

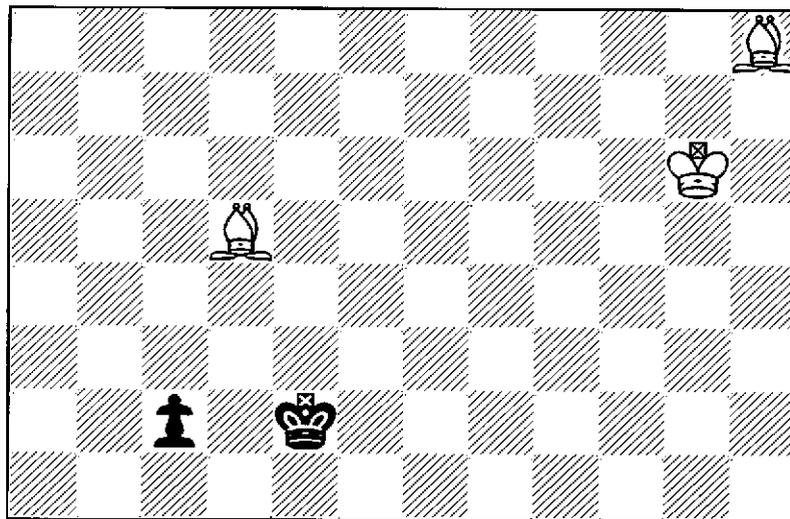
British Endgame Study News

Special Number 4

December 1996

Edited and published by John Beasley, 7 St James Road, Harpenden, Herts AL5 4NX
ISSN 1363-0318

Endgame Theory and Studies in Chess Variants



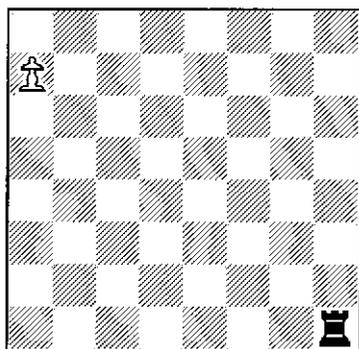
White to play and draw

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Václav Kotěšovec and two generalized knights
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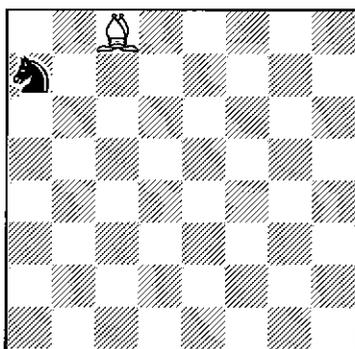
Elementary duels in the Losing Game

Of all chess variants, the Losing Game is one of the most popular. Men and board are normal, but capturing is compulsory (if a player has more than one capture open to him, he may choose between them) and the first player to lose all his men wins. The king is an ordinary man, and can be captured. Stalemate was traditionally a win for the player stalemated; some now play it as a draw, but I have always played to the traditional rule and greatly prefer it.

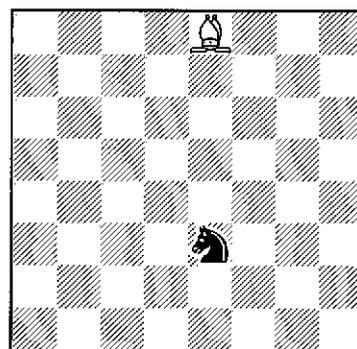
The first thing players learn is that many games can be won in short order by enlisting an opposing bishop (he who carelessly opens 1 d4 is inviting the reply 1...e5 2 dxe5 Qg4 3 Bxg4 Kd8 with sixteen consecutive sacrifices); the second is that the endgame offers much delight. The latter is our concern here, and the purpose of this article is survey the most fundamental case: that of one man against one.



