Chapter 23

Other planar boards

[We have had squares, and we have had hexagons. In this chapter, we consider planar boards based on cells of other kinds.]

23.1 Boards based on triangles

[A triangle-based board offers 12 natural directions of movement: across the middle of a side (three cases), through a vertex (three more), and parallel to a side (the remaining six). Moves of the first and second kinds, if prolonged, take a piece through edges and vertices alternately; moves of the third kind take it along rows of triangles which alternately face 'left' and 'right' (or 'up' and 'down'). Some games restrict themselves to moves of the first two kinds, others exploit all three.]

Triangular Chess [Dekle] (George Dekle Sr, 1986). Hexagonal board made up of 96 triangles arranged in rows of 9, 11, 13, 15, 15, 13, 11, 9, the triangles in each row being alternately vertex-up and vertex-down :
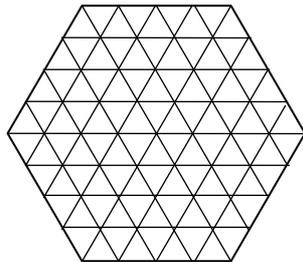
Men are 1 x K, Q, Unicorn, 2 x R, B, N, 11 x P. K can move across any edge to the triangle immediately beyond (three possibilities), or across any vertex to the triangle directly beyond in the same line (three more). R can cross any edge and continue in the same straight line, crossing vertices and edges alternately (three directions of movement). B the same but starting by crossing a vertex. Q as R+B. N two triangles as B and then one as R, may leap. U two triangles as R and then one as R in a different direction (see note below), may leap. P moves one triangle forward whether across a vertex or across an edge, captures to either adjoining triangle in the same row (may capture even if the triangle directly ahead is occupied), promotes on reaching the last row. A pawn which hits the side of the board before promoting may advance by using its capture move even if there is no man to be captured. Pawn-2 and e.p. allowed. K castles by moving three triangles towards the rook. Baseline RNBQUKBNR with 11xP in front, BK opposite WK.

Tri-Chess [Dekle, two-player game] is the same except that the powers of K, Q, R, B are increased. K now moves one triangle as (previous) B or two as (previous) R; B now moves as previous Q; R moves along rows of triangles (so has six directions of movement); Q as new R+B. (Author's rule sheets) [Text revised. The author's text for the U move actually specifies two steps as R and then one as B, but an explanatory diagram to which he refers does not conform to this and David followed the diagram. As specified, K-side castling moves the K to the R's triangle, but the source is quite explicit.]

Enchantment (Tony Berard, 1988). Board of 76 chequered triangles; 12 pieces and 8 pawns per side. The pieces are an odd assortment: Emperor (K), Mother Nature (Q), Death (R), Aphrodite (B), Mars (N), and two unique pieces, Time and Fate. A novelty is that pawns are either male (serf) or female (damsel) with pleasing promotion logic (e.g. serf cannot become Mother Nature). Object is to checkmate the Emperor. (Author's rules pamphlet)

Klin Zha (Leonard Loyd Jr, 1989). Practical realisation of a game featured in the Star Trek novel *The Final Reflection* by John M. Ford. Triangular 81-cell board; 1 x Fencer (moves up to three unobstructed cells in any direction or combination of directions), 1 x Lancer (moves up to three unobstructed cells in a straight line in any direction), 1 x Swift (moves two, three, or four unobstructed cells in any direction or combination), 2 x Fliers (move from three to six squares straight in any direction, and may jump), 3 x Vanguards (move one cell in any direction), 1 x Blockader (moves one or two unobstructed cells in any direction, and controls the three cells adjacent to itself as described below); 1 x Goal, which cannot move by itself but can be carried to another cell by a Fencer, Lancer, or Vanguard. Win by capturing the Goal or by stalemate. A man may not enter or pass any cell controlled by the opposing Blockader; a Blockader may not be moved to a cell occupied by or adjacent to an enemy man; the cells controlled by the Blockaders may not overlap; the Goal may not be at any time on a cell controlled by its Blockader. To start the game, one player chooses a corner, and distributes his men (apart from the Goal) as he wishes among the 24 cells which are nearer to this corner than to any other; his opponent chooses a second corner and does the same; the players in turn then place their Goals with a carrying piece, and play commences. It is generally reckoned to be a disadvantage to have to choose and place first. (Cazaux, also *Variant Chess* 31) [Text editorial. After drafting it, I came across a letter in David's files saying that he had decided to exclude the game as being too remote from chess, but on balance I am inclined to retain it. The movable 'Goal' provides an objective with a flavour of its own, being essentially a mutating king but with the restriction that it is left immobile after its previous carrier moves away and until its next carrier arrives to take it up.]

