Chess Tests: Basic Suite, Positions 21-25

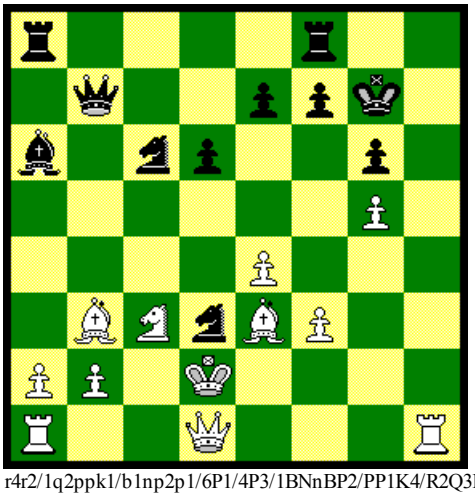
(c) Valentin Albillo, 2020

Last update: 14/01/98

See the *Notes on Problem Solving*

NEW

21.- Nguyen vs Zuger, Moscow 1994



FEN: r4r2/1q2ppk1/b1np2p1/6P1/4P3/1BNnBP2/PP1K4/R2Q3R/ w

White to play and mate in 11:
1. Rh7+!! Kxh7; 2. Qh1+ Kg8; 3. Qh6

Results

Program	CPU/Mhz	Hash table	Move	Value	Plys/Max	Time	Notes
Chess Genius 1.0	P100	320 Kb	Rh1-h7+	+3.00	7/19	00:06:16	seen at 6:06, +1.30
Chess Genius 1.0	P100	320 Kb	Rh1-h7+	+8.30	11/23	05:54:17	doesn't see mate
PANEK Chess Genius 5.0	PII/266	10 Mb	Rh1-h7+	+2.87	8/20	00:02:38	first sight
PANEK Chess Genius 5.0	PII/266	10 Mb	Rh1-h7+	+5.75	11/23	01:53:07	
PANEK Chess Genius 5.0	PII/266	10 Mb	Rh1-h7+	+14.12	12/24	05:58:33	
NEW Rebel Decade 2.0	P100	512 Kb	Rh1-h7+	+2.58	9	00:20:12	
Crafty 12.7	P100	12+5 Mb	Ra1-b1	+0.672	11/12	01:20:10	can't see sacrif.

Notes:

In this position, taken from a game between **Nguyen** and **Zuger** *(match Vietnam/Switzerland, 31th Chess Olympiad, Moscow 1994)*, White plays and gives *mate in 11*. It's not an easy mate for a chess program because most of the moves are *not* checks, and Black can *delay* the mate by major piece sacrifices, thus pushing the loss beyond the horizon.

For instance, after *3. Qh6*, Black can delay the mate for just a single move sacrificing its queen *(3. ... Qb7xb3)*. Any other move results in a shorter mate.

Chess Genius 1.0 finds the correct move while looking at 7/19 plies in a few minutes, but though it sees a sizable gain, equivalent to a minor piece *(+3.00)*, it doesn't see the mate. Continuing the search, it goes to a depth of 11/23 plies in a few hours, this time seeing a gain equivalent to the enemy queen *(+8.30)*, yet it still *doesn't see* the existing mate in 11.

Chess Genius 5.0 does *somewhat worse* than its older relative. It needs one extra ply to see the correct move for the first time (8/20 instead of 7/19) with a slightly lower evaluation (+2.87 vs +3.00). Then, at 11/23 plies its evaluation is significantly less (+5.75 vs +8.30). Continuing the search for another ply, 12/24, finds the greatest gain of all programs tested, +14.12. For further results as the search goes deeper, see the **Addendum** below.

Crafty 12.7 does much worse. Though it used large hashtables, it *failed* to see the correct Rook sacrifice, even when looking at 11/12 plies in a long time. It finds an irrelevant defensive Rook move which gains nothing. Continuing the search for yet another ply takes *more than 5 hours*, but it doesn't see the winning sacrifice either.

Freeware **Rebel Decade 2.0** does quite well. It finds the correct move with a sizable evaluation, +2.58 while looking at only 9 plies (*20.968.518 positions* examined) in a reasonable time (though still *3 times slower* than CG1.0). It doesn't evaluate it as a mate in 11, but then none of the programs tested did, either.