1 - White to move wins



2 - reciprocal zugzwang



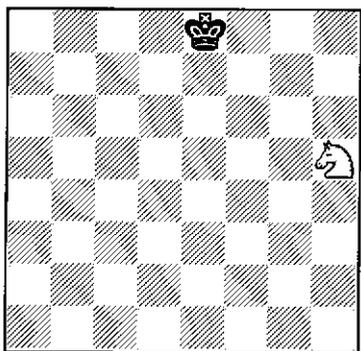
3 - reciprocal zugzwang

Endings in which each side has a line-moving piece (Q, R, B) are usually trivial. Bishops of opposite colour give the deadeast of draws; otherwise, if the player to move is not forced to capture his opponent's man immediately, he can sacrifice his own. The only exceptions are typified by **1**, where White wins by **1 a8B** (other promotions lose). Black cannot sacrifice to the new bishop, and White will sacrifice it by **2 Bh1** next move. The same can be done by a rook against a bishop: set wPe7 and bBe2, and the winning line is **1 e8R B-- 2 Re2**. This device of attacking a man, waiting for it to move away, and then sacrificing on its previous square, will occur more than once.

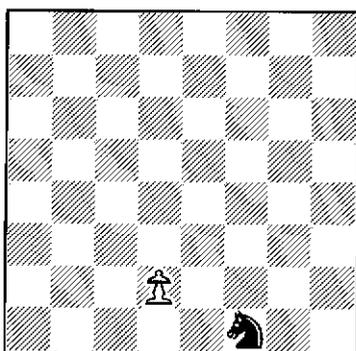
A line-moving piece normally has an easy win against a knight. If it cannot sacrifice itself immediately, it simply keeps at a distance, waits for the knight to move to a vulnerable square, and then either sacrifices itself directly or attacks as in **1**. The most important exceptions are shown in **2** and **3**. In **2**, wB must move, and bN then sacrifices itself on c8. In **3**, Black to play must yield to the "attack and wait" technique (for example, **1...Nf1 2 Bb5 N-- 3 Bf1**) but White to move cannot maintain his distance; he must advance and allow Black to sacrifice (for example, **1 Ba4 Nc2**). However, this exception only arises on a centre file. If everything is one file to the right, with wBf8 and bNf3, White to play can win by **1 Ba3**.

A rook or queen can win against a king by advancing at a wary distance until its

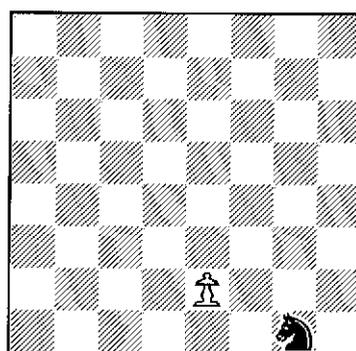
opponent is penned against the edge of the board, but a bishop cannot do this and the ending K v B is in general drawn. However, a king can do it against a knight, the galumphing leaps of the cavalryman being no match for the mincing precision of the monarch. The only significant exception is typified by 4, where White to play can win by 1 Ng7 K-- 2 Ne8 (though not by 1 Nf6 since the reply 1...Kd7 is available).



4 - White to move wins



5 - White to move loses



6 - White to move wins

King against king is a draw; the adversaries can make gestures at each other from a distance of three squares, but neither can force the other to come closer. Knight against knight is a win for the player to move if the knights are on squares of the same colour, and a loss if they are not. It follows that more than half the possible positions in this ending are reciprocal zugzwang.

Piece against pawn is usually a win for the piece, which can sacrifice itself to the pawn either before or after promotion. There are two significant exceptions: (a) a distant king which cannot catch a fleeing pawn but can sacrifice itself to a promoted rook (in some cases, typified by wPa7 and bKb5, the pawn can draw only by promoting to a king); (b) a knight, which gives the most interesting ending of all.