Diamond Chess [Sirius] (Proprietary game, Sirius Products; Bart D. Follis and James G. Chapman, 1991). Diamond-shaped board composed of 98 alternating black-and-white triangles; usual men. Q can move in up to 12 directions, other pieces in up to six. Pawns move and capture as in orthochess but when facing a cell apex the pawn moves sideways. An optional game excludes the four board cells at each end. (Proprietor's rules brochure)

Chass (Peter Kirk, 2003). Board 6x6, each square divided into a black and white triangle so arranged that no triangle abuts another of the same colour, thus board 12x12 triangles. Smaller board 8x12 triangles also offered. Standard men in usual array on both boards. (Inventor's rules pamphlets)

23.2   Boards based on diamonds

Rhombic Chess (Tony Paletta, 1980). Board of 72 diamonds with angles of 60 and 120 degrees, 24 in each of three colours. White diamonds are oriented E-W, black NE-SW (30 degrees round from N-S), grey NW-SE similarly. Six white diamonds across the centre; five black and five grey nestled below them; five white diamonds across the bottom of these; four more black and four more grey; four white; three black and three grey. Normal men; array RNQKNR (black and grey diamonds), -BB- (white), 8xP (black and grey), Black mirroring vertically as usual.

There are two directions of movement: edgewise and pointwise. Edgewise is a straight-line move from one diamond to another through a common side; pointwise is a straight-line move from one diamond to another through a common 60-degree corner. R moves only edgewise, two or more spaces; B point-wise but also one space edgewise; Q as R+B; K one space edgewise or pointwise; N two spaces edgewise and then one space edgewise in a different direction, may jump. Pawns move edgewise (two-step option initially), capture as they move, and promote on the array spaces of opponent's pawns. No e.p. or castling. (*Chess Spectrum Newsletter*) [Text revised]

Hexstar Chess (Tony Paletta, 1980). Six-pointed star board made up from six 60-120 degree diamond-shaped sections meeting at a central point, each divided into nine smaller diamonds which are the board cells (hence 54 cells in all). Sections and cells are oriented

E-W and 30 degrees either side of N-S. Each player has two home sections in which his men are placed initially, the two remaining sections (those oriented E-W) being called 'side sections' and being initially empty. Moves are edgewise (between cells connected by a common side) and pointwise (between cells connected only at a corner); a pointwise move across the centre is possible only between cells diametrically opposite. R and B always leave a cell by the edge or corner opposite to that by which they entered, so they move normally within a section but on entering a new section they change direction. Q as R+B. N two steps as R then one step across an edge adjacent to that of entry, may leap. K one step edgewise or pointwise. P in its home section or in one of its opponent's sections moves one step forward only, in a side section may move one step edgewise in any direction but may not return to its home section; captures as it moves, promotes on its opponent's back rank. No castling. Players occupy two sections initially,

array RBQ/KBR, -N-/-N-, PPP/PPP (six pawns only), Black mirroring vertically as usual.

Paletta also proposed **Octostar Chess** using a 72-cell board based on 45-135 degree sections and diamonds, and **Hexagram Chess** in which the 60-120 degree sections of Hexstar Chess are divided into 16 diamonds instead of 9 (array RNBQ/KBNR fronted by 8xP, P-2 permitted). So far as is known, none of these games has been widely tested. (*Chess Spectrum Newsletter*)

Omni-Chess [Holmes] (Proprietary game, Rocket Games; Simon J. Holmes, 1987). Two-dimensional board giving an illusion of a 3-D board made up of cubes. There are 184 diamond-shaped cells of which 56 are black (tops of cubes) and 128 white (64 half-left and 64 half-right side faces). Each player has 24 men, the usual eight pieces and 16 pawns. The rules, including those of movement, remain close to those of orthochess. (Inventor's presentation brochure)

