 / 2003

No. 92 / Extruded-square 2 / 2003

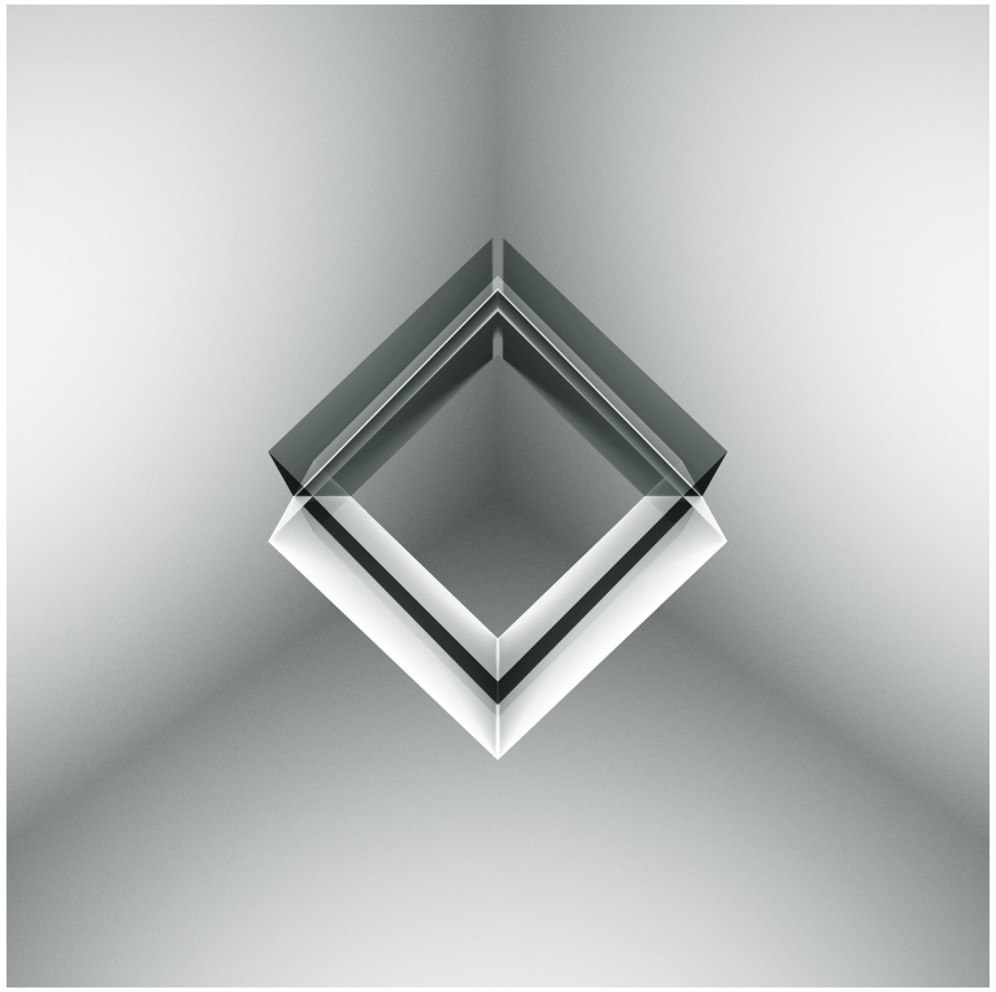


No. 92 / Extruded-square 3 / 2003

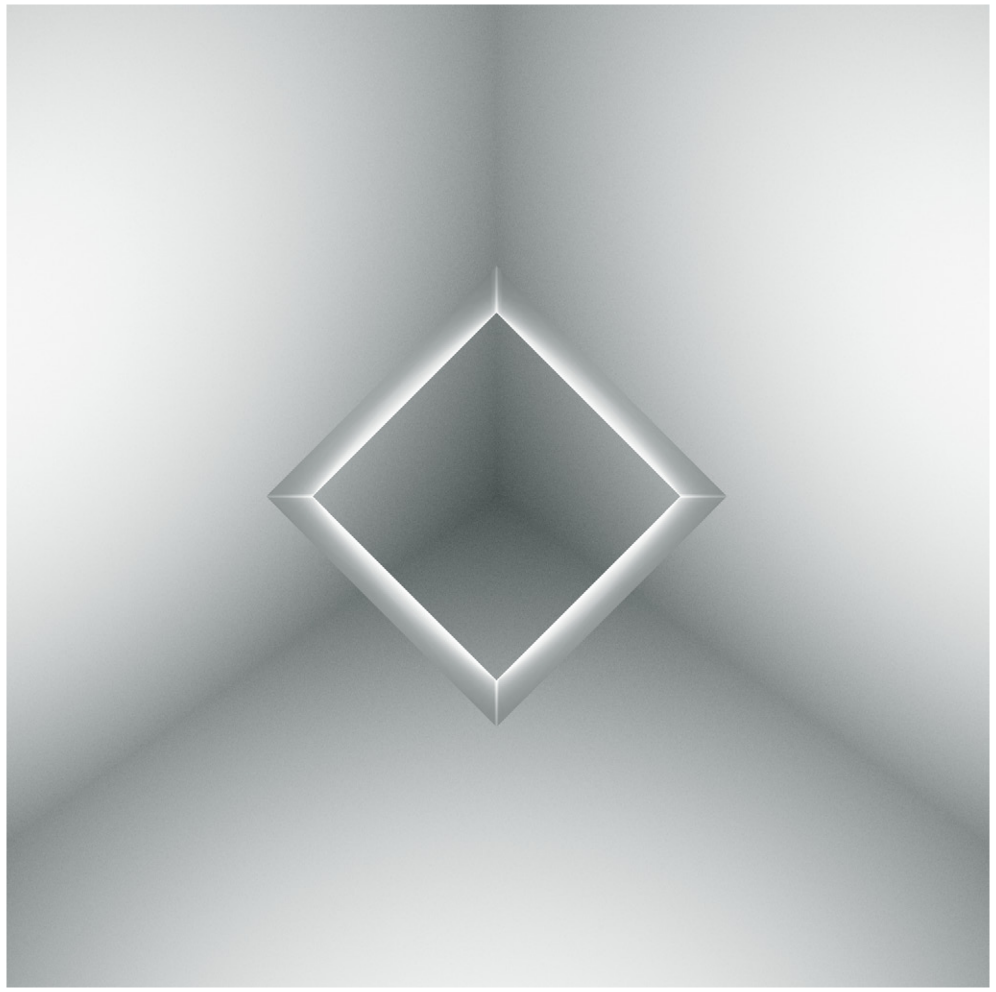
No. 92 / Extruded-square 4 / 2003



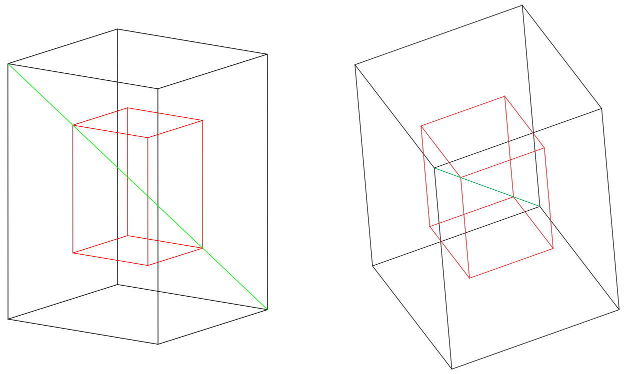
No. 92 / Extruded-square 5 / 2003

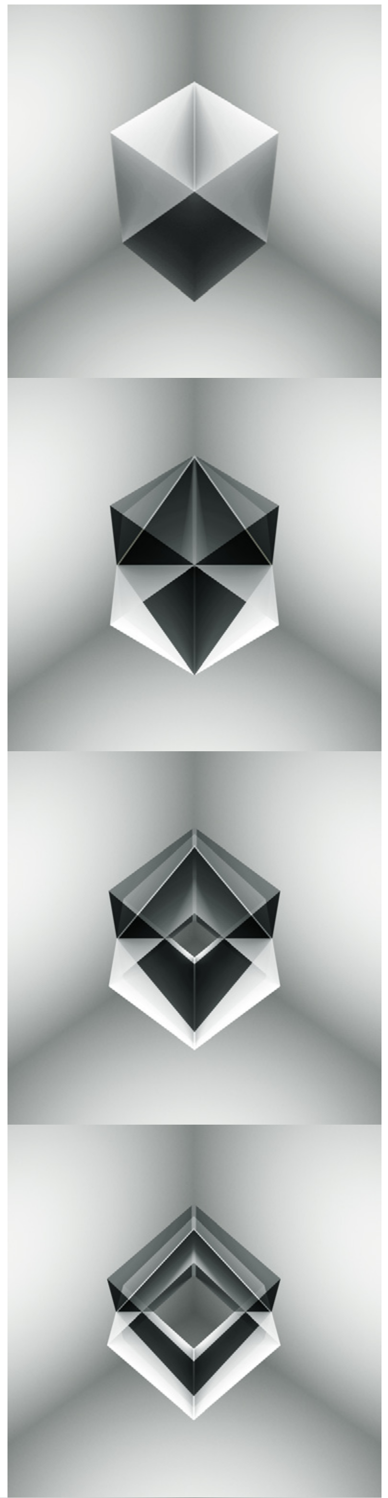


No. 92 / Extruded-square 6 / 2003

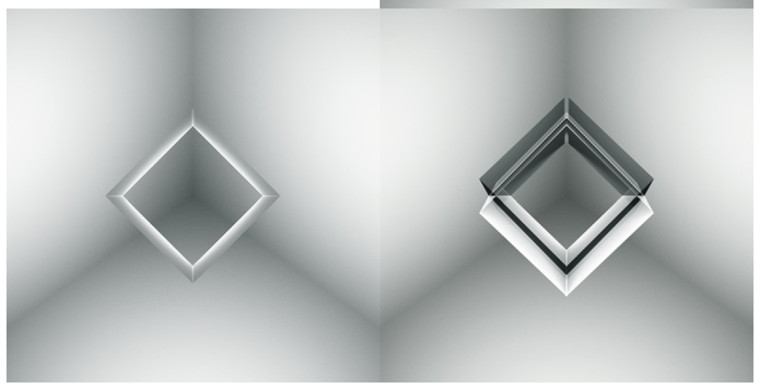


No. 92 / Extruded-square 7 / 2003



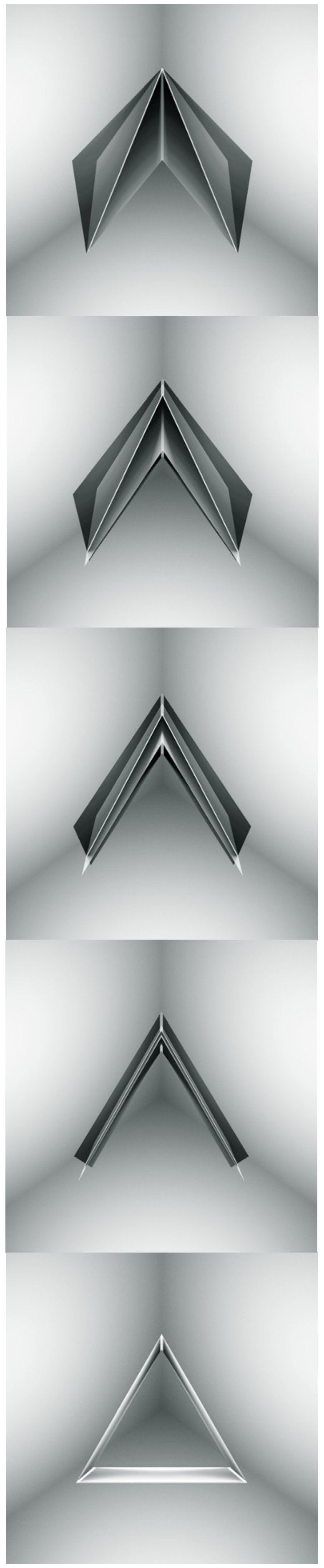


A square has been extruded (red) to the extend, that its diagonal (green) cuts in a 45º angle through the geometry, representing the angle of the camera. The extruded square and a copy, both semi transparent, rotate vertically in intervals of 11.25º in opposite directions, intersecting each other. The extruded squares are lit differently, allowing their intersections to contrast. The environment (black in the diagrams) is a scaled-up version of the extruded square. The images represent keyframes in an animation.

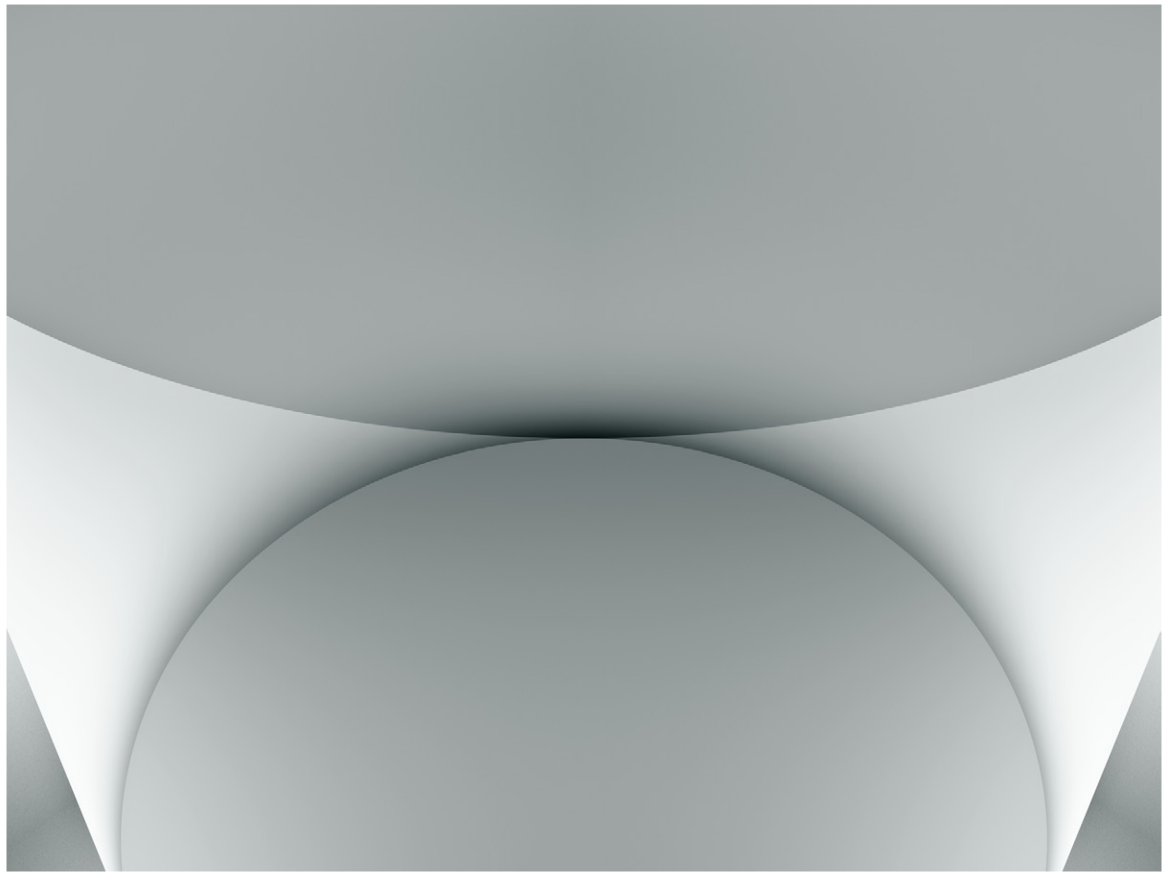


No. 93 / Extruded-triangle 1 / 2003

The extruded triangles follow the same rules as the extruded squares. The different lighting for the two identical geometries allows their intersections to contrast. In the four rotating triangles the base has been deleted.