Suppose that White has the pawn, and that it has just moved. If it is now on a square of the *same* colour as that of the knight, the knight will never be able to sacrifice itself while the pawn is still unpromoted, and if the pawn is a rook's or knight's pawn White can win by promoting to a bishop. However, this usually fails in the case of a bishop's or centre pawn because Black can play to b5 or c6 (against a c-pawn) or d5 or f5 (against an e-pawn), wait for the promotion to bishop (other promotions lose immediately), and then play ...Na7 to produce 2 with White to move or ...Ne3 to produce 3. If the pawn is on a square of the *opposite* colour to that of the knight, White runs the risk that the knight will sacrifice itself before the pawn promotes, but if he successfully negotiates this risk he can win by promoting to a knight.

It follows that a rook's or knight's pawn on the second rank can win by playing to a square of the same colour as the knight and promoting to a bishop, but a bishop's or centre pawn must risk playing to a square of the opposite colour and all will then depend on the knight's ability to sacrifice itself before the pawn promotes. It can do so in 5 (1 d4 Ng3 2 d5 Nh5 3 d6 Ng7 4 d7 Ne8), so White loses. However, if the knight takes any other route the pawn will be able to sacrifice itself first, and if the position in 5 is moved one file to the right, as in 6, White will win.

Václav Kotěšovec and two generalized knights

The familiar knight is not the only chess piece of its kind. The knight jumps two squares in one direction and one in the other; Arabic and medieval chess used the “firzan” or “fers”, which jumped one square in each direction, and the “fil”, which jumped two; and one can imagine a generalized “ x - y leaper”, which jumps x squares in one direction and y in the other. According to this terminology, the knight is a 2-1 leaper, and the Arabic firzan and fil were 1-1 and 2-2 leapers respectively.

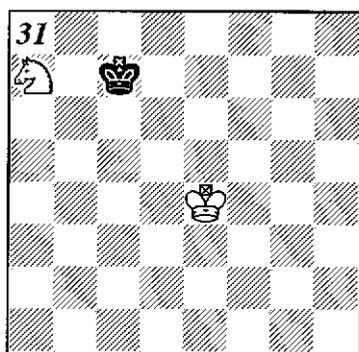
Now we all know that king and two knights cannot force mate against a bare king. However, they don't fail by much - Troitzky pointed out that mate could be forced if the chessboard had a pair of additional squares at d9 and e9 - and it occurred to the Prague computer expert and variant chess theoretician Václav Kotěšovec to wonder whether there were other leapers which could do better. He reported his results in the Bratislava chess composition journal *Pat a mat* in 1994, and they are reprinted in his recent book *Mezi šachovnicí a počítačem* (“Between chessboard and computer”).

Václav asked, “For what values of x and y can a king and two x - y leapers force mate from a general position against a bare king?” If we require both leapers to be the same, the answer is simple and depressing: there are none at all. However, if we permit leapers of different kinds then there are several combinations that succeed:

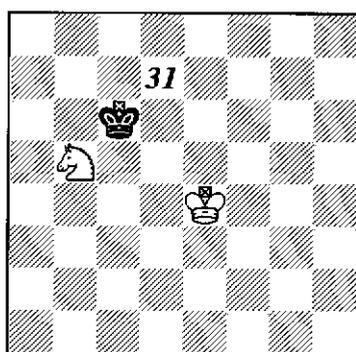
1-0 + 2-1 mate in 45 moves at most

1-0 + 3-1	77 moves	1-0 + 4-1	55 moves	1-0 + 6-1	93 moves
2-1 + 3-1	49 moves	2-1 + 4-1	41 moves	2-1 + 6-1	53 moves