Addendum:

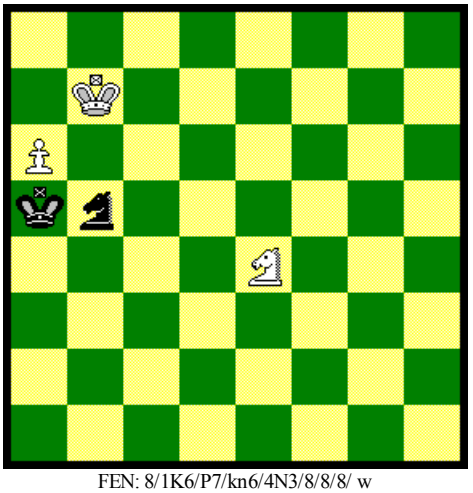
Ed Panek continued the search with **Chess Genius 5.0** till it found the mate. In his own words:

"... quickest mate is seen after 6 hours with the following Principal Variation:

h1h7+, kxR, qh1+, h7g8, h1h6, b7xb3, a2xb3, d3f2, e3xf2, a6f1, a1xf1, a8a1, f1xa1, c6e5, a1h1, e5xf3+, d2e2, f3h2, h1xh2, e7e6, h6h7++

... See you. Ed"

22.- Study of R. Reti



FEN: 8/1K6/P7/kn6/4N3/8/8/8/ w

White to play and win: 1. Ne4-c5

Results

Program	CPU/Mhz	Hash table	Move	Value	Plys/Max	Time	Notes
Chess Master 2175	P100	16 Mb	Ne4-c5	+3.32	21	00:02:41	doesn't see prom.
Chess Genius 1.0	P100	320 Kb	Ne4-c5	+2.30	4/16	00:00:01	doesn't see prom.
Chess Genius 1.0	P100	320 Kb	Ne4-c5	+6.45	20/32	00:20:08	sees promotion
NEW Comet-A.75	P100	13786 Kb	Ne4-c5	+2.85	16	00:07:06	can't see promotion
NEW Rebel Decade 2.0	P100	512 Kb	Ne4-c5	+2.61	16	00:46:31	doesn't see prom.
Crafty 12.7	P100	12+5 Mb	Ne4-c5	+2.526	19/23	00:22:17	can't see it
KAI Crafty 12.6	Pentium Pro 200 MHz	24+16 Mb	Ne4-c5	+6.66	17	00:01:40	sees promotion
KAI Crafty 12.6	Pentium Pro 200 MHz	24+16 Mb	Ne4-c5	+9.70	18/24	00:03:15	sees promotion

HYATT Crafty 13.3	P6	?	Ne4-c5	+2.803	22/29	00:02:22	can't see promotion
KAI Chess Master 5500	Pentium Pro 200 Mhz	?	Ne4-c5	+1.17	16/23	00:09:36	can't see promotion
KAI MChess Pro 5.0	Pentium Pro 200 Mhz	10 Mb	Ne4-c5	+3.49	10	00:02:02	can't see promotion

Notes:

A *very, very difficult endgame*. Here White can promote the pawn, despite the nearby King and Knight, and despite the fact that all Black needs to secure the draw is to capture the Pawn, even sacrificing its Knight, as it is impossible to mate with King and Knight.

However, finding the solution requires a very deep search, which would be impossible were it not for *the hash tables*.

Here, **Chess Genius 1.0** sees the correct move at once, in less than a second, with a 4/16 ply search, but it doesn't see the promotion at that depth. That requires a 20/32 ply search, which takes a long time. A larger hash table would have helped.

Comet-A.75 uses that large hash table (13.786 Kb vs 192 Kb), but though it finds the correct move at once, evaluated at +2.63, it doesn't see the promotion. Letting it search deeper, it goes to 16 plies in some minutes, but the evaluation merely raises to +2.85. In that time, it could look at *13.649.892 positions*.

Rebel Decade 2.0 can use only a smallish 512 Kb hash table (though it's nearly a threefold improvement over the meager 192 Kb used by its former incarnation, RD1.2), and though it finds the correct move while looking at the same 16 plies as **Comet-A.75** and with a similar evaluation, +2.61, it takes *7 times longer*. At that depth, it has examined *40.000.647 positions*, yet it can't see the incoming promotion.

Chess Master 2175, using too a big 16 Mb hash table manages to go to its maximum depth of 21 plies in a short time, but although it finds the correct move, it doesn't see the promotion either.

Same goes for **Crafty 12.7**, which uses its large 12 Mb hash table to search 19 full plies, plus 4 additional quiescence plies, but also fails to see that the correct move forces the promotion.

Oddly, **Crafty 12.6**, using larger hash tables, sees the promotion both when searching to 17 plies and 18 plies, plus 6 other extension plies. Why **Crafty 12.6** sees this searching to *17 plies* and **Crafty 12.7** *cannot* searching to 19 plies beats me.