23.3 Boards based on rectangles

Masonic Chess (George Dekle Sr, 1983). Tricolour 8x8 board consisting of staggered rectangles (like a brick wall), even-numbered ranks half a brick to the right of odd-numbered ranks. Usual array. Rook moves to left and right, or up and down at 30 degrees to the vertical (six directions in all). Bishop moves at 30 degrees to left and right (four directions), and also one cell as R. Q as R+B (ten directions), K one cell as Q. N up or down two ranks at 30 degrees to the vertical, or the same at 50 degrees to the vertical, or up or down

one rank at 20 degrees to left or right. Pawn moves one step forward as R, captures one step forward as B (but not by the B's one-step R move), usual pawn-two, e.p. allowed. Castling normal. (Author's rule sheet) [Text revised. The knight's move is curious, since the moves at 30 degrees to the vertical are merely two steps along R-lines and there is no piece which can move to the cells two ranks away and directly above and below, but the diagram in the source document is quite explicit.]

23.4 Boards containing cells of more than one shape

Circle Chess (Proprietary game, Alphonso Stanonis, 1968). 77-cell board based on a tesselation comprising hexagons, rectangles, and triangles. Each hexagon is surrounded by six rectangles; each triangle is surrounded by three rectangles; each rectangle is surrounded by hexagons and triangles alternately. The board contains nine hexagons in a diamond formation, 1-2-3-2-1, each surrounded by a circle of rectangles with interleaving triangles, giving 38 rectangles and 30 triangles in all.

Straight paths unite hexagons and rectangles, circle paths are composed of alternate rectangles and triangles. No direct movement is possible between hexagons and triangles.
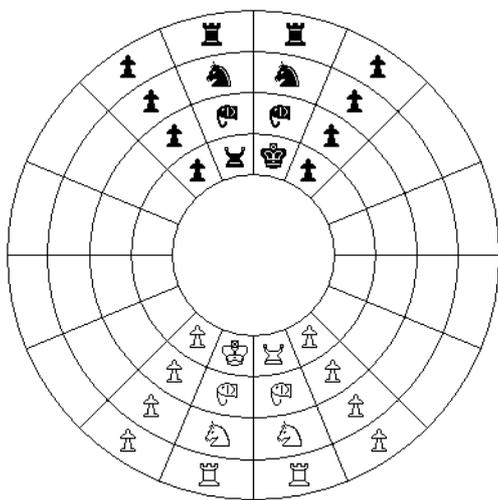
Standard set except that each player has only 4 pawns. Initially the men are set up in the 12 spaces surrounding the black hexagons at either end of the board. Array clockwise from outer triangle: PQNRBPPPBRNK. Two ways of winning: checkmate or occupying the centre space with the king. Rooks move in

straight paths, bishops in circle paths; queens in either. Kings move as bishops, or as rooks within the circle(s) they occupy only. Knights have two kinds of move; one or two spaces (circle or straight path, no capturing) but if occupying a hexagon a knight commands (move or capture) all adjacent hexagons and their circle paths surrounding the knight. Thus on the central hex a knight commands 48 spaces. Pawns move one or two spaces on circle or straight paths. Pawns promote on any of the opponent's array spaces. Stanonis edited the *Circle Chess Journal*. (Rules booklet *Circle Chess*, produced as volume 6 number 2 of this journal)

   Lotus Chess (David Moeser, 1998) uses a 39-cell board based on the same tesselation except that the rectangles have become squares; four hexagons in a 1-2-1 diamond, surrounded by 19 squares and 16 triangles. Each side has King, Counselor, Crook, Wyvern, Lotussa, Knight, and 5 x Pawn, and the smallness of the board is not matched by any simplicity of rule. *Lotus Chess: the Book* explores the game in depth. (Chess Variant Pages) [Text editorial]

Conquest [Berard] (Tony Berard, 1988). Board effectively 9x9 made up of 65 cells (25 squares and 40 hexagons of which 20 are aligned horizontally and 20 vertically) and 16 vertices (points where four hexes meet). Pieces have fantasy names mostly disguising regular chess pieces with movements adapted to the board. Object is to checkmate the Emperor (K). (Originator's rules pamphlet)

23.5 Circular boards

Round Chess is both a general term given to chess on a circular board and a name applied to specific variants, in particular Byzantine Chess. G. W. G. Moraes analyses the transfer of orthochess to a round board in his *Xadrez a seu Alcance* (1972). During a revival of interest in 19th-century Germany, two titles were published in quick succession: *Praktische Anweisung zum Rund-Schach-Spiel* (Schmalz, 1844) and *Das Rund-Schach-Spiel* (Crailshaimer, 1845). A round board is commonly met with in modern commercial variants but the detailed design can vary considerably.