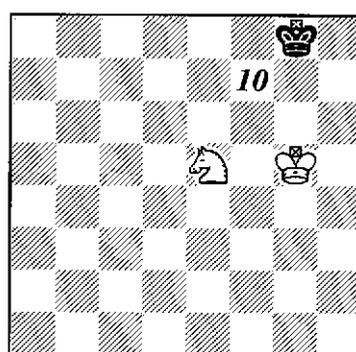
The 1-0 leaper steps one square sideways. We discount certain exceptional positions: (a) where one leaper is immobile (a 6-1 leaper on one of the sixteen central squares cannot move at all); (b) where the weaker side can capture one of the leapers; (c) where the weaker side can force a draw by attacking each of the leapers in turn. Václav gives an elegant example of the last case, which we reproduce as 1. The man on a8 is a 3-1 leaper X, and we have **1 Nb5** (Black threatened 1...Kb7, and 1 Xb5 would have been met by 1...Kb6) **Kb7 2 Xd7** (wN blocks b5, so there is no other move to save the 3-1 leaper) **Kc6** (see **1a**) **3 Xa8** (wK blocks e4, so again there is no other move to save material) **Kb7** and draws by repetition.



1 - only a draw
3-1 leaper on a8

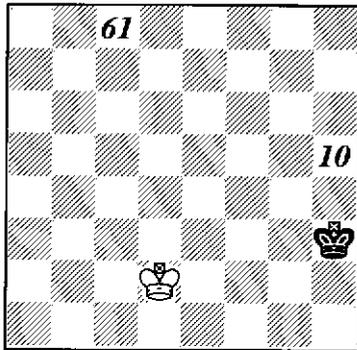


1a - after 2...Kc6
3-1 leaper on d7



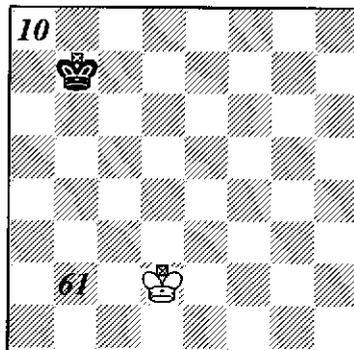
2 - mate in 3
1-0 leaper on f7

The 1-0 leaper is a feeble piece; why can a knight and such a leaper force mate, when two knights cannot? The answer is shown in 2, where the piece on f7 is a 1-0 leaper Y. We are now in the last stages of the play, which finishes **1 Kh6 Kh8 2 Ng6+ Kg8 3 Yg7** and mate, and we note that *the mate does not occur in the corner*. White uses his knight to control h8 and f8, his king to control h7 and g7, and his 1-0 leaper to give the mate and control the remaining square f7; if this 1-0 leaper were a second knight, it would have to stand on h6 to do the same job, and this square is already occupied by the king. (Alternatively, it could stand on e9, which is why Troitzky said that the ending could be won if that square existed.)