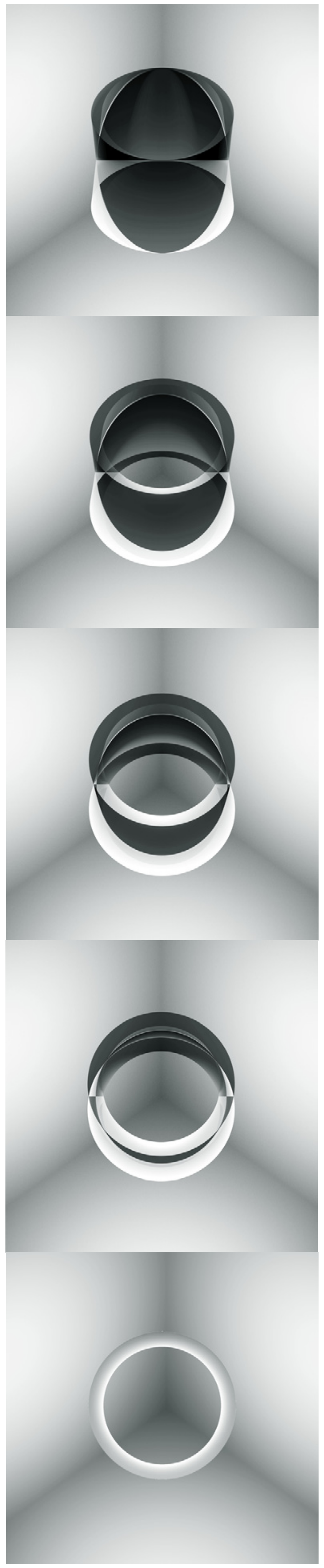


No. 93 / Extruded-triangles 3 - 7 / 2003

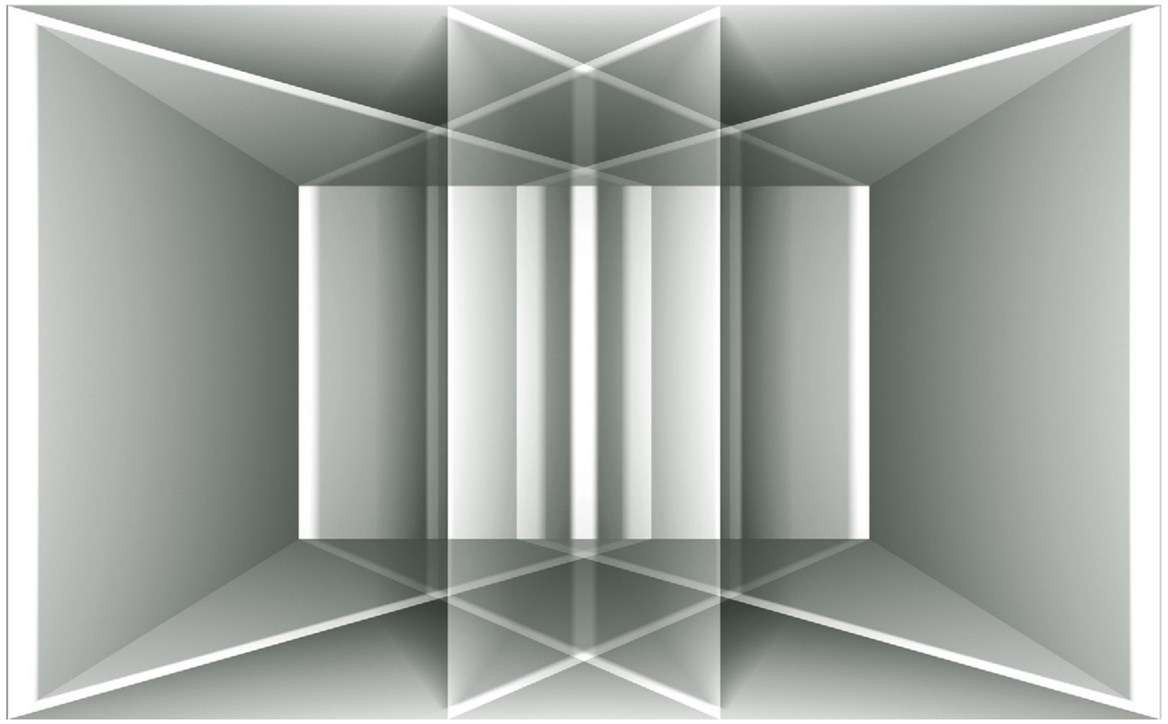


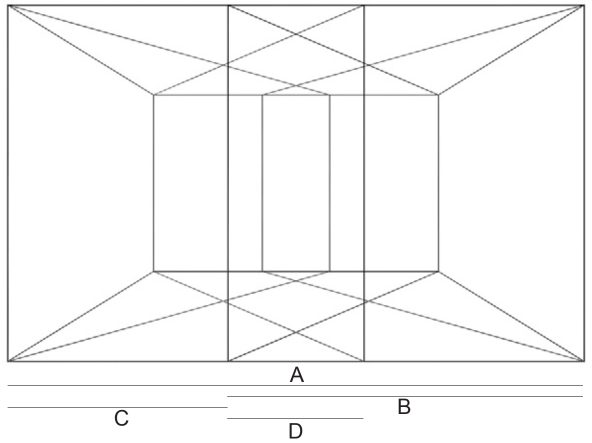
No. 94 / Extruded-circle 1 / 2003

The extruded circles follow the same rules as the extruded squares. The different lighting for the two identical geometries allows their intersections to contrast. The bottom image shows a single extruded circle.



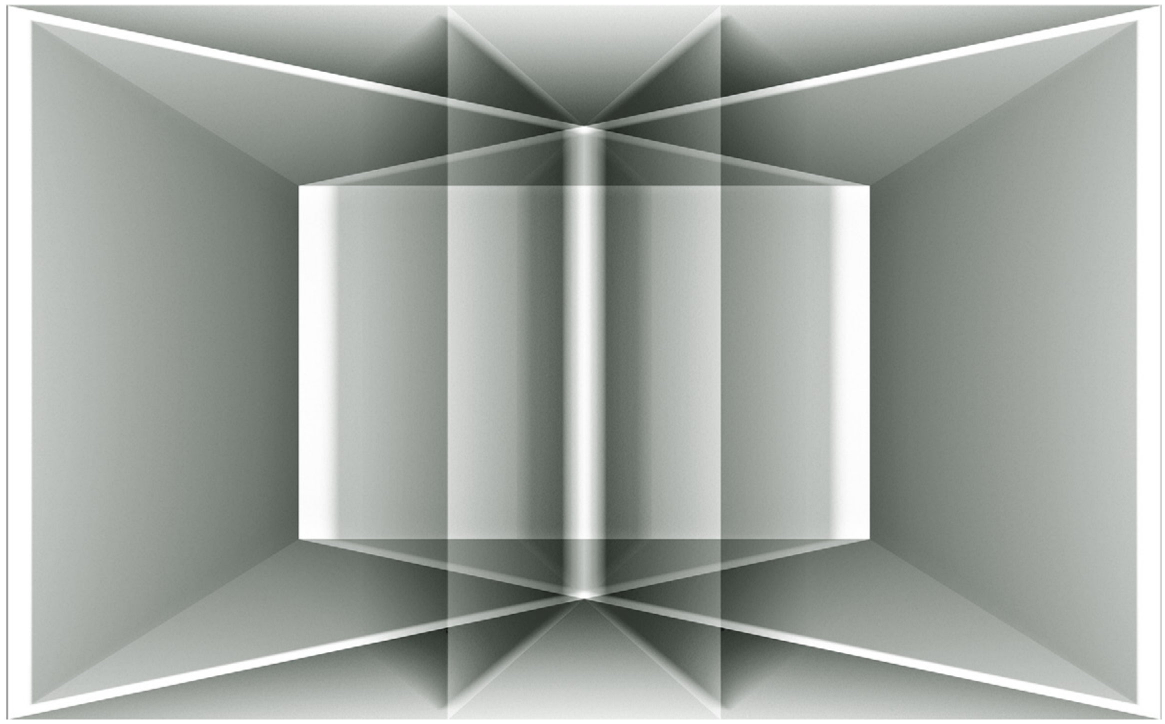
No. 94 / Extruded-circles 3 - 7 / 2003

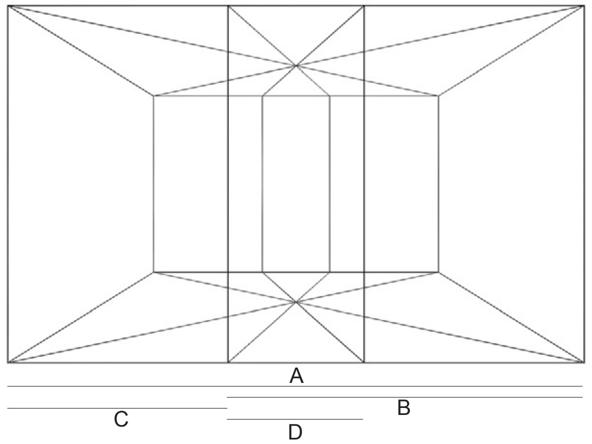




Within a perspective box, 10 units deep and high, length and width related by Φ, four planes connect the foreground rectangle with its proportional background. A,B,C,D relate to each other by Φ.

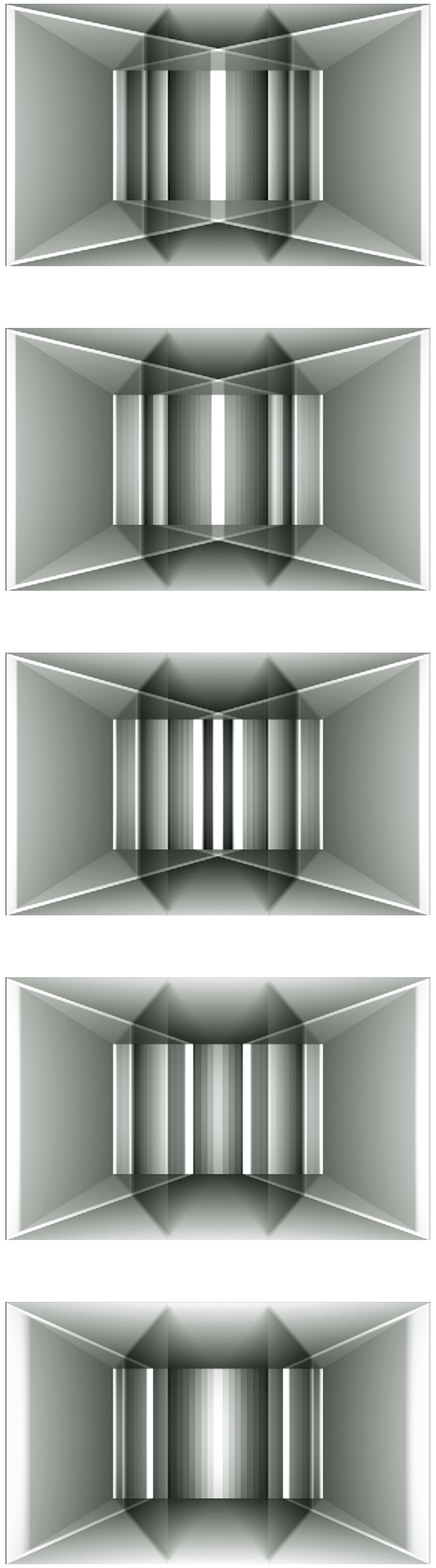
No. 95 / Environment 1 / 2004





The four planes connecting the foreground rectangle with its proportional background intersect each other in the center, creating the illusion of a column.