Which is more, **Robert Hyatt** sent an analysis (see **Addendum** below) of this position run with **Crafty 13.3.**, and it shows that it can't see the promotion either, even when looking at 22/29 plies. Sure, it does find the correct move, but the low evaluation (+2.803) and the principal variation both fail to see the promotion. Anyone can *explain* ?

Chess Master 5500 look very deep, to 16/23 plies, but though it finds the correct move, it neither sees the promotion, nor a substantial gain. The timings isn't very good either: in the same time or less, **Chess Genius 1.0** looks a lot deeper (20/32 plies vs. 16/23) and sees both the promotion and, of course, a large gain.

MChess Pro 5.0 does a lot better. As nearly always, it looks at significantly less plies than most other programs (10 vs. 16/23, 20/32, 18/24, 19/23) in quite a short time, and it finds both the correct move and a large gain, but it falls a little short of seeing the promotion.

Addendum:

I sent an e-mail to **Robert Hyatt** with this comment:

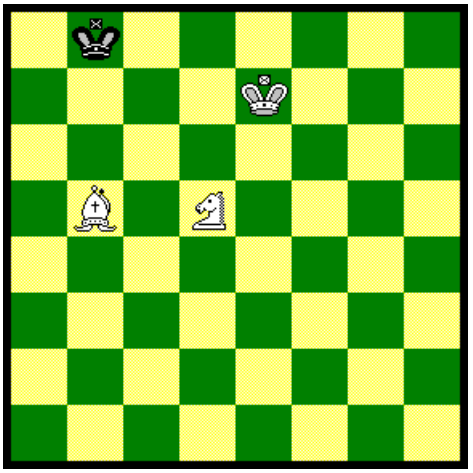
VA: *" ... A rather strange thing: Crafty 12.6 finds this while looking at 17 plies, but Crafty 12.7 *cannot* looking at 19 plies !?"*

RH: *"My version [13.3] finds it from ply 1 all the way to as far as I let it go:"*

```
depth    time    score   variation (1)
 19     58.54    2.717   Nc5 Kb4 Kb6 Nd6 Nd7 Nc8+ Kc7 Na7 Kb7
                         Nb5 Kb6 Nd6 Nf6 Nc8+ Kb7 Nd6+ Kc6 Nc8
                         Ne8 Ka4 Kb7 Kb5
 19->    1:00    2.717   Nc5 Kb4 Kb6 Nd6 Nd7 Nc8+ Kc7 Na7 Kb7
                         Nb5 Kb6 Nd6 Nf6 Nc8+ Kb7 Nd6+ Kc6 Nc8
                         Ne8 Ka4 Kb7 Kb5
 20      1:21    2.811   Nc5 Kb4 Kb6 Nd6 Nd7 Nc8+ Kc7 Na7 Kb7
                         Nb5 Kb6 Nd6 Nf6 Nc8+ Kb7 Nd6+ Kc6 Nc8
                         Ne8 Na7+ Kb6 Nb5 Nf6
 20->    1:23    2.811   Nc5 Kb4 Kb6 Nd6 Nd7 Nc8+ Kc7 Na7 Kb7
                         Nb5 Kb6 Nd6 Nf6 Nc8+ Kb7 Nd6+ Kc6 Nc8
                         Ne8 Na7+ Kb6 Nb5 Nf6
 21      1:49    2.737   Nc5 Kb4 Kb6 Nd6 Nd7 Nc8+ Kc7 Na7 Kb7
                         Nb5 Kb6 Nd6 Nf6 Nc8+ Kb7 Nd6+ Kc6 Nc8
                         Ne8 Na7+ Kb6 Nb5 Ng7 Kc4 Ne6
 21->    1:51    2.737   Nc5 Kb4 Kb6 Nd6 Nd7 Nc8+ Kc7 Na7 Kb7
                         Nb5 Kb6 Nd6 Nf6 Nc8+ Kb7 Nd6+ Kc6 Nc8
                         Ne8 Na7+ Kb6 Nb5 Ng7 Kc4 Ne6
 22      2:22    2.803   Nc5 Kb4 Kb6 Nd6 Nd7 Nc8+ Kc7 Na7 Kb7
                         Nb5 Kb6 Nd6 Nb8 Nc8+ Kb7 Nd6+ Kc7
```

```
Nb5+ Kb6 Nd6 Nc6+ Ka4 Ne7 Nc4+ Kb7 Nd6+
Kc6 Nc4 Kb7
```

23.- Taken from "