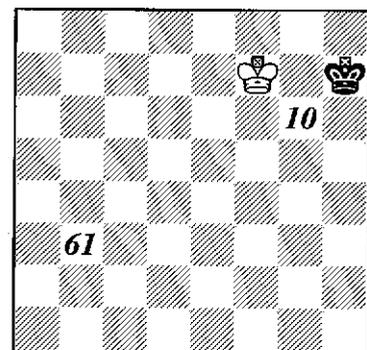
3 - mate in 93

6-1 leaper on c8, 1-0 on h5



3a - after 11 Zb2

6-1 leaper on b2, 1-0 on a8



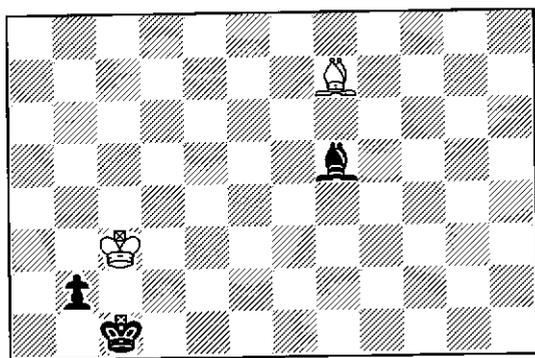
3b - after 83 Kf7

6-1 leaper on b3, 1-0 on g6

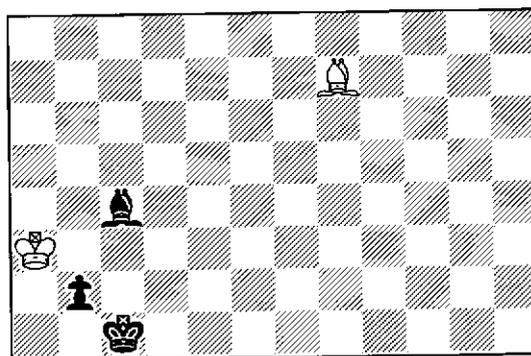
3 shows the starting position in the longest win. There is a 1-0 leaper Y at h5, and a 6-1 leaper Z at c8. The play features an amusing preliminary: the 1-0 leaper is open to attack from the Black king, so White's first task is to move it to safety, and the only square on which it can be defended by the 6-1 leaper is a8! The solution therefore starts **1 Yg5 Kh4 2-3 Yg7 Kh6 4-9 Ya7 Kb6 10 Ya8 Kb7 11 Zb2!** and we have **3a**. What follows is not so clear, and I give the computer's moves without comment: **11...Kc6 12 Kc3 Kc5 13 Zh1 Kd5 14 Kb4 Kc6 15 Zg7 Kd5 16-17 Ya6 Kd3 18 Kc5 Kc3 19-20 Yb5 Kc3 21 Zf1 Kc2 22 Kc4 Kd2 23 Ze7 Kc2 24 Kd4 Kd2 25-29 Ye3 Ke1 30 Kd3 Kf2 31 Zd1 Kg3 32 Ke4 Kg4 33-34 Yf4 Kf6 35 Kd5 Kg5 36 Ke5 Kh4 37-39 Za7 Kf1 40 Kd4 Kf2 41 Kd3 Kg3 42-43 Kf5 Kg3 44 Zg8 Kg2 45 Kg4 Kf1 46 Kf3 Ke1 47-48 Kd3 Kc1 49 Ye4 Kb2 50 Zh2 Ka2 51 Kc3 Ka3 52-53 Kc5 Ka5 54-55 Yc4 Kb7 56 Kd6 Kc8 57 Zg8 Kb7 58 Yb4 Ka6 59 Zh2 Kb6 60 Zb1 Ka6 61 Kc6 Ka5 62 Kc5 Ka6 63-64 Yb6 Kc8 65 Kd6 Kd8 66 Ke6 Ke8 67 Yb7 Kf8 68 Kf6 Ke8 69 Yc7 Kd8 70 Ke6 Ke8 71-72 Ye7 Kg7 73 Kf5 Kh6 74-75 Zb3 Kh6 76 Yf7 Kh5 76-79 Yg5 Kh6 80 Kf6 Kh7 81 Yg6 Kg8 82 Ke7 Kh7 83 Kf7** and bK is at last panned (see **3b**). However, this is a "best play" line, which includes every possible short cut and is therefore more complicated than the line a human player would choose; what I do not know is whether there is a systematic and relatively straightforward winning line which the computer ignores because it takes longer. The final stages are easy enough to follow: **83...Kh8 84 Zh4 Kh7** (now White wants to lose a move) **85 Kf6 Kh8** (best) **86 Ke6 Kg8 87 Ke7 Kh8 88 Kf8 Kh7 89 Kf7** (mission accomplished, though it took five moves) **Kh8 90-91 Zh6 Kh8 92 Zb7+ Kh7 93 Yg7**. Once again, the mate occurs away from the corner.

Studies in Modern Courier Chess

The Courier Game, which is mentioned in a German poem of 1202 and is featured in Lucas van Leyden's painting *The chess players*, was one of the more popular early variants of chess. It used a 12x8 board, and included a piece like the modern bishop. But though it survived for over 600 years, it remained essentially medieval, and Paul Byway has developed a version much closer to modern chess. He has kept the 12x8 board, but uses modern men with two additions: a "fers" (a 1-1 leaper, to quote the preceding article) and a "modern courier" (a combined 2-2 and 2-0 leaper, much more useful than the medieval fil). For full details, see David Pritchard's *Encyclopaedia of chess variants*, p 199. As well as playing and publicizing this eminently practicable game, Paul has examined its endgame theory and has composed a number of studies.