No. 95 / Environment 2 / 2004

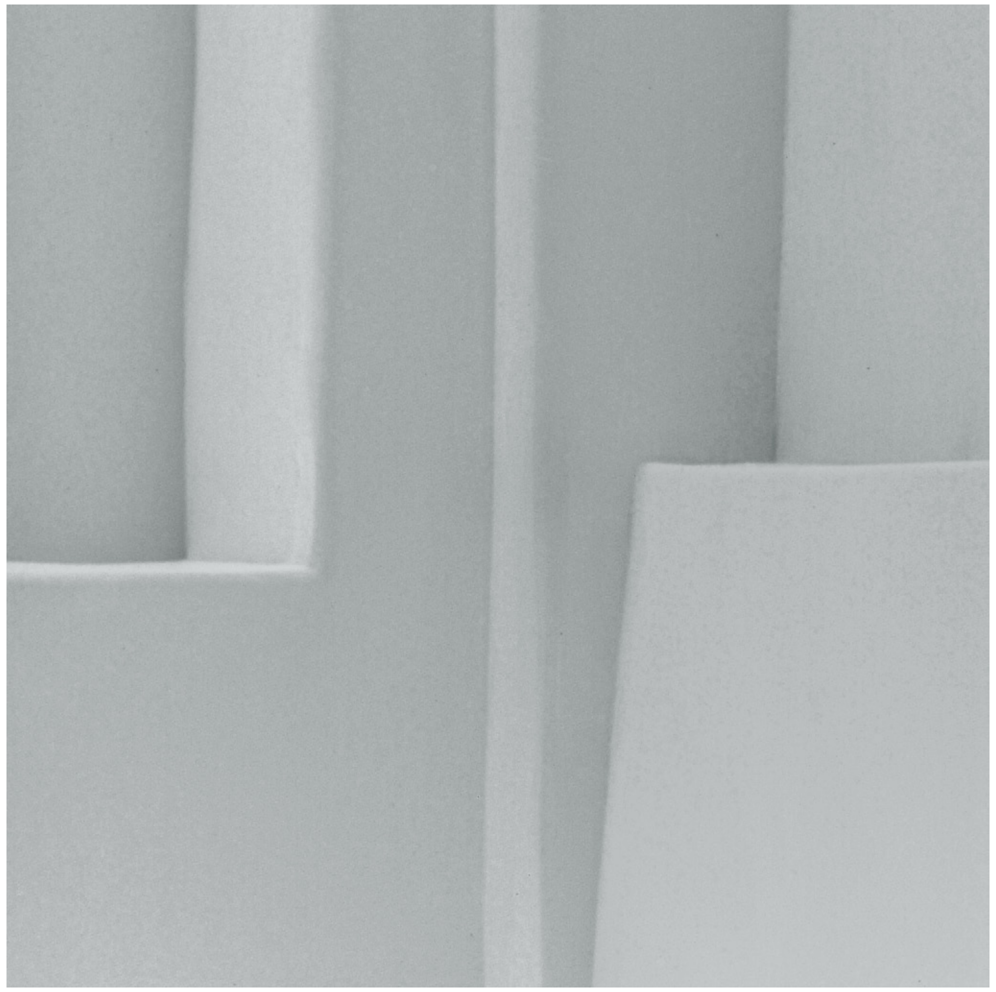


No. 95 / Environments-3f / 2007

No. 96 / Inside #1 / 2003

No. 96 / Inside #2 / 2004

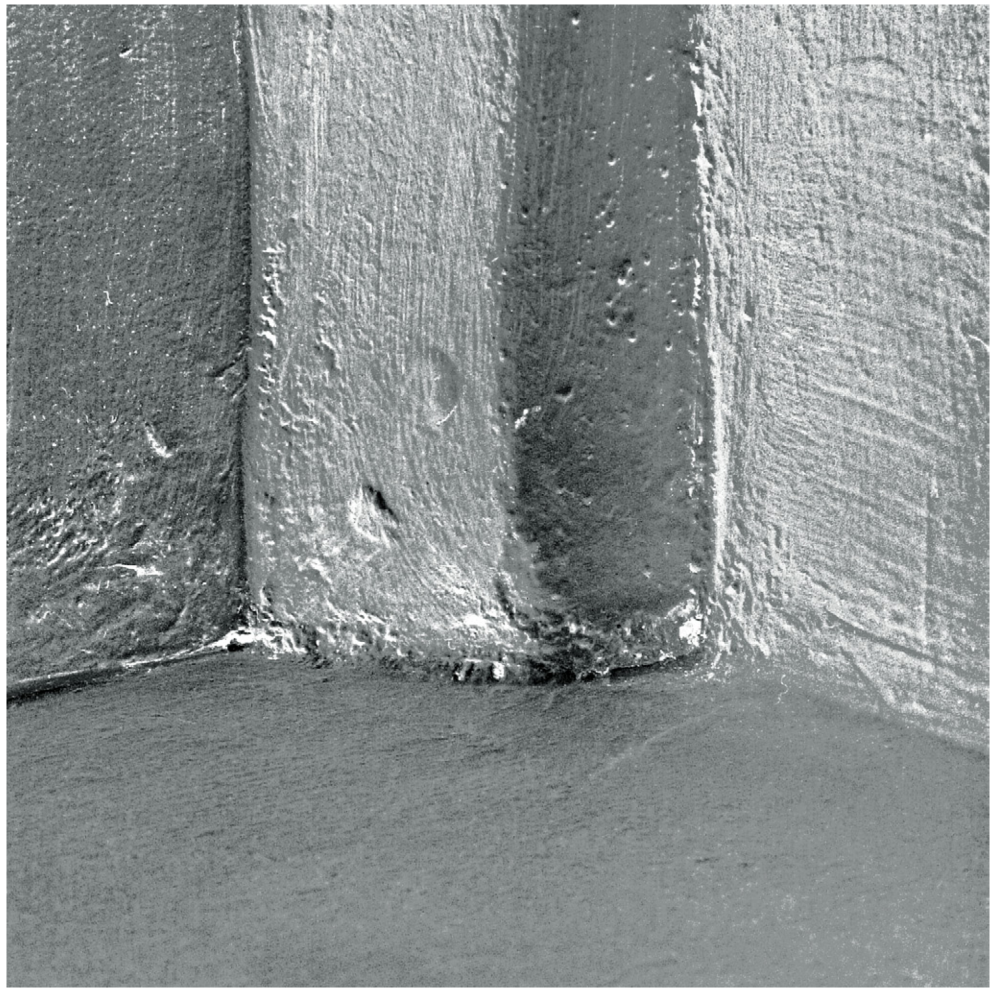
No. 96 / Inside #3 / 2004



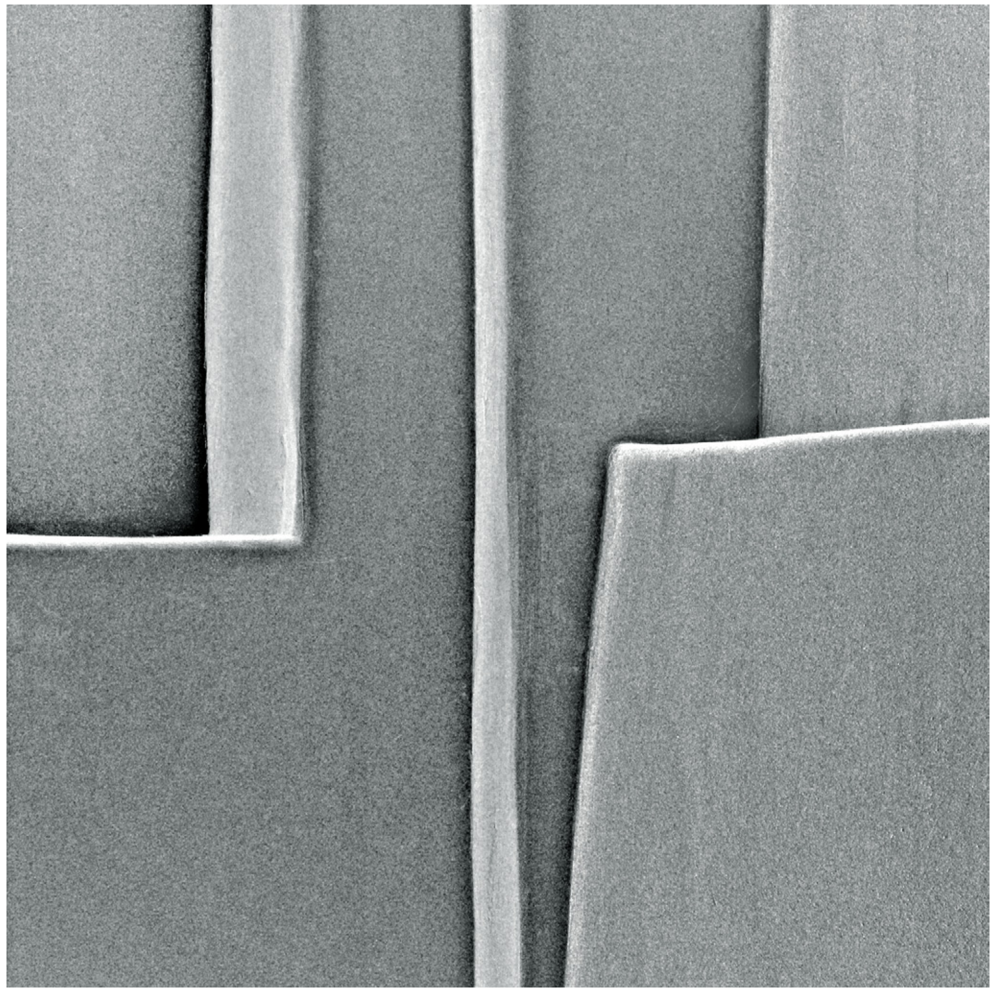
No. 96 / Inside #4 / 2004

No. 96 / Inside #5 / 2004

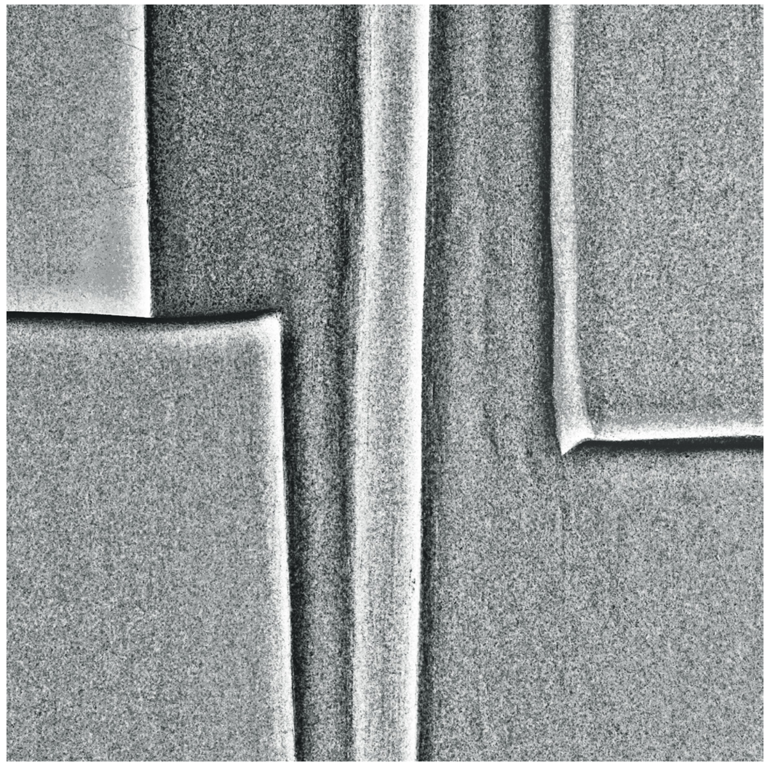
No. 96 / Inside #6 / 2004



No. 96 / Inside #7 / 2004



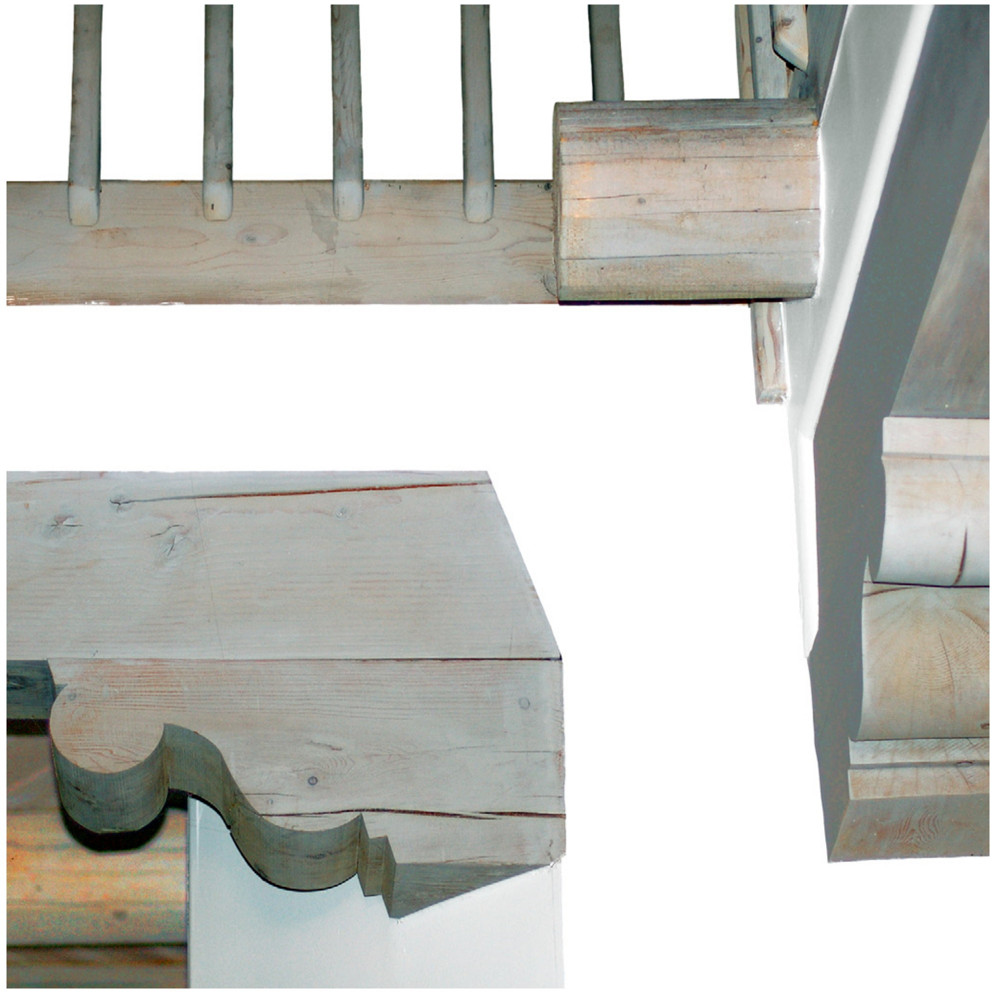
No. 96 / Inside #8 / 2005



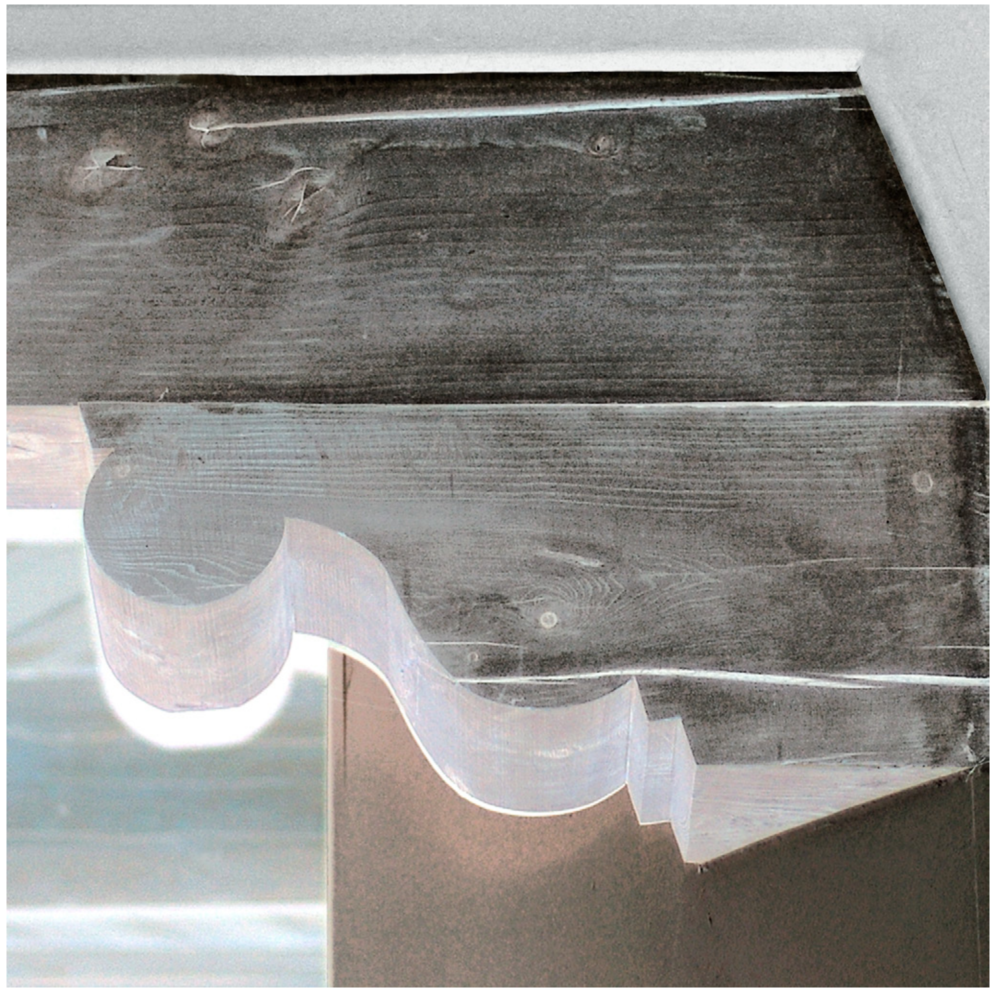
No. 96 / Inside #9a-b / 2005

No. 96 / Inside #10 / 2006

No. 96 / Inside #11 / 2005

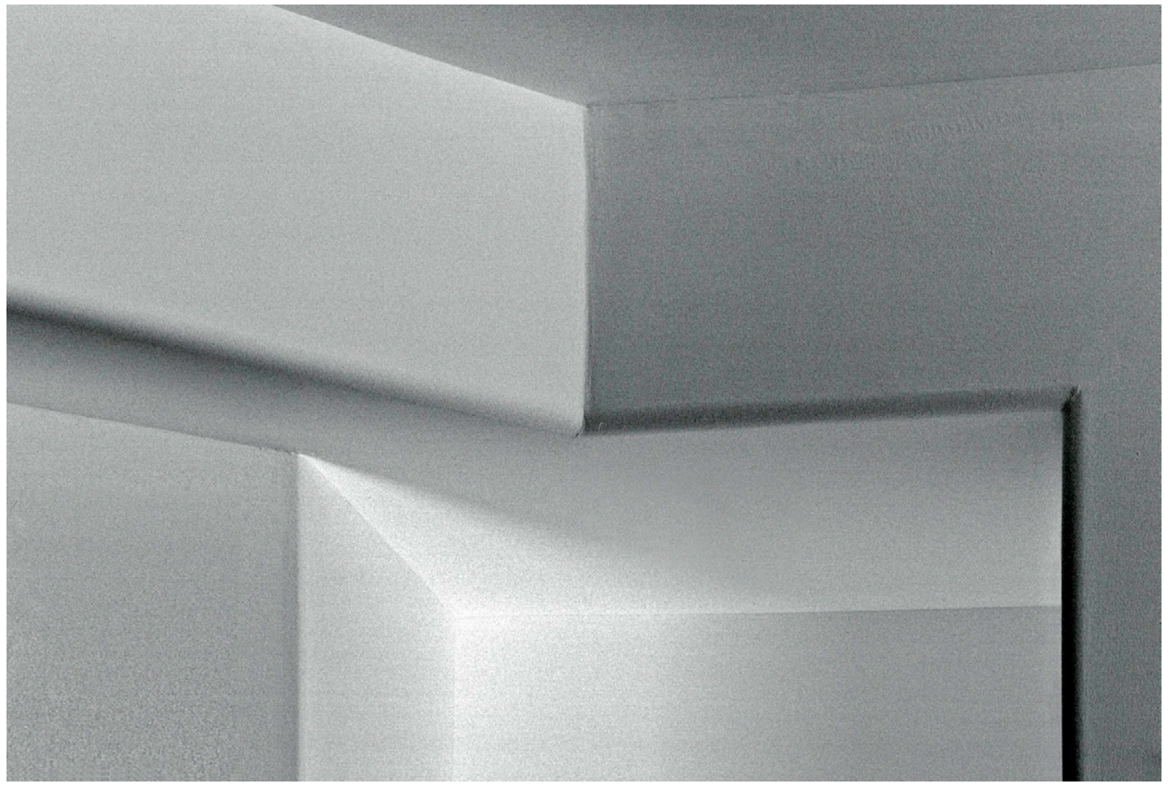


No. 96 / Inside #12 / 2006

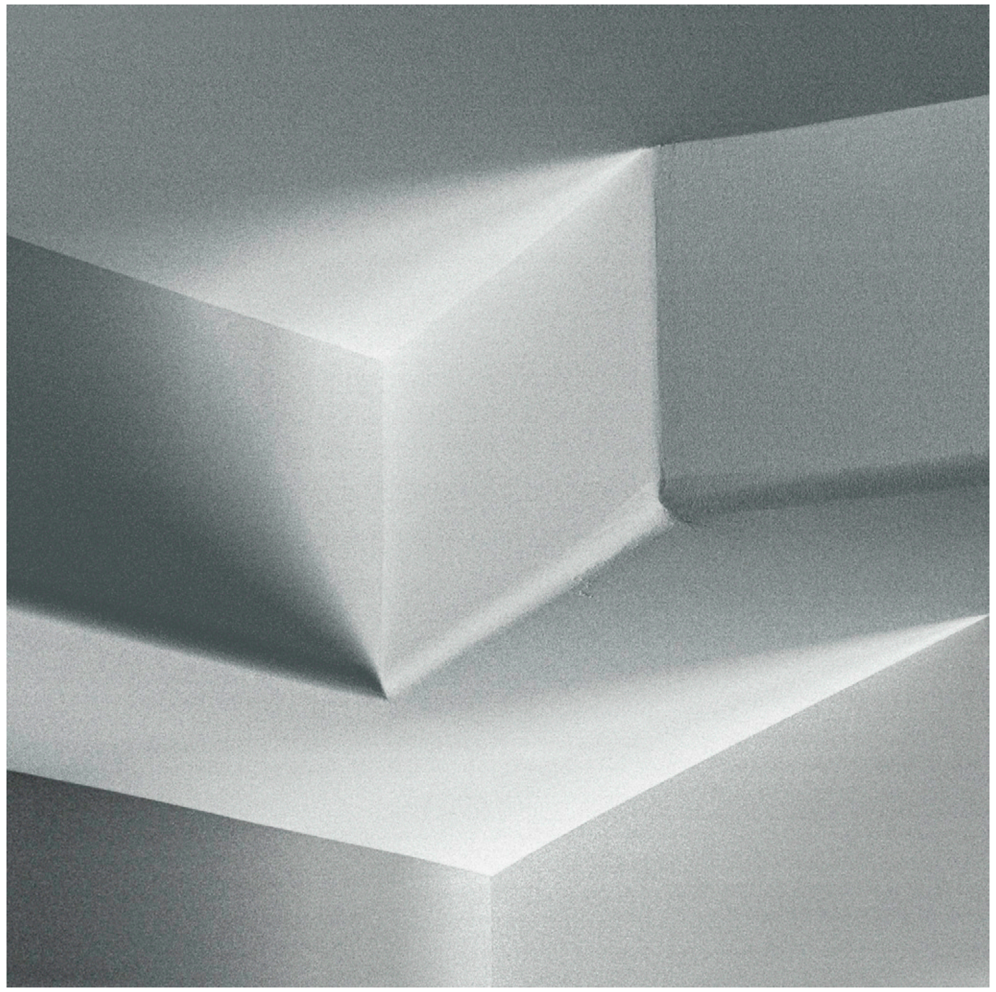


No. 96 / Inside #14 / 2006

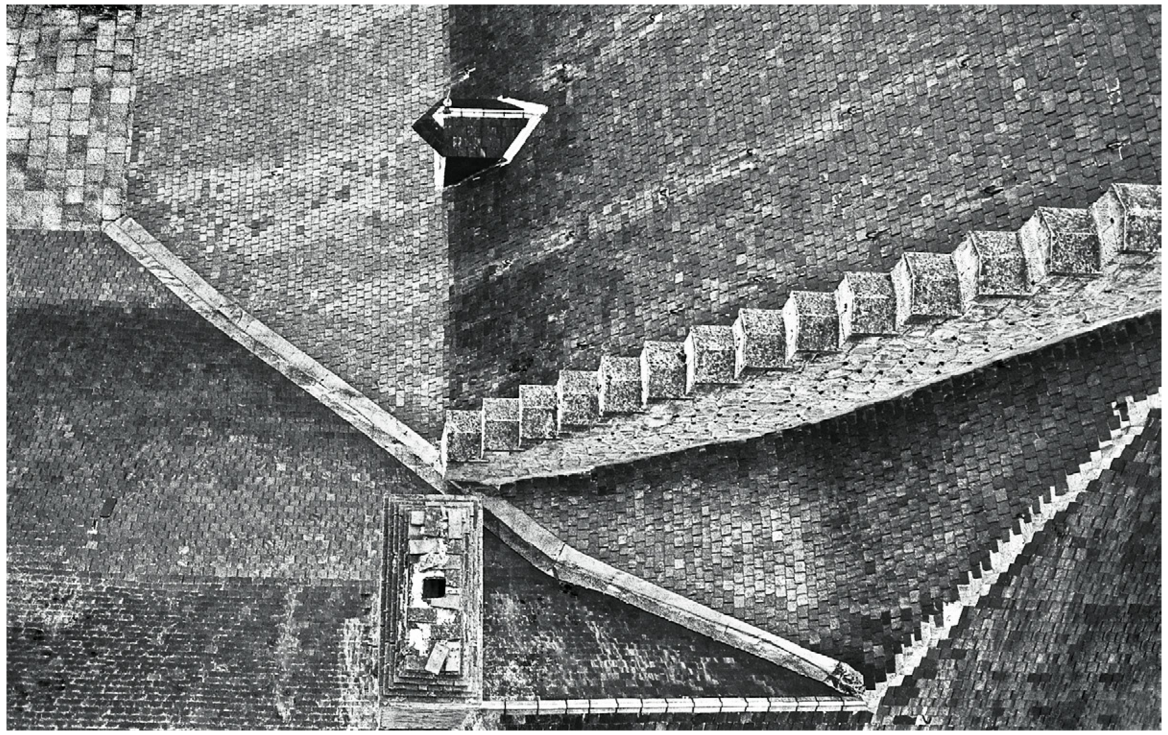
No. 96 / Inside #15 / 2008



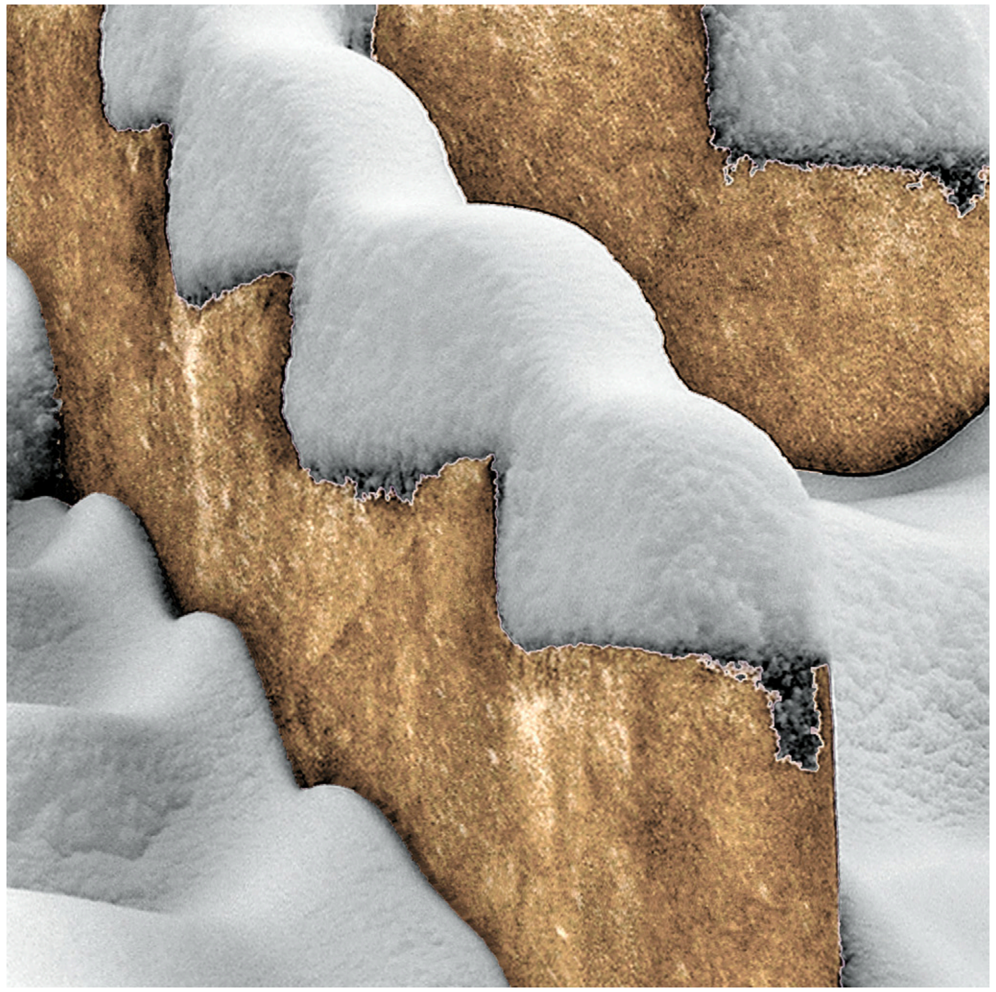