The seminal circular-board variant, **Byzantine Chess**, is a historical game and will be covered in chapter 26, but it is conveniently mentioned here in order to set the scene. The board had 64 cells arranged in four concentric rings of 16, and the original form of the game is shown in the diagram. The 'firzan' and 'fil' of shatranj had not yet been replaced by the modern queen and bishop, and there was no pawn promotion.

   The game was revived in the late 18th century, and many people have been inspired to redesign it with modern accoutrements: queens and bishops, pawn promotion, and kings on the same side of the board instead of crosswise. Modern proprietary versions include **Manolo Chess** (Creative City; Manuel Macia, 1990) and **Strategem** (Logicsource Ltd; John Lion, 1990). The latter was endorsed by the British Chess Federation, which expressed an interest in organising tournaments and a U.K. Championship.

   Whatever may have happened elsewhere, **Circular Chess [Lincoln]** (Dave Reynolds, 1983) has been the subject of an annual 'World Championship' since 1996. The sponsorship normally runs to prizes but not to travelling expenses and international participation tends to be limited to foreign nationals who happen to be in the U.K. on the day, but the leading regular players are of regional champion standard at orthochess and

at least one international master has tried his hand with success. The pieces have their natural modern moves, with pawn promotion on the enemy piece lines; no castling, no e.p. (most modern versions permit these). The king's side is to White's left and Black's right, and the attractive wooden boards used on club nights and for tournaments feature the city emblem in the centre.

Here is part of the playoff game (15 minutes per player), fought out in front of the cameras of TransWorld Sport, which decided the 1999 championship. The game can be conveniently represented by two 4x8 half-boards set side by side, full algebraic notation being used for moves 'round the end' (thus 'a1' and 'h1' are in fact adjacent cells). Note that a1 is white. White was Paul Byway, Black Francis Bowers.
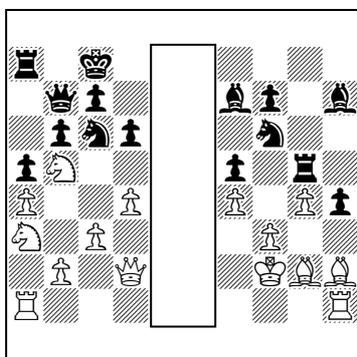

Black opened things up by 19...Bxe4, thinking it a reasonable gamble in a 15-minute game, and play continued 20 fxe4 Nxg4+ 21 Kf1 h3 (this P is guarded by Ra8) 22 Bf3 Nxh2+ 23 Rxh2 Rg1+ (guarded by Qb7) 24 Kf1-c1 Qb7-g3 25 Qd2-e2 Rb8 (Black now dominates the b/g ring, White's king is exposed, and few onlookers expected White to hold out) 26 Rb1 Bh4 27 Rh1 Rg1xb1+ 28 Nxb1 h2 29 Rxh2 Qg1+ 30 Kc2 Be1 31 Qxe1 Qg1xb1+ 32 Kb3 Rb8-g1 33 Qe1-d2 Qb1-f1 34 Be2 Qe1 35 Qd2xe1 Rxe1 36 Bf3. Contrary to the expectations of most of those present, White has weathered the storm and should have won, but Black proved the more ruthless blizter in the final stages and it was White's flag which fell. Black could however claim that it was his enterprise in trying 19...Bxe4 which had made the game what it was. (*Variant Chess* 31/32)

[Text revised. All these modern interpretations have endgame differences from orthochess which should not be overlooked. K+R v K is only a draw unless the stronger side's king is already holding the defender's against the edge. K+2B v K and K+B+N v K are only drawn, though the first of these can become a win if the board dimensions are different (see next chapter). K+Q v K+R is only a draw. However, K+Q v K is still a win, and it follows that K+P v K is a win as soon as the pawn can be defended, even with a side pawn, because there is no stalemate defence.]