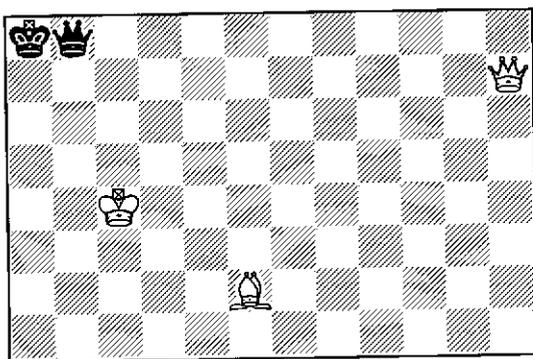


1 - draw (White loses on the 8x8 board)

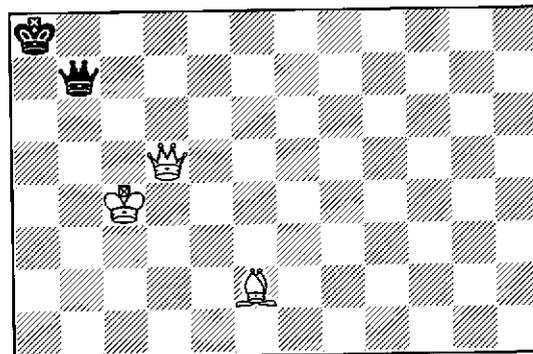


1a - after 2...Bc4

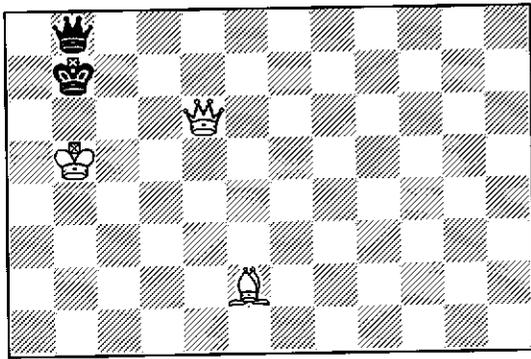
Some of the most interesting of these studies involve positions in which the extra men are not used but the extra files are crucial. 1 (*Variant Chess*, Jul-Sep 1993) was analysed by Centurini in 1847 on the 8x8 board, and he showed a win for Black after 1 Kb3 Bf7+ 2 Ka3 Bc4 (see 1a) 3 Bg6 Be2 4 Kb3 Bd1+ 5 Kc3 Bh5! 6 Bd3 Bf7 7 Bh7 Ba2 8 Bd3 Bb1 9 Bc4 Bh7 10 Ba2 Bg8. On the 12x8 board, however, White can draw by 3 Bi8! Now Centurini's manoeuvre no longer wins, because after 3...Be2 4 Kb3 Bd1+ 5 Kc3 Bj7 6 Bd3 the crucial move 6...Bh9 is not available; the best Black can do is 6...Be2 7 Bi8 Bk8 8 Bd3 Bj7 leaving wB with no move (9 Be4/.../Bh7 would allow the Centurini win), but White can play 9 Kb3 and Black can do nothing.