No. 96 / Inside #16 / 2009



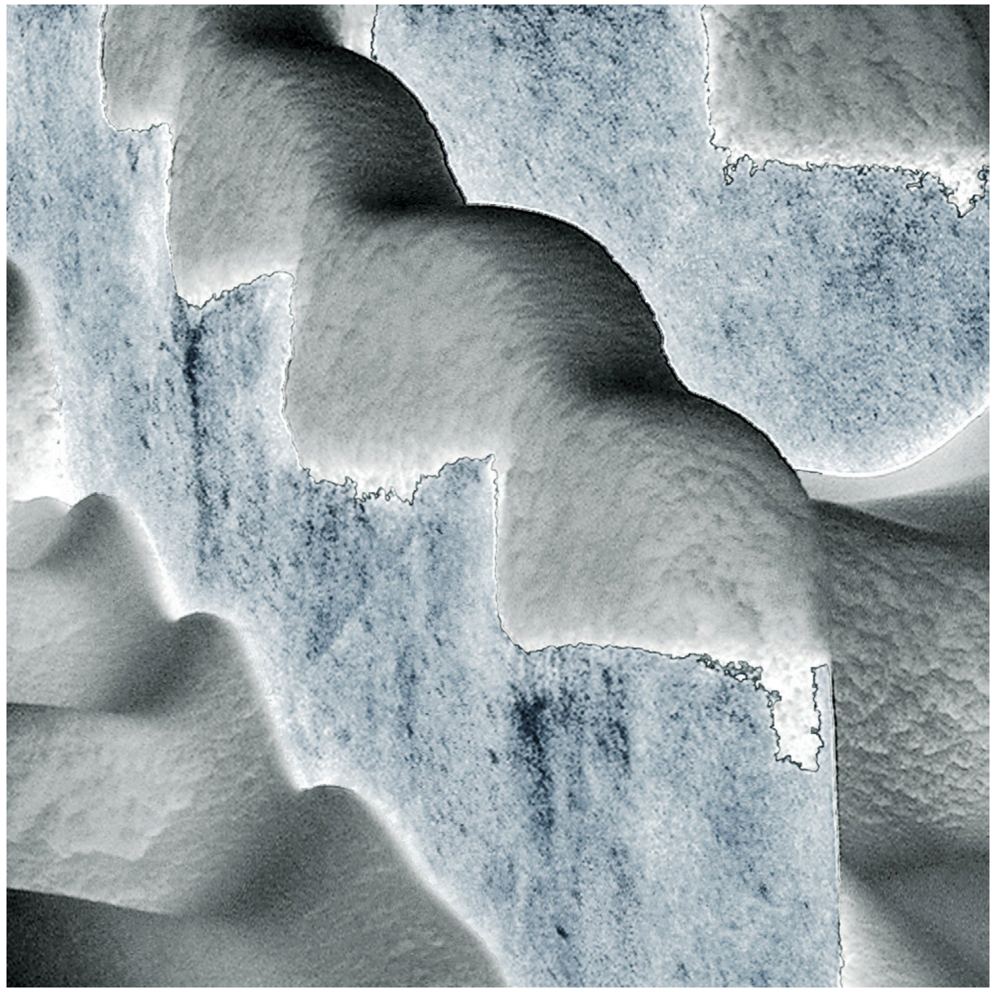
No. 96 / Inside #17 / 2009



No. 97 / Alcazar / 1958-2008



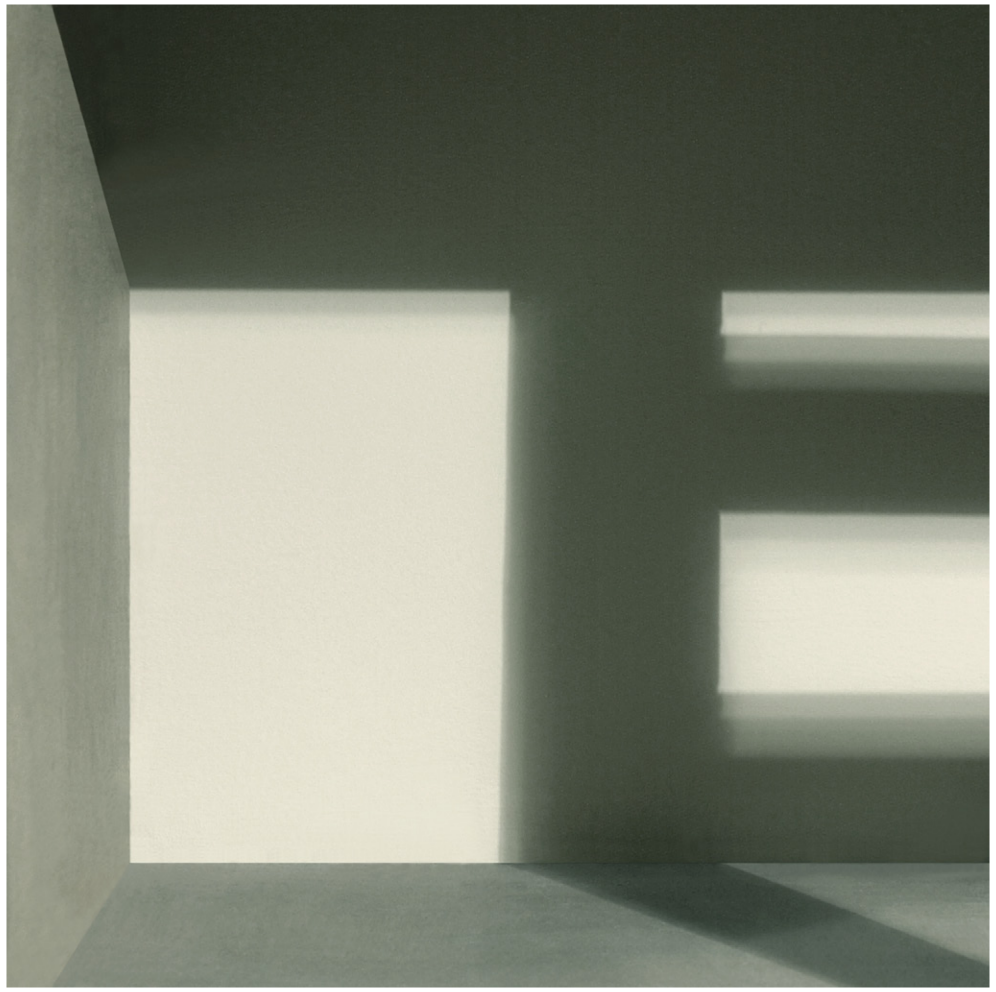
No. 98 / Outside #1a / 2005

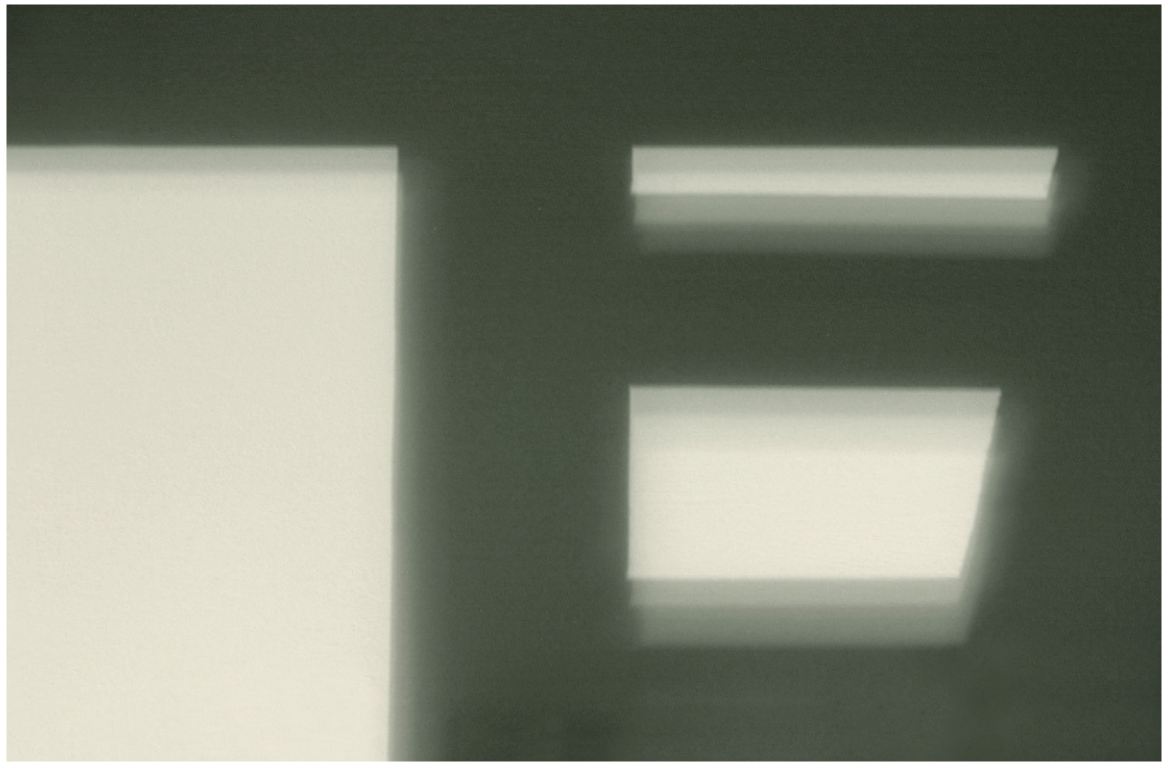


No. 98 / Outside #1b / 2005

No. 99 / Chair #1 / 2002

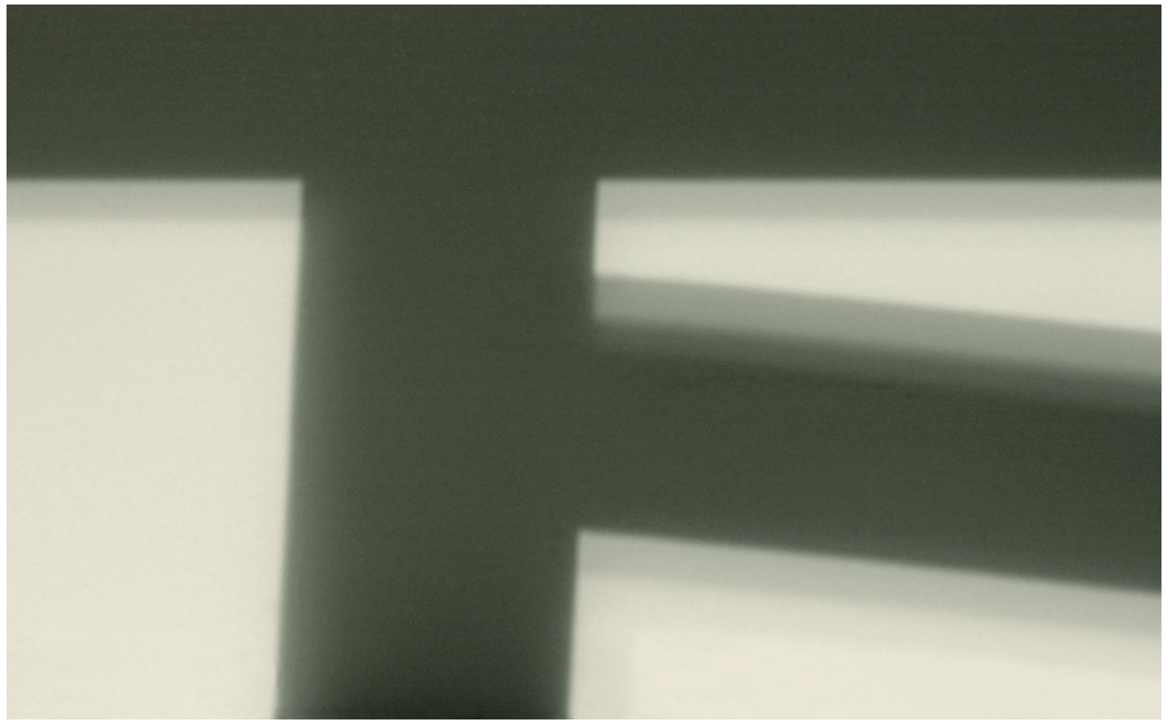
No. 99 / Chair #2 / 2004





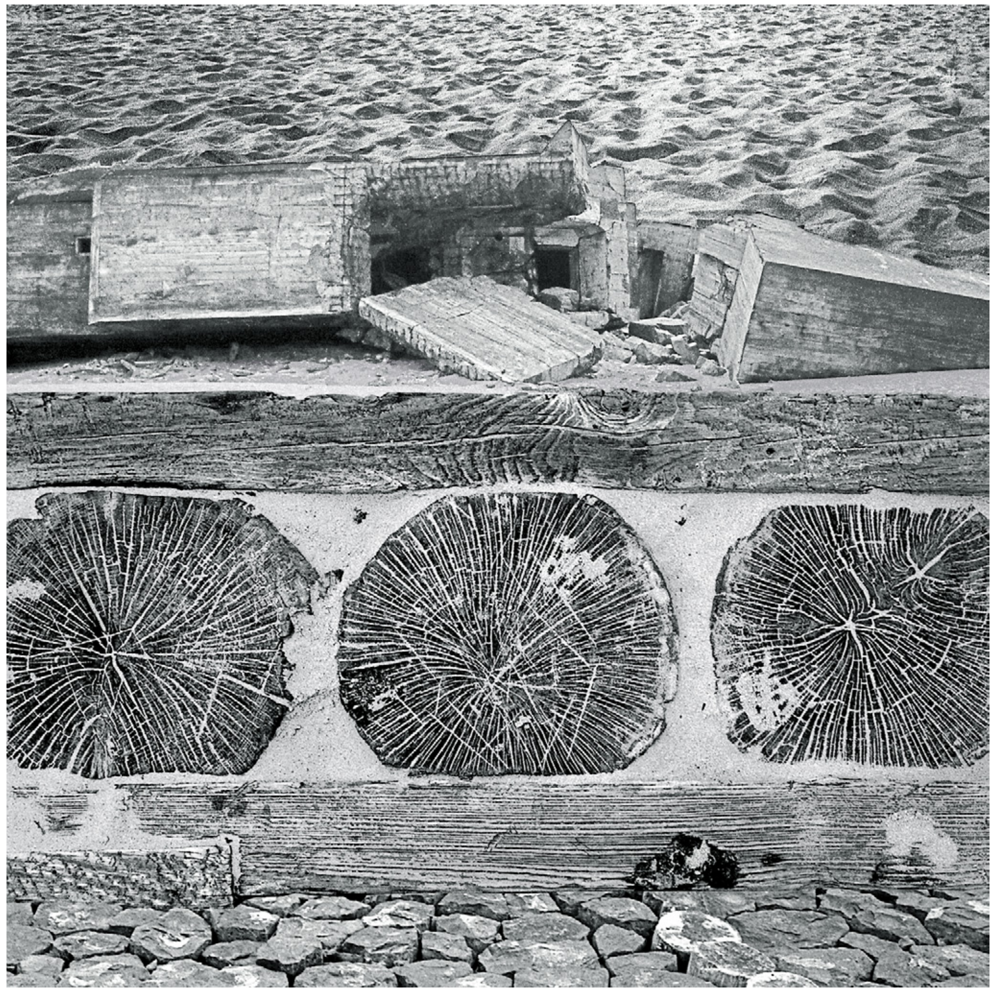
No. 99 / Chair #5 / 2004

No. 99 / Chair #6 / 2004



No. 99 / Chair #7 / 2004

No. 99 / Chair #8 / 2004

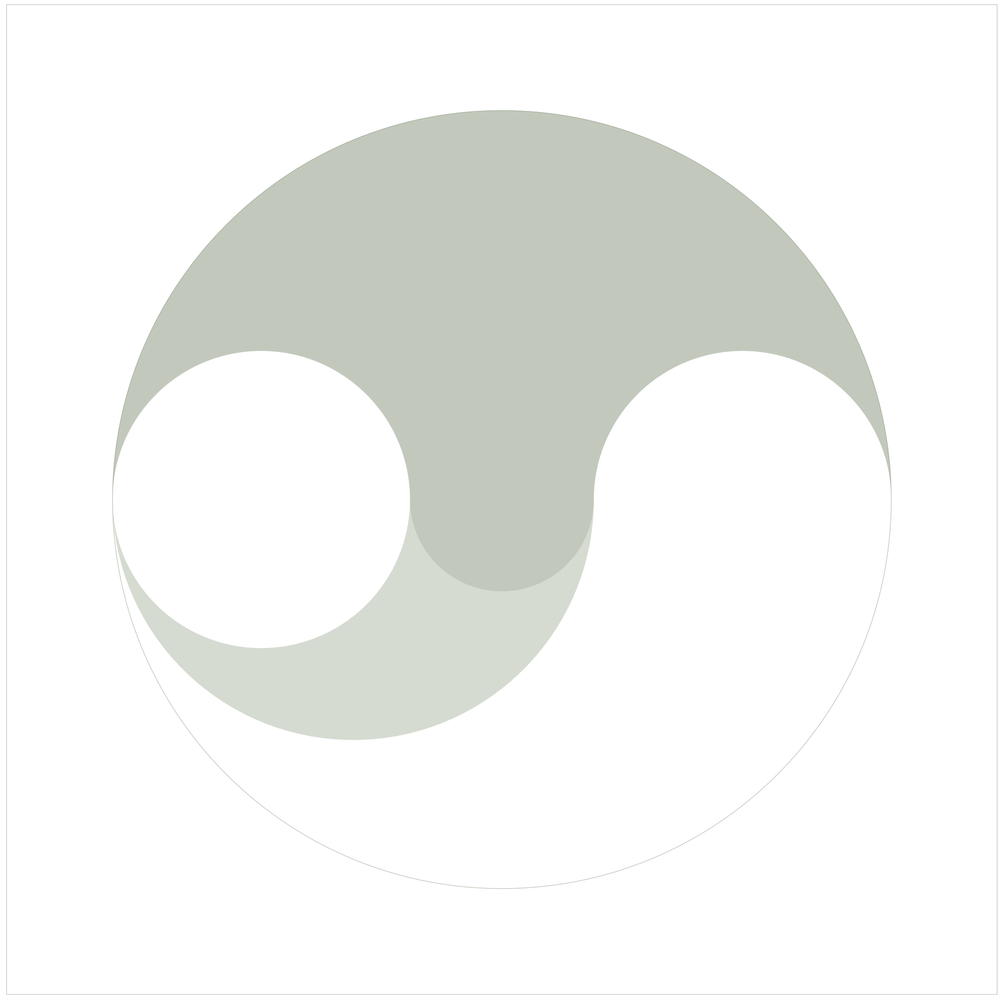


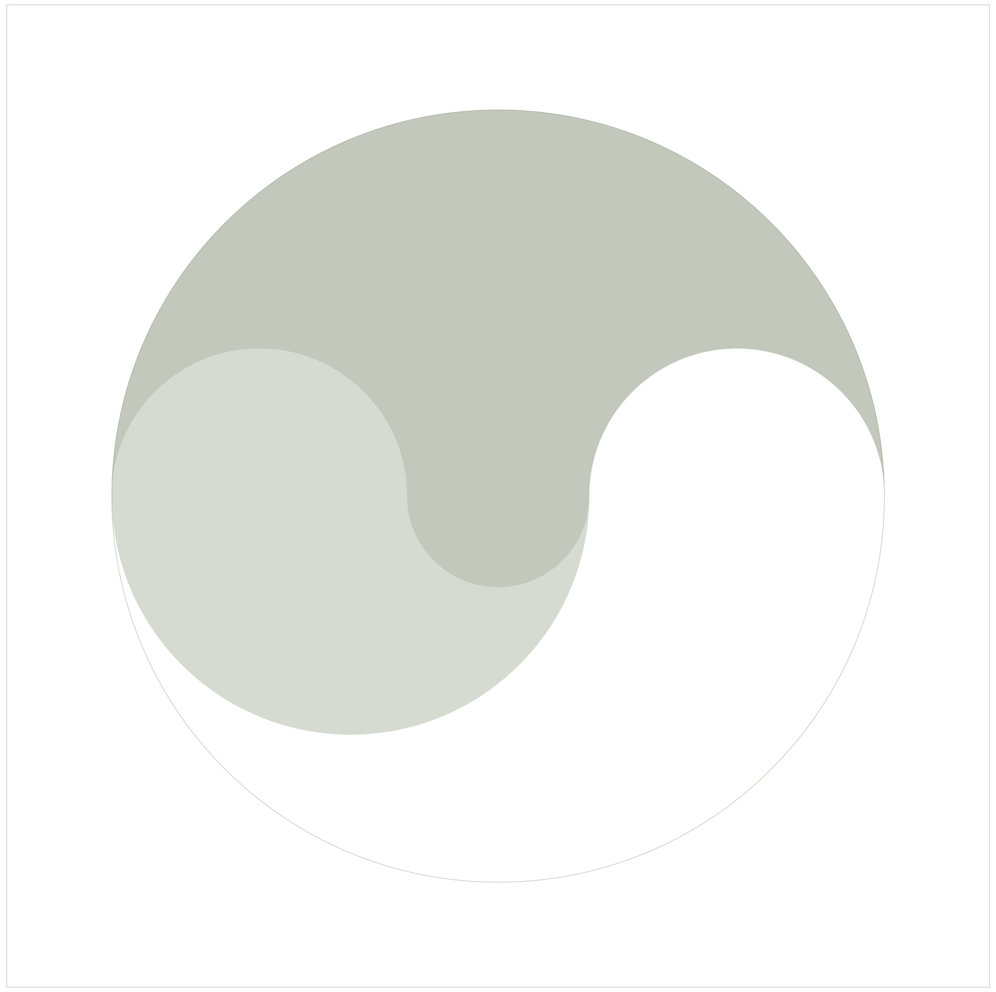
No. 100 / Castle by the sea / 1957-2005

No. 101 / Hovenweep / 2006

No. 102 / by the sea #1 / 2009

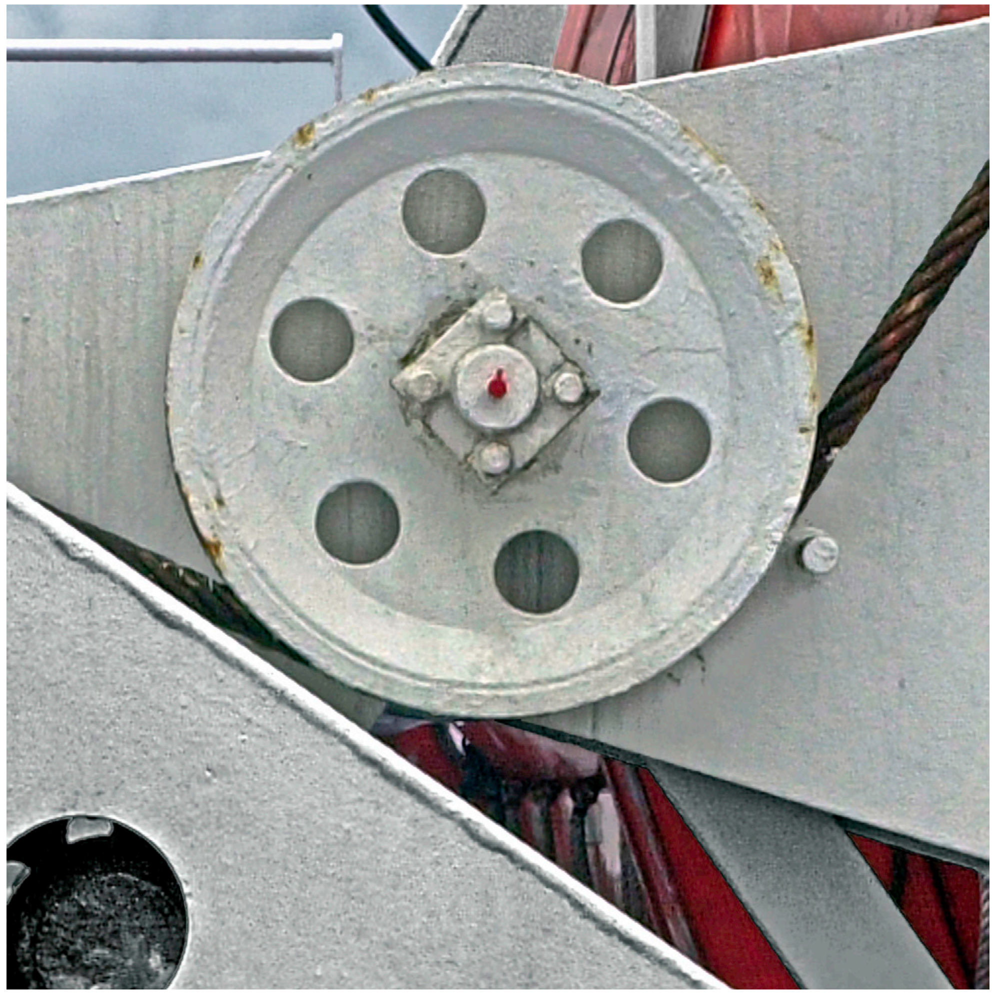
No. 102 / by the sea #2 / 2009



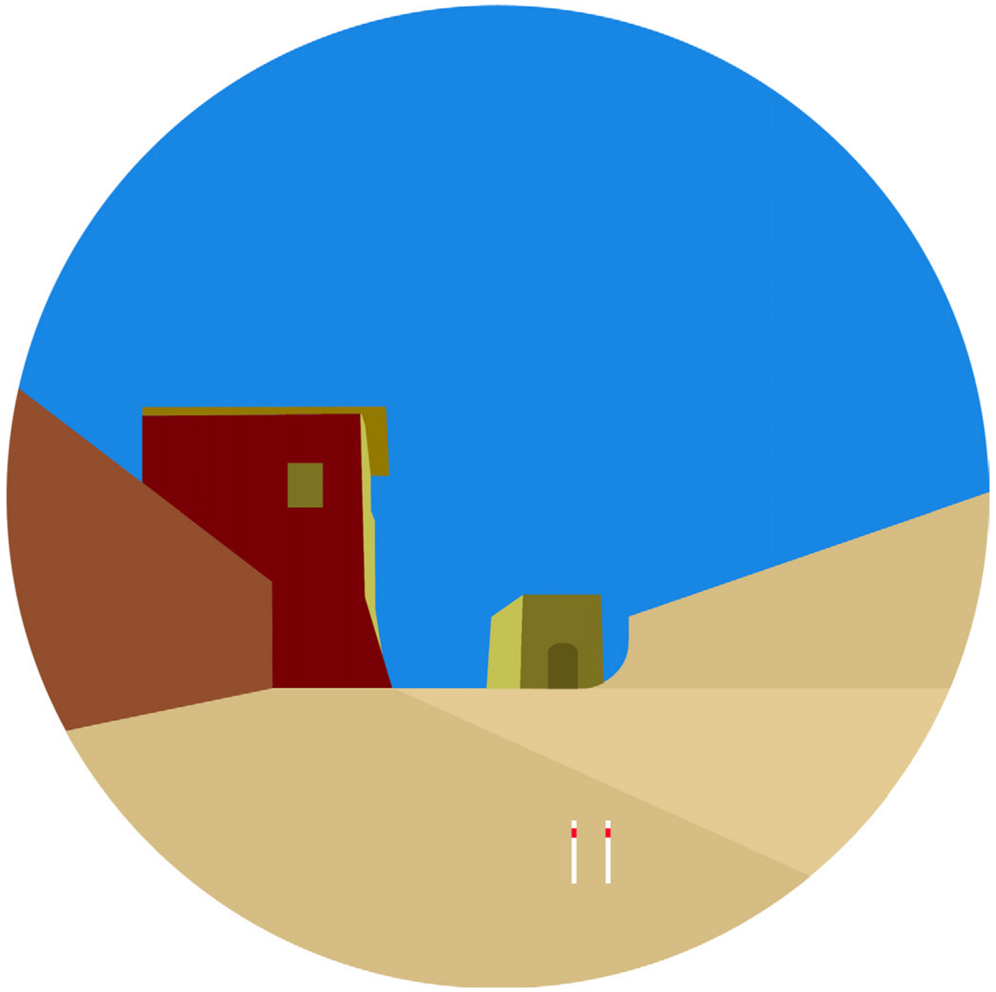


No. 103 / 2009