Jabberwocky Chess (V. R. Parton, 1961). The board is made up of five concentric circles crossed by six equally-spaced diameters (12 radii) making a total of 61 intersections, including the centre point, on which the game is played. Parton defined the pieces, mostly of Carrollian origin, but not the starting position. All play is along board lines. The Snatch (king) moves only to adjacent points, the Bandersnatch (queen) moves in any direction; the Tove moves as a rook but only on its circle of origin (Parton suggested that players should have a Tove on each circle); the Borogove is like a queen but must leap at least one man of either colour to move or capture; the Onewocky or Wonky moves like a king; the Twowocky or Twocky exactly two points in any direction; the Threwky three points in any direction. The Jabberwocky's move is unclear but would appear to be that of the Bandersnatch or Borogove. (*Chess - Curiouser and Curiouser*, *Chesshyre Cat Playeth Looking Glass Chessys*)

Concentric Chess, also known as **Capablanca Concentric Chess** (Proprietary game, Abercrombie and Fitch; Fernando A. Capablanca and Douglas E. Whitney, 1971). Round board with eight sectors and eight rings. The white pieces occupy the outermost ring with the pawns in front of them, the black men the two innermost rings. Usual array (rooks in adjacent spaces) but with kings opposite queens. No rules are given, but the game might be a realisation of Cylinder Chess (see next chapter) with rings and sectors for ranks and files. (Photocopy of advertisement in *New York Times*, 23 March 1972, also U.S. patent 3,776,554 of 1973) [Text revised]

Fourth Dimension, also known as **4D** (Proprietary game, J. A. Ball and Co; J. A. Ball, R. D. Carew, and K. A. Warburton, 1974). Played on a 60-cell round board divided into rings containing successively 4, 8, 16, and 32 cells outwards from the centre, so a typical cell outside the central quartet is a curved segment with five neighbours: two in its own ring, one in the next ring inside, and two in the next ring outside. Additionally, each player has three off-board 'time warp' cells.
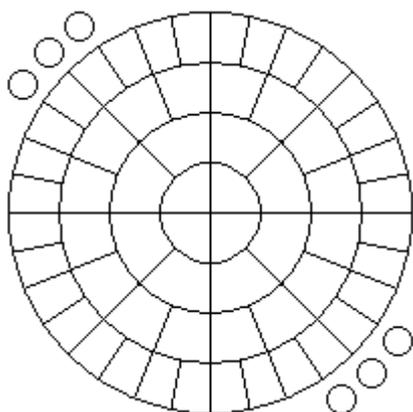
Each player has a Time Lord, 2 x Guardian, 3 x Ranger, 6 x Warrior. Aim is to capture the opponent's Time Lord. A turn normally consists of three actions: a move of a man to an adjacent cell, a 'beam down' (except on a player's first turn), and a 'beam up'; the beam down must precede the beam up, but otherwise they may be in any order. Beaming up takes a man off the board into the first of the player's time warp cells, a marker being placed on the cell it came from; beaming down brings it back into play in a cell not more than two spaces away from the marker. As an alternative to beaming up and beaming down, a player may advance a man within his time warp cells, but there are only three of these and when he has reached the last one he must beam down whether he likes it or not; part of the skill of the game lies in arranging a suitable reception committee for a man whose reappearance is imminent. Captures are made from adjacent spaces, not by displacement, and in general a man can only capture an inferior (T>G>R>W); exceptionally, however, W can capture T and not the other way round

(so a player who has captured all his opponent's warriors can never lose). At the game's peak there were about 30 clubs in the U.K., mostly combined with chess, and a magazine. There is (or was) a British 4D Association and regular championships at different levels have been held. In the U.S., TSR have run regular tournaments. Two books on strategy have been published. (Proprietor's booklet *4D Strategy*)

[Text revised. I fear that 'was' is the appropriate word; an enquiry in 2005 as to what was still available and at what price came back 'not known at this address', an enquiry to a later address found in David's files also failed, and a Google search for the phrase 'British 4D Association' produced only a library catalogue entry listing *4D Strategy*. A pity, because the game is a good one. Perhaps the appearance of this book will cause the proprietors to resume operations. If they don't, there is a copy of *4D Strategy* in the library of the British Chess Variants Society, there was an article on the game in issue 50 of *Variant Chess*, and each will give enough information for the game to be resurrected when the proprietary rights have expired.]