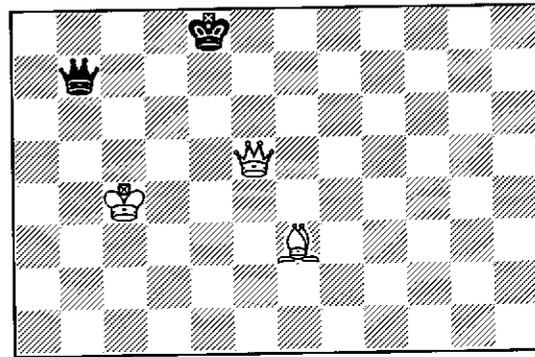
2 - win



2a - after 3...Qb7

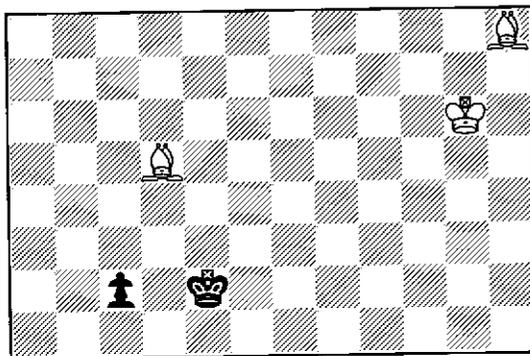


2b - 4 Qd8+, after 8 Kb5

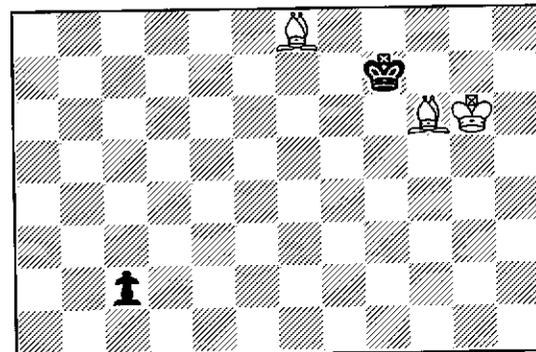


2c - 4 Qa5+, after 7...Ke8

2 (*Variant Chess*, Oct-Dec 1993) shows a different kind of subtlety. Play starts 1 Qg2+ Qb7 2 Qg8+ Qb8 3 Qd5+ Qb7, and we have 2a. On the 8x8 board there is now a win by 4 Qd8+ Qb8 5 Qa5+ Kb7 6 Qb6+ Kc8 7 Qe6+ Kb7 8 Kb5 (see 2b) and either 8...Ka8/Kc7+ 9 Bb6(+) etc, or 8...Qc7 9 Bc5, or 8...Qf4/Qh2 9 Qc6+ Kb8 10 Ka6, but on the 12x8 board Black can draw by 8...Qi1. However, what is sauce for the goose... On the 12x8 board, White can play 4 Qa5+ Kb8 5 Bg3+ Kc8 6 Qc5+ Kd7 7 Qf5+ Ke8, which is only a draw on the 8x8 board (see 2c), and now it is White's turn to use the i-file: 8 Qi8+ Kd7 9 Qh7+ Kc6/Kc8 10 Qg6+/Qg8+ Kd7 11 Qf7+ with capture of bQ or mate next move.



3 - draw



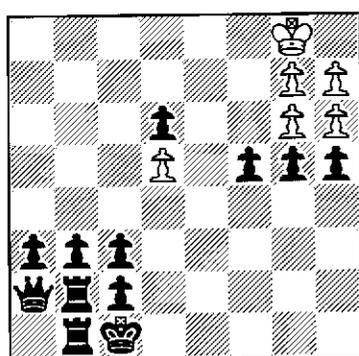
3a - after 6 Bj6+

3 is strictly a study for the 12x8 board. Paul sent it to the 50th birthday tourney of the Dutch study expert Jan van Reek, and although the director and judge declared it "hors concours" they printed it in the tourney booklet and added a note that it had given them pleasure. Play starts 1 Bc4+ (if 1 Bg8 then 1...c1Q 2 Bi6+ Ke3 3 Bj6 Qf1 and we have a position which would be won for Black in 62 moves on the 8x8 board - Paul acknowledged help from John Nunn in examining the Thompson database - and is presumably won on the larger board as well) Kf3 (the diagonal d2-h6 is poisoned: 1...Kd2 2 Bk7 c1Q 3 Bj8+) 2 Bd5+ Kg4 3 Be6+ Kh5 4 Bf7+ Ki6 5 Bg8+ Ki7 6 Bj6+ (see 3a) Ki8 (6...Kh6 7 Bk7, or 6...Kj8 7 Bk7+ Ki8 {7...Ki7 8 Bj6+ with repetition, 7...Kk8?? 8 Bi6 with mate} 8 Bh7+ Kxh7 9 Bj8) 7 Bi6 and although White can no longer prevent Black's promotion he can reach a fortress position discovered by Lolli (wKk7, wBj7/j6) which saves the game on the 8x8 board and appears to save it on the 12x8 board as well: 7...c1Q 8 Bj7+ Kj8 9 Bk7+ Ki7 10 Bj6+ Kh7/Kh6 11 Kk7.

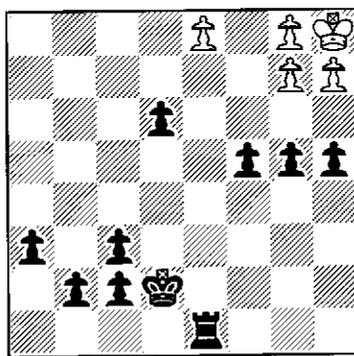
The dummy pawn revisited

The modern rules for pawn promotion were not adopted without controversy, and two alternative rules had support until quite late in the nineteenth century: the "single box of men" rule and the "dummy pawn" rule. Under the former, promotion was possible only to replace a captured piece, and if no piece had been captured then a promoted pawn remained a pawn until there was a vacancy for it to fill. Under the latter, a player could leave a pawn unpromoted instead of making a normal promotion.

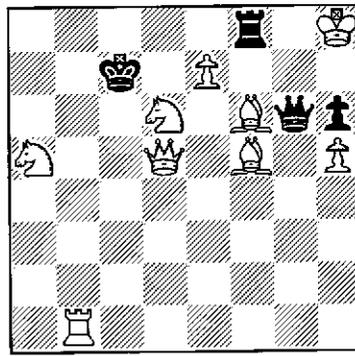
The "single box of men" rule would be convenient for practical play, but from the point of view of the endgame study we must be thankful that it did not win the day. Just think of all those glorious multiple-knight studies that we would lack! In return, we would have only the possibility of moving a pawn to the eighth rank ready to materialize after a capture, but this would imply that all that side's pieces were still on the board and its relevance to endgame studies would be small.



1 - draw by dummy pawns



1a - after 7...Re1 8 h7



2 - win by dummy pawn

The "dummy pawn" rule is a different matter. It was realized long ago that a dummy promotion might save a game by stalemate, and T. R. Dawson achieved no fewer than three such promotions in 1 (*Caissa's fairy tales*, 1947): **1 Kh8 Kd2 2 g8P! Re1 3 g7 Re6 4 dxe6 Rb1 5 e7 b2 6 e8P!! Qxg8 7 hxg8P!!! and 8 h7**, and Black cannot relieve the stalemate (see 1a for an example). As regards a dummy promotion to win, Harold van der Heijden, in his recent book *Pawn promotion to bishop or rook in the endgame study*, says that "at first sight this would seem impossible", but he refers to its use in a three-move problem by Loyd and a win study is not difficult to construct. I sent him 2, which I understand he intends to quote in the Dutch study magazine *EBUR*, but I suspect it has been done before. **1 exf8R** guards d8, so **1...Qg7+** forces stalemate; **1 exf8N** guards d7, hence **1...Qh7+**; **1 exf8B/Q** guard d6, hence **1...Qg8+**; but after **1 exf8P** we have **1...Qg7+ 2 Bxg7** releasing d8, **1...Qh7+ 2 Bxh7** releasing d7, and **1...Qg8+ 2 Qxg8** releasing d6, while **1...Qxf6+** destroys the stalemate at once and White will win as soon as the checks have run out.

If you have enjoyed this supplement to our normal fare, I recommend that you try the quarterly magazine Variant Chess. Contact Peter Wood, 39 Linton Road, Hastings, East Sussex TN34 1TW, 1996 subscription (UK) £8 - JDB.