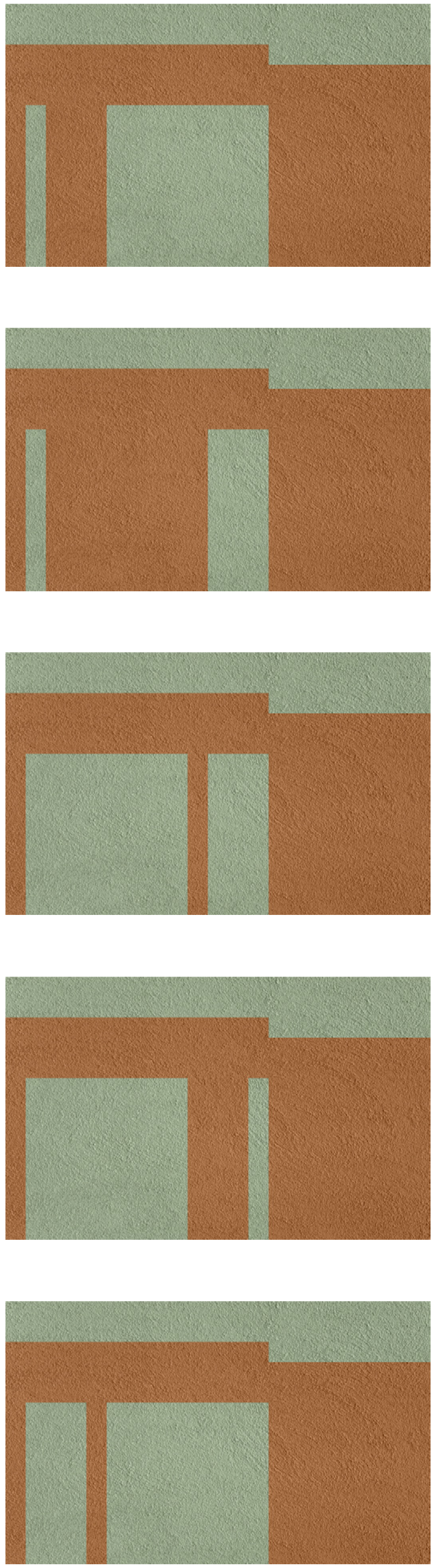
No. 104 / 2009



No. 105 / Stena / 2004-2010

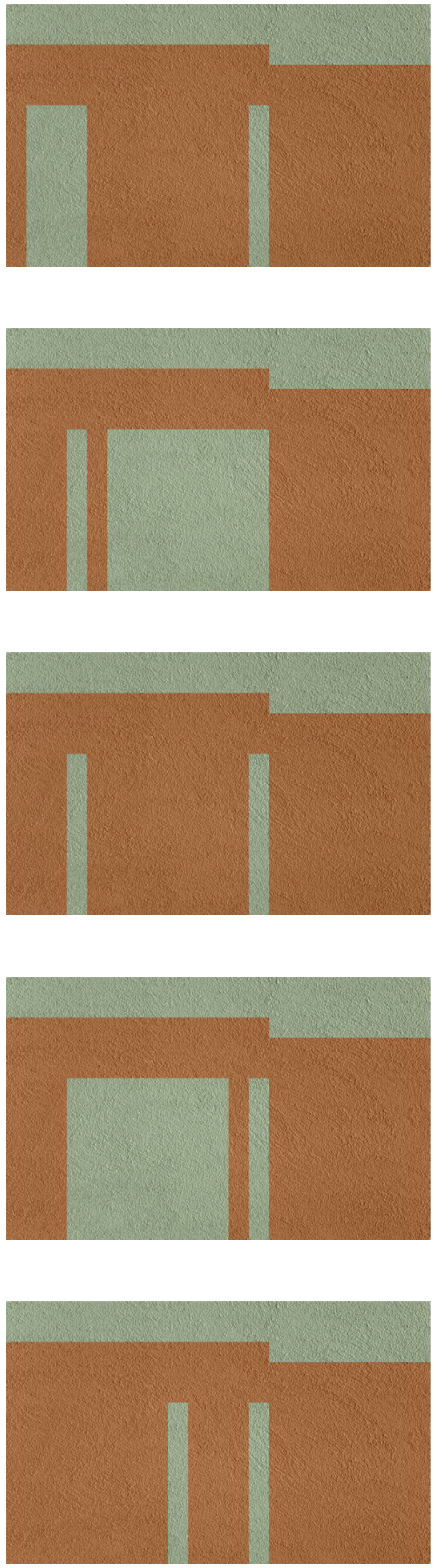


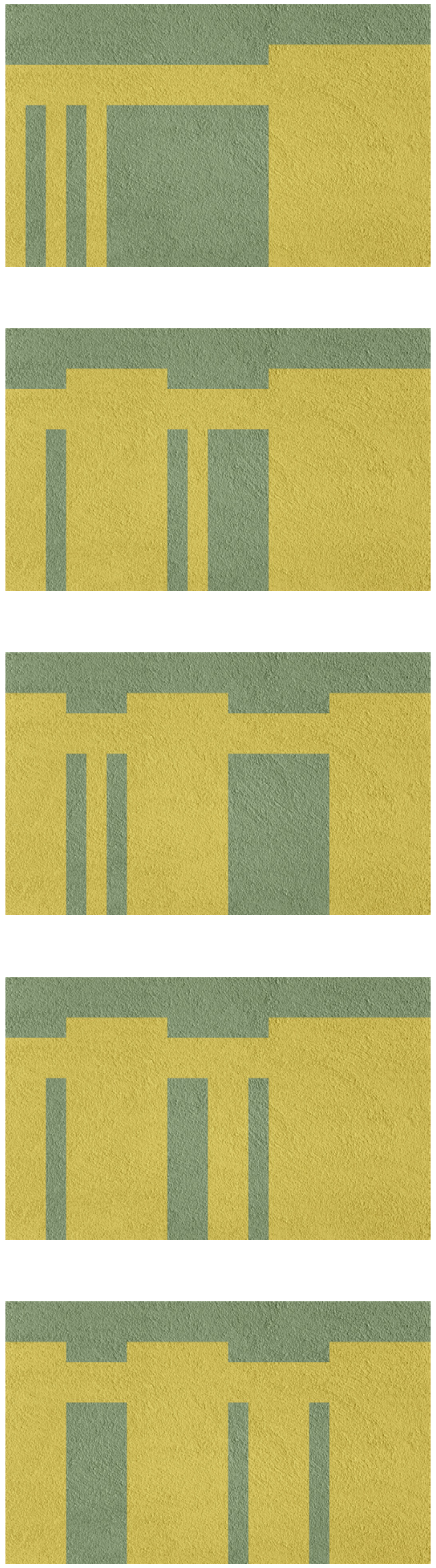
No. 106 / after G. Wals / 2010



No. 107 / House 49 - five #1-5 / 2011

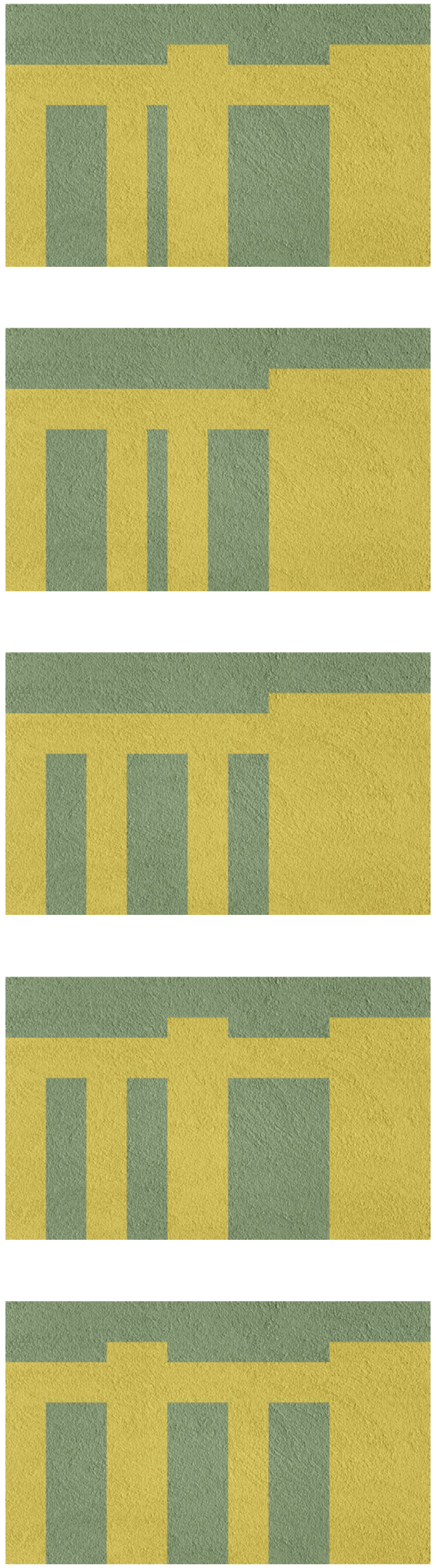
No. 107 / House 49 / five #9-10 / 2011

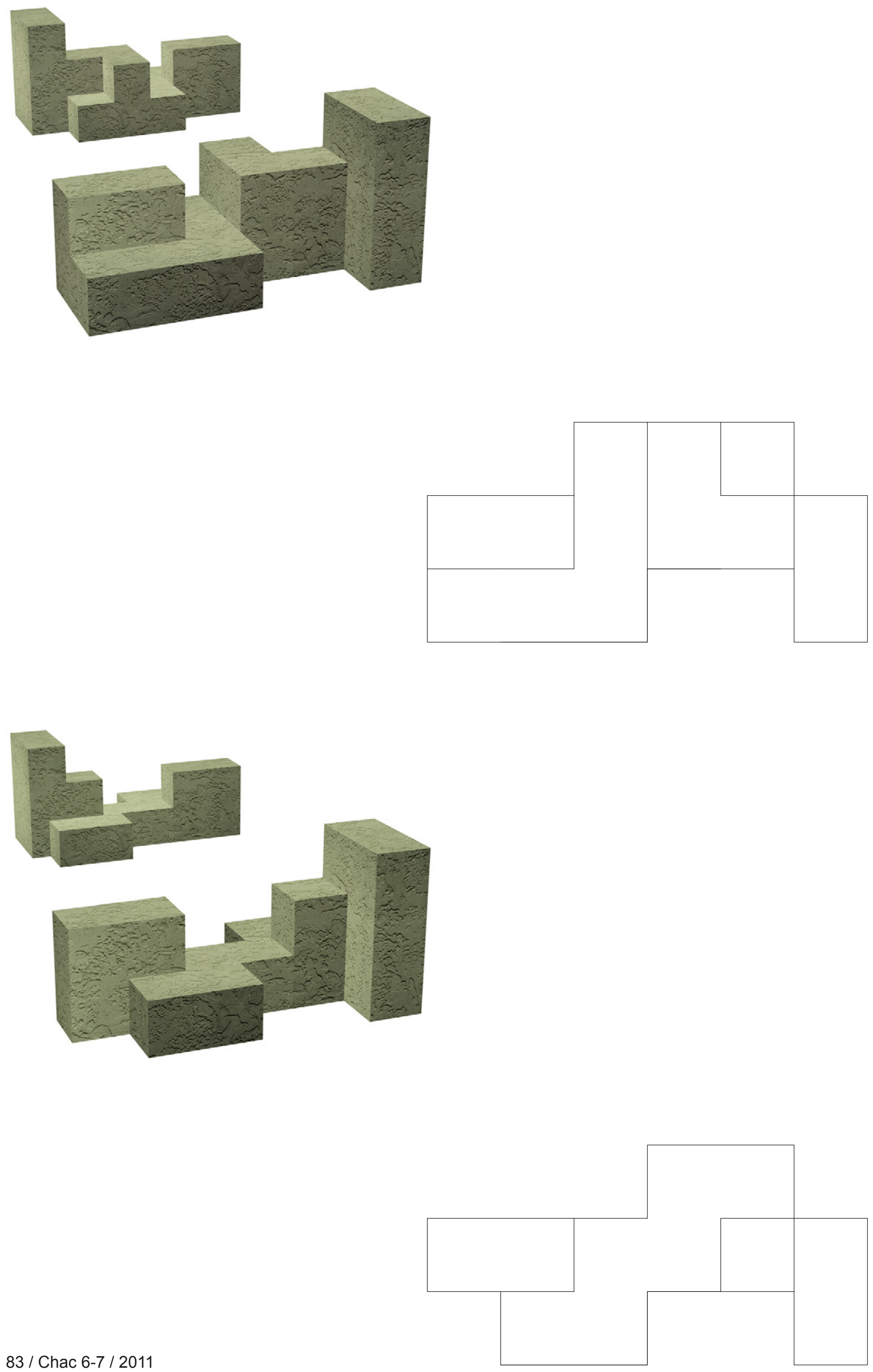




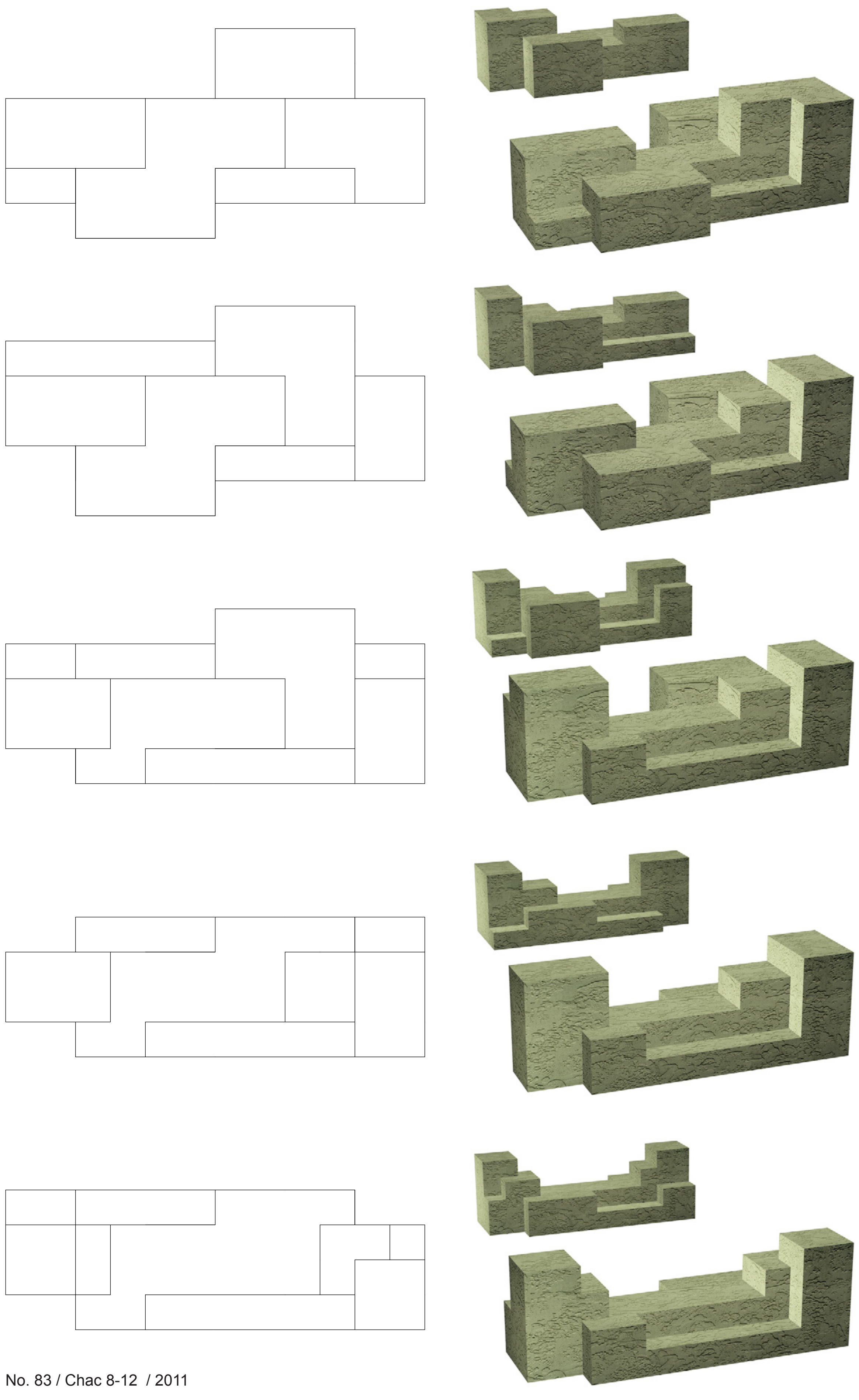
No. 107 / House 49 - seven #1-5 / 2011

No. 107 / House 49 / seven #9-10 / 2011

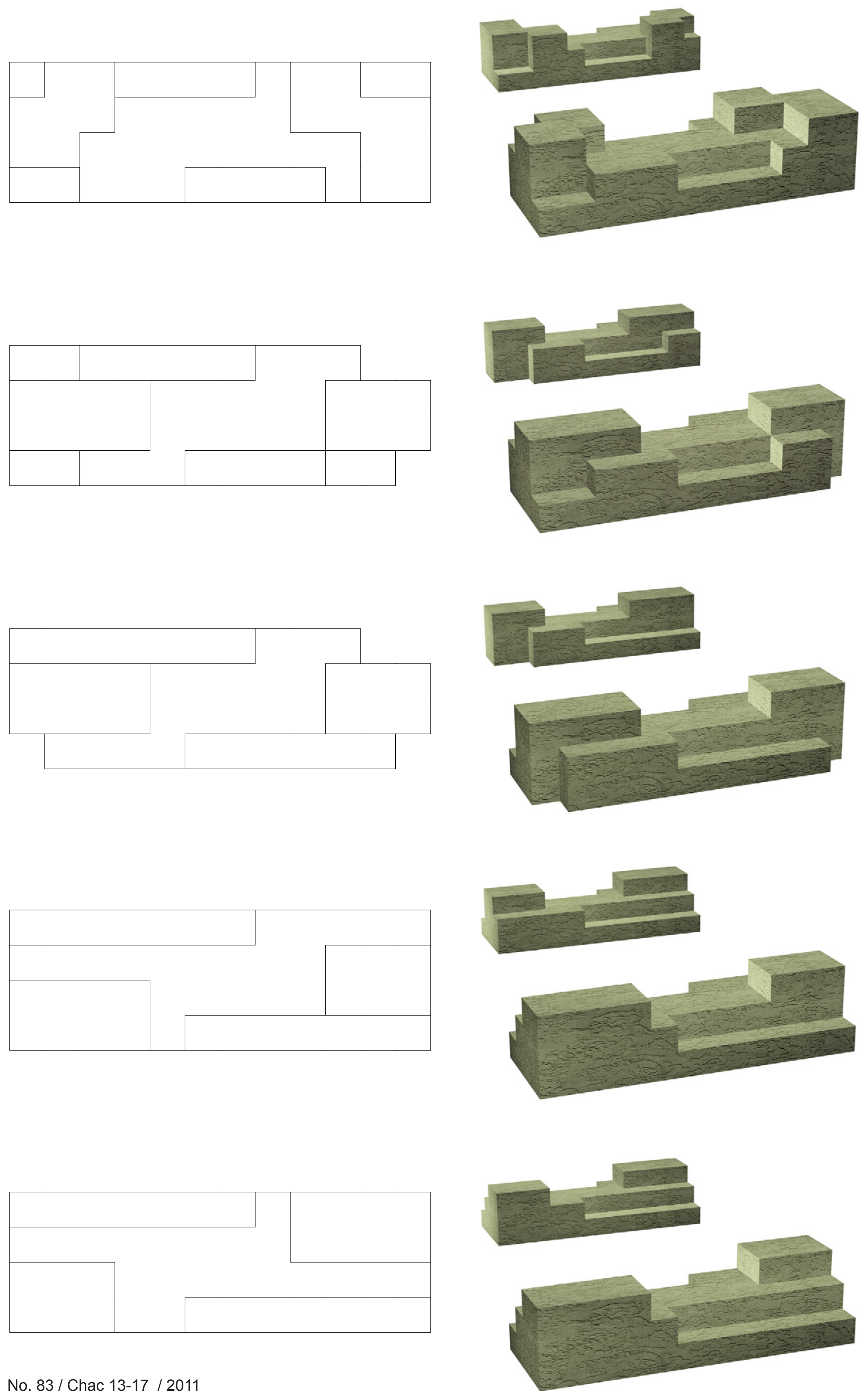




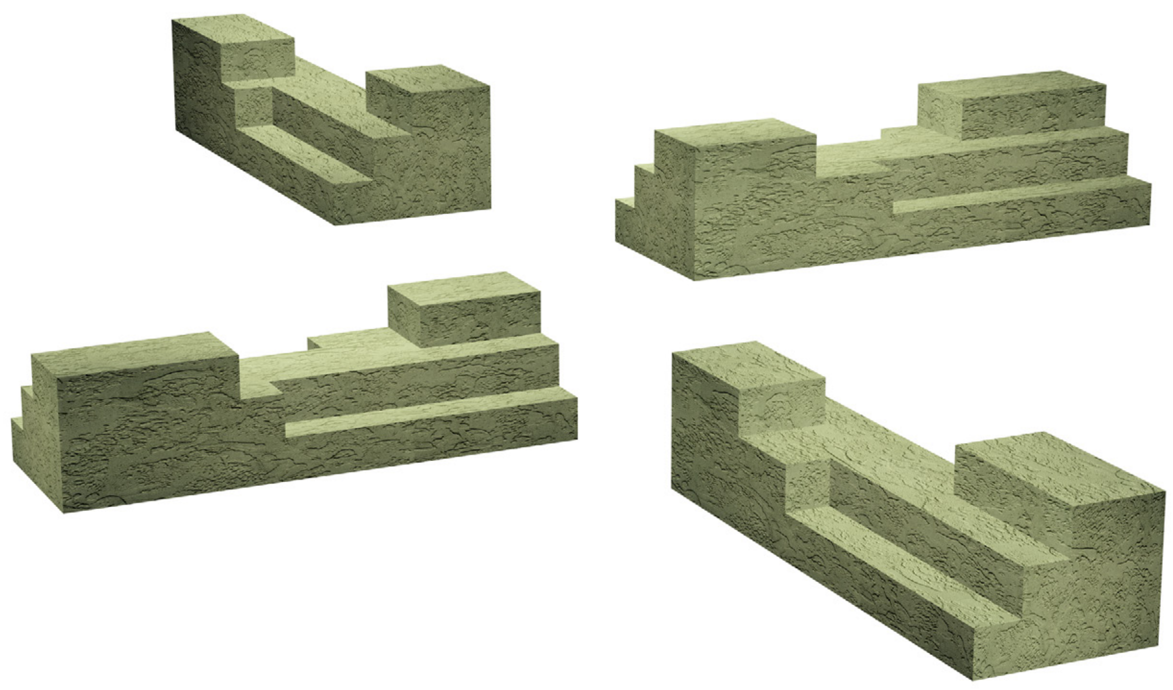
No. 83 / Chac 6-7 / 2011



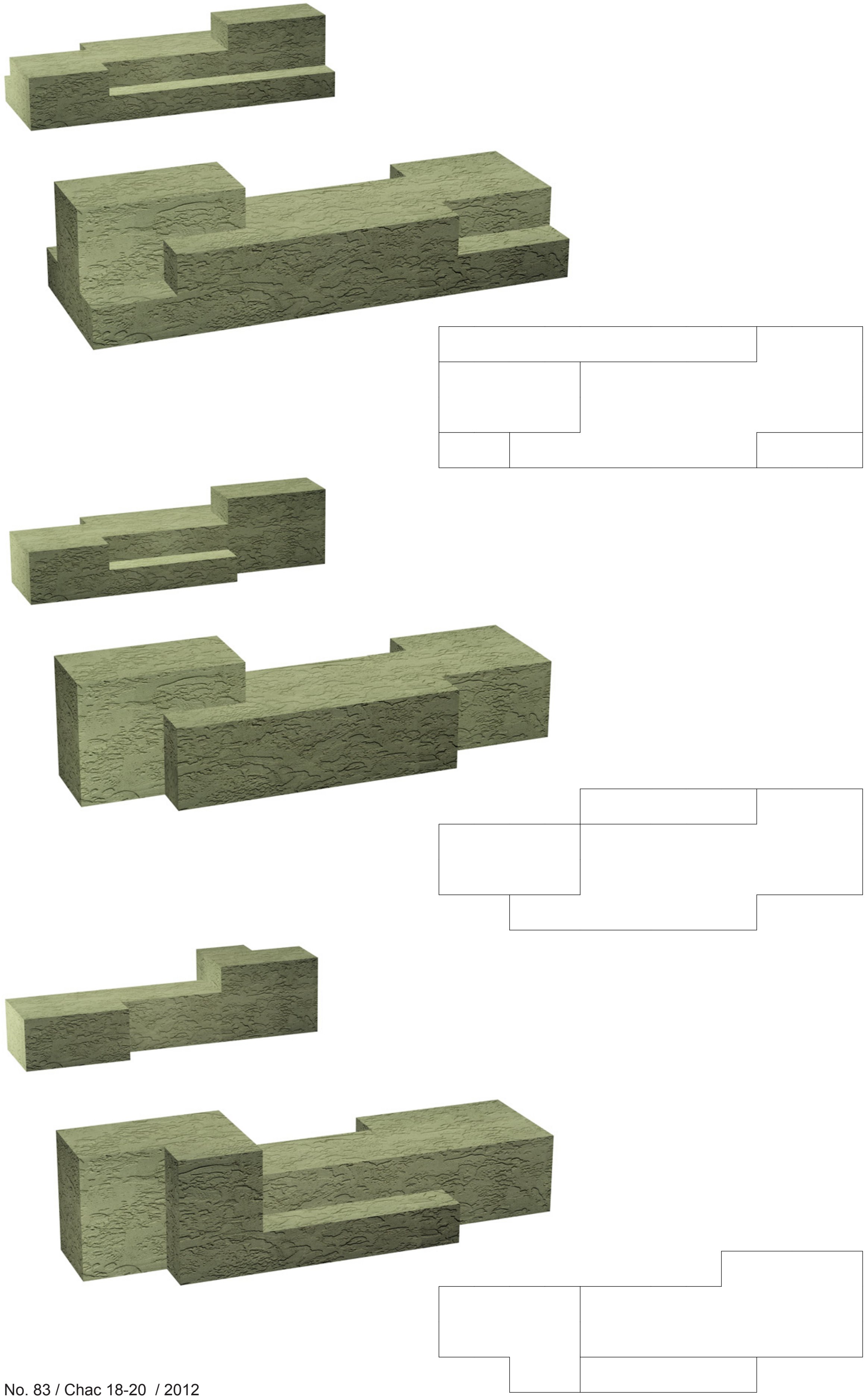
No. 83 / Chac 8-12 / 2011



No. 83 / Chac 13-17 / 2011

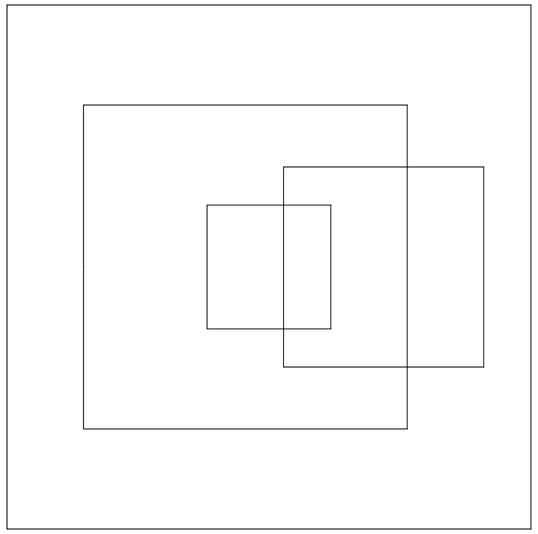


No. 83 / Chac 17 / 2011



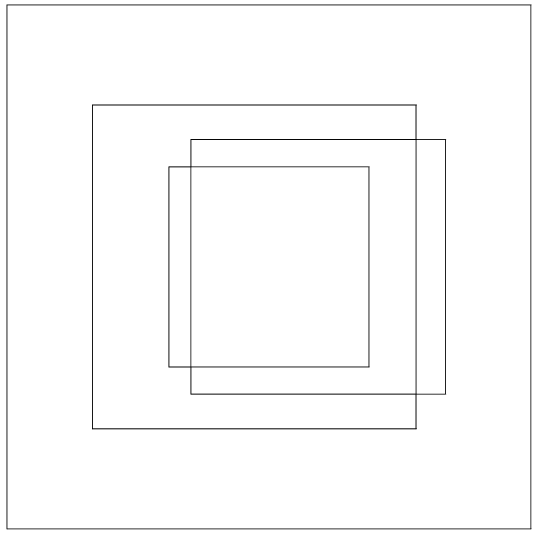
No. 83 / Chac 18-20 / 2012

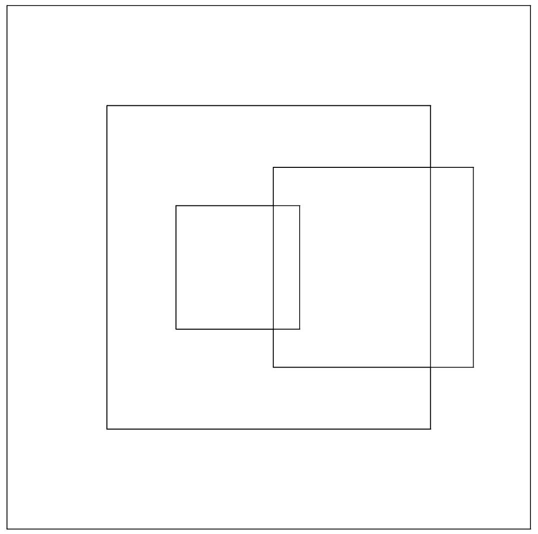