Chess In The Round (Proprietary game, Saxon Enterprises Ltd, 1974). Circular board, in effect a distortion of the regular board: outer circle comprises squares a1-h1-h8-a8-a1 (28), next circle squares b2-g2-g7-b7-b2 (20), next circle squares c3-f3-f6-c6-c3 (12), innermost d4-e4-e5-d5-d4 (4). Men, rules, akin to orthochess. Qs and Rs have increased powers since they can rotate within a circle in addition to their normal moves, subject to not being obstructed. This has the effect of increasing their range the nearer they stand to the board edge. On an empty board, Qd1 for example can move to any of 38 squares (including d1 by rotation), but Q on a central square has only orthochess powers. (*Nostalgia* 168) [For an apparently equivalent normal-board game, see Circuit Chess in chapter 16.]

Imperial Chess [Fanning] (Proprietary game, Chris Fanning, 1977). Round board 14 sectors x 8 rings, chequered; two players each with usual pieces and 16 pawns. Pieces are set up in standard array in opposite sectors (queens on

own colours) flanked on each side by 8 pawns. The game is thus orthochess but on two fronts and with only one set of pieces. Pawns promote in the sector occupied by the opponent's pieces in the array. (Manuscript notes derived from personal communication)

An apparently similar game was later marketed as **Global Chess [Original Toy Corporation]** (Proprietary game, Original Toy Corporation; republished 1985 by International Chess Company). Circular board 14 sectors x 8 rings with base map of the world (apparently not used in the play); 'uses the same moves and strategies as standard chess'. Usual pieces but with 16 pawns a side, eight facing each way. (Photocopy of advertisement in *Chess Life*, November 1985) [Text revised]

Centre Chess (Proprietary game, Amerigames International; Joe Miccio, 1991). Round board; four concentric rings of chequered cells, divided into 18 sectors by lines radiating from the centre point (72 cells). The men are arrayed round the outer two rings as for the standard game. A sector on either side, through which there is restricted movement, divides the two forces. (Proprietor's publicity leaflet, also manuscript notes presumably deriving from personal communication)

Checkchess RoundBoard (Proprietary game, Checkchess Co; Raymond H. Loomis, 1991). Circular board of 64 alternate red and black cells formed by eight concentric circles divided into eight sectors by lines radiating from the centre. Usual men arrayed round the two innermost circles (White) and two outermost circles (Black) with like-pieces occupying the same sector (e.g. white Q in red cell faces black Q in black cell with pawn in front of each). Moves are those of orthochess. (Manuscript notes presumably made from a set in David's game collection)

23.6 Spiral and figure-of-eight boards

Spiral Chess [Hitchcock] (Proprietary game, David Hitchcock, 1973). Circular board of 24 sectors x 8 rings in which the two halves are offset by one cell, producing two interleaved 96-cell spirals in which cells a distance 24 apart on the spiral are on the same radius. The men are set up normally facing one another across the board, the spiral preventing mutual attacks by the rooks. The spiral also allows queens and rooks to circle the board more than once in a single move. The centre can be crossed by pieces subject to certain rules. (Copy of cutting from the *Toledo Blade*, 22 July 1973, also U.S. patent 3851883 of 1973)

Crazy 38's (Ben Good, 1997). Figure-of-eight chequered board of 38 cells, most easily obtained by taking an ordinary 8x8 board, blanking off the 2x2 squares a1-b2 and g7-h8 and the L-shaped regions a5-a8-d8-d7-b7-b5-a5 and h4-h1 etc, and writing in new curved cells a1 joining c1 and a3, a6 joining a4 and c6, c8 joining c6 and e8, and h8, h3, f1 similarly. These new cells are quadrant segments with the same width as a normal square, and the spaces within them are left unfilled (so the board now has holes at b2, b5, d7, g7, g4, and e2). The players sit cornerwise, White's home cell being a1 and Black's h8.

Each side has 1 x King, Rook, Bishop, Knight, Gold General, and Silver General, and 4 x P. K to any adjacent cell edgewise or cornerwise. R across cells as long as the road is clear, bending around quadrants in the natural way (so Rc1 on an empty board has moves c1-a1-a3-a6-c6-h6, c1-f1-f3-f8, and c1-c8-e8-h8-h3-f3-a3). B and N as in orthochess, N jumping as usual and being allowed to make its orthogonal and diagonal steps in either order (so Na1 can move to b4/c3/d2, Nc3 to a1/a4/d5/e4/d1). Gold General as K but not diagonally to the side, Silver General as K but not diagonally forwards or backwards (regrettably, these are not the moves of the similarly named pieces in shogi). P one square obliquely (i.e. orthogonally) forward, captures as it moves, promotes to queen (R+B) on opponent's home cell. Captured men change sides and can be dropped (a P not on the opponent's home cell nor to give checkmate); a captured Q reverts to P before being dropped. Aim is to give checkmate or to move K to the opponent's home cell. White array Ka1, Gb3, Sc2, Nb4, Rc3, Bd2, Pa4/c4/d3/d1, Black mirrored about the board centre. (Chess Variant Pages) [Text editorial]

Infinite Chess (Proprietary game, Mark Colebank, 1997). 72-cell board in the form of a figure-of-eight 'infinity' symbol comprising two three-quarter circles, each with seven sectors and four concentric ranks, joined by a 4x4 central area. Men arrayed at opposite ends of the board as in Circular Chess except that the order of pieces is reversed (K, Q on outside rank). (Manuscript notes presumably derived from a set in David's game collection)

23.7   Infinite and infinitely divisible boards

Infinite Plane Chess (Lav Rajcic and Nenad Petrovic, 1952). The board is extended in all directions, and four points are added analagous to the 'points at infinity' of geometry. There are 'E-W' (at infinity on the ranks), 'N-S' (on the files), and 'NE-SW' and 'NW-SE' (on the diagonals). Line pieces can move off the board to 'infinity' and return at will. For example, a rook moving off left to 'E-W' can re-enter on any rank and from either side of the board. In **Projected Chess** (described by Sergei Zubkov in 1990, apparently quoting an article by E. Gik in *Quantum* in 1974) only the four 'points at infinity' are added, the board remaining otherwise normal. Essentially a problem theme, the game has been little tried and according to Gik is impractical; Boyer however gives two examples, and says it has 'interesting characteristics'. (*Problem* 7-9, March 1952, *Nouveaux Jeux d'Echecs Non-orthodoxes*; personal communication) [There were some inconsistencies in the original treatment, since Zubkov's board did not match those shown by Rajcic and Petrovic and by Boyer, and I will take responsibility for the present disentanglement. There is some added detail regarding the moves of KNP which I haven't gone into since it doesn't affect the salient feature of the game.]

Dense Chess (Richard Grandy, 1965). Play is on the rational points within the square [0,0]-[1,1] of a Cartesian plane. Usual men plus three extra pawns a side. The pieces start at the decimal points of the back row, points 0, 1/2, 1 being left vacant (so rooks at 1/10 and 9/10, knights at 2/10 and 8/10, etc), with pawns all across the board a distance 1/10 in front. King moves to any point not more than 1/10 away in any direction; R orthogonally, B diagonally, Q both, N along any line with a slope of 2 or 1/2 (may not jump); P with a natural analogue of its normal move. The full rules of the game, helpfully annotated, are in issue 7 of *The Gamesman*. The game has been played, the inventor remarking that it is useful to have a blackboard on which the approximate positions of the pieces are marked. [Text revised]

23.8   Boards with transport mechanisms

Orion Chess (Steve Wilson, 1983). Chess played on the Orion principle. Orion is a proprietary games system (Parker Bros, 1971) which uses a 5x5 array of linked rotors that can be adapted to a number of games and puzzles. Orion pieces are elliptical and fit in the spaces between adjacent rotors. Each quarter-turn of a rotor moves any piece within the rotor through 90 degrees. A turn consists of moving one or more rotors in sequence according to the piece moved. Apart from the rotary actions, Orion Chess is surprisingly orthodox with the pawn moving two spaces initially, e.p., and promotion on the last rank whether or not achieved by a pawn move; castling however is impossible. (*World Game Review* 3)