No. 108 / 2012



Four Squares 5

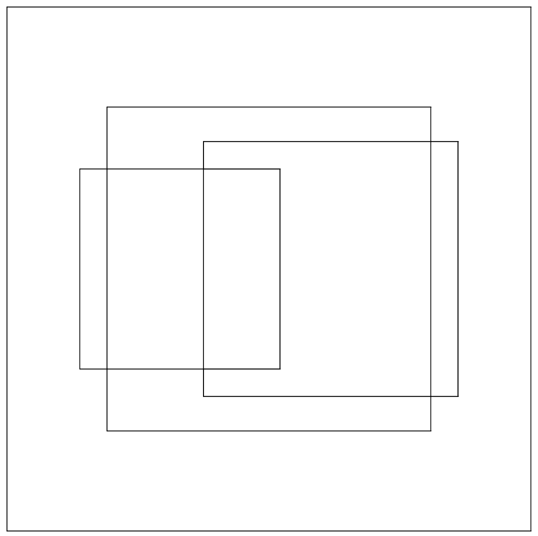
Four Squares 6



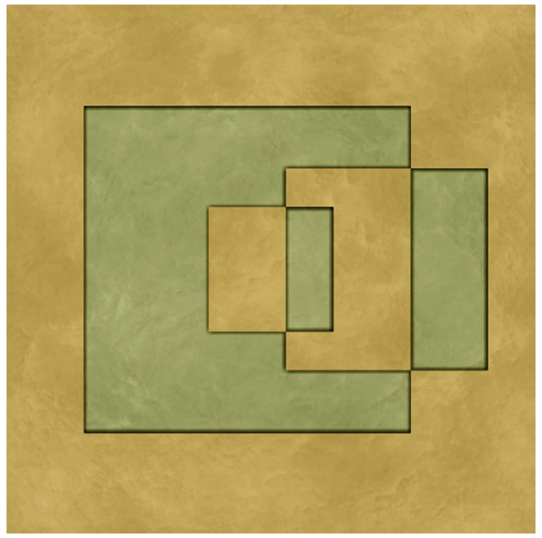


Four Squares 7

Four Squares 8

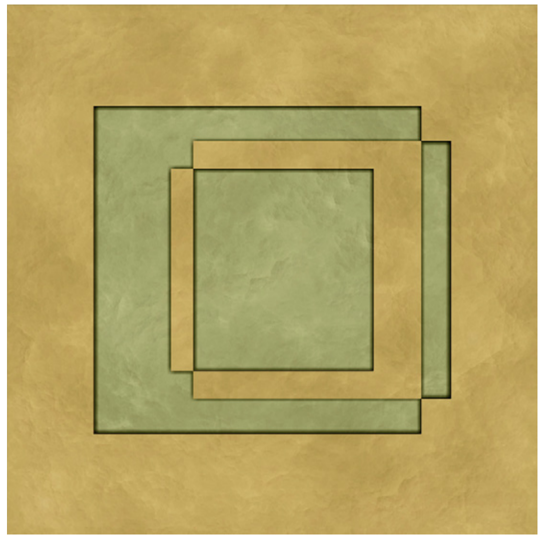


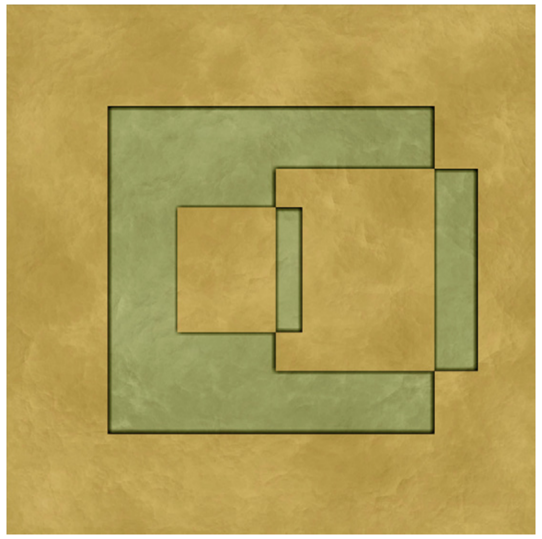
No. 78 / 5-8 / 2012



Four Squares 5

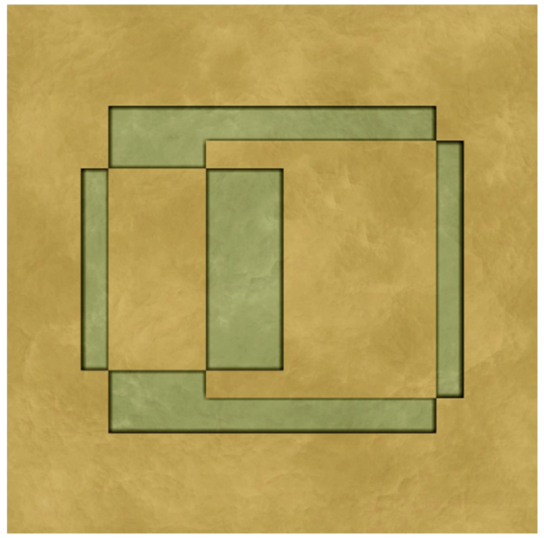
Four Squares 6





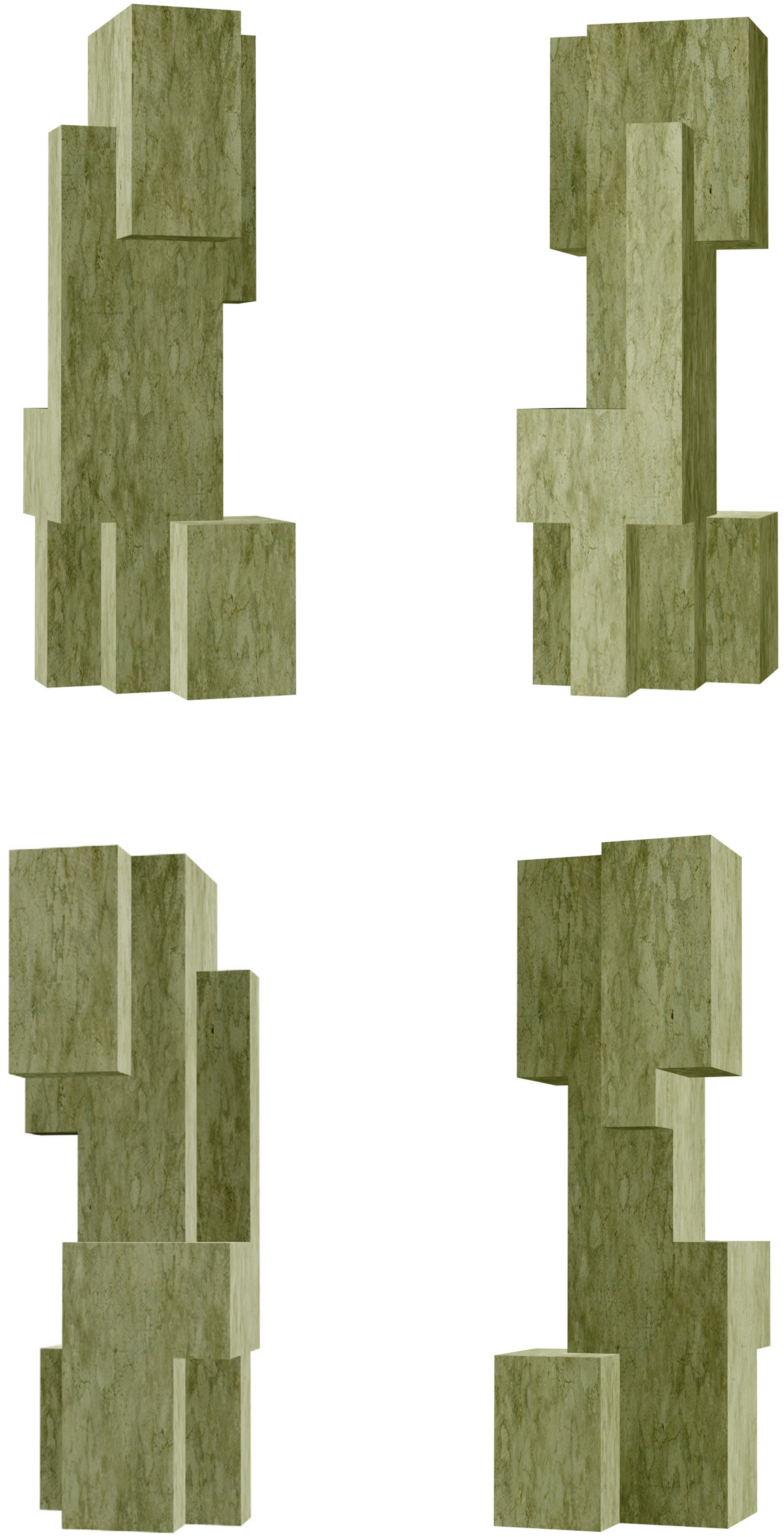
Four Squares 7

Four Squares 8

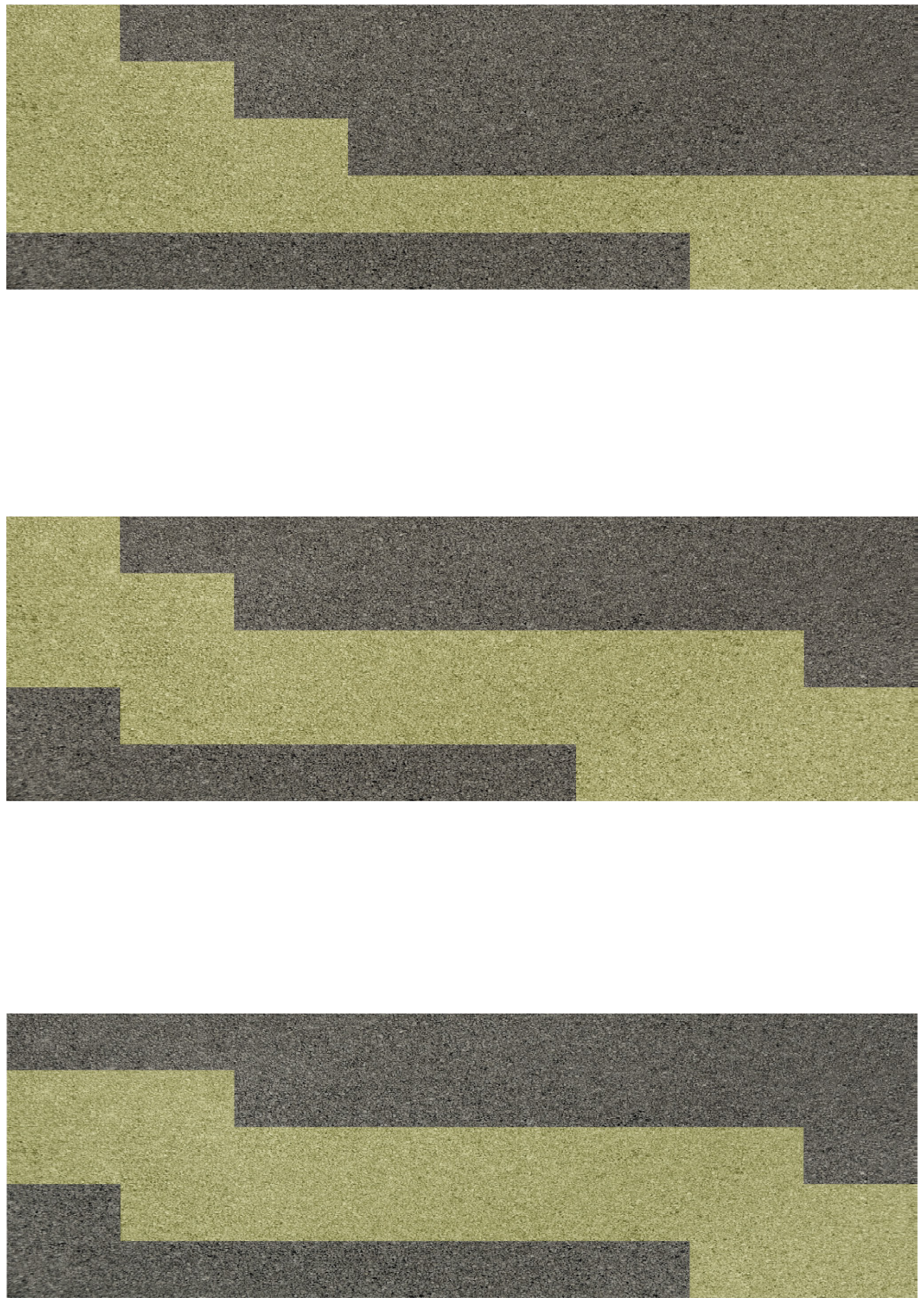


No. 78 / 5-8 / 2012

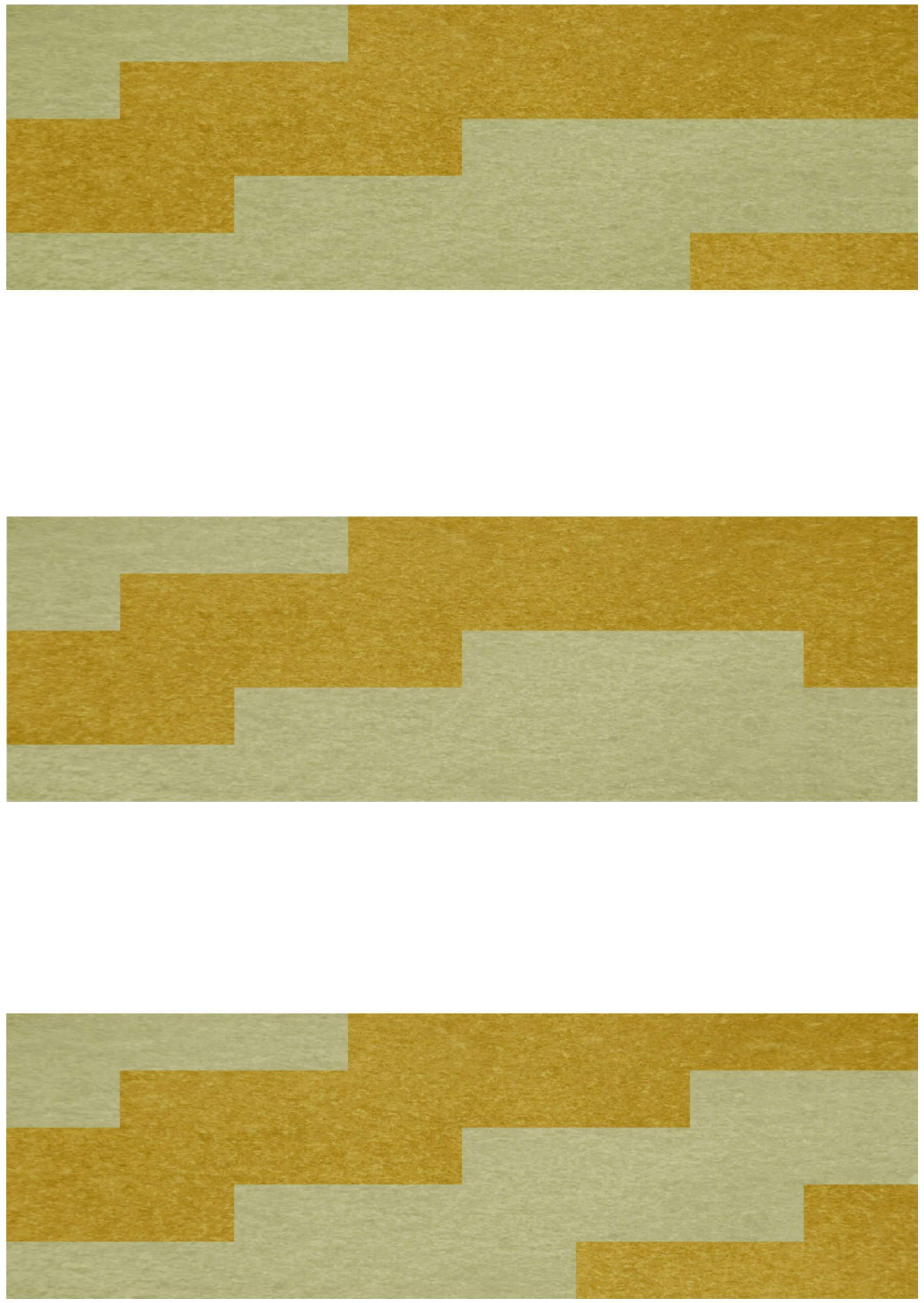
No. 109 / Column 1 / 2012



No. 109 / Column 2 / 2012



No. 110 / Santa Fe 5-7 / 2012



No. 110 / Santa Fe 8-10 / 2012

Ulrich Niemeyer was born 1936 in Trier, Germany and spent his childhood in Bernkastel-Kues. He attended art schools in Mainz and Saarbrücken from 1955 to 1958, when he left Germany, first to study figure sculpture at the Royal Academy in Stockholm, Sweden, and from 1959 to 1963 at the Slade School, University College, London, England. During his student years he hitch-hiked extensively throughout Western Europe and part of the Middle East, in search of museums and archaeological sites. In 1963 he received the University of London Diploma in Fine Art in sculpture and design, and later that year was admitted as a permanent resident in the USA.

In New York City he supported himself freelancing in the advertising industry, as well as designing and producing accessories for a Los Angeles based fashion company. He taught 3D design and sculpture at Friends Seminary, Pratt Institute and Rockland Community College. During a first three month travel through Central America in 1974 his interest in pre-Columbian art evolved and began to influence his work. In 1989 he left New York for Mexico to work first in Cuernavaca and subsequently in Taxco. In 1990 he moved to Santa Fe, New Mexico. From 1994 - 2008 he developed and taught the Visual Communication program at Northern New Mexico College.

He lives and works in Santa Fe, New Mexico.

Photographs - Bruce Papier - 2002

Colophon

Type face: Arial

Software: AutoCAD and 3ds Max from Autodesk as well as Acrobat, Ilustrator, InDesign and Photoshop, from Adobe.

When the first pages came to be realized in 1994 as vector drawings using AutoCAD, little hope existed that the potential for hardcopy would reach the present state. Further development of hardware and software, cost-efficiency and standardization, better design of interfaces allowing more intuitive usage will lead to the realization of as yet unknown creative visions resulting from digital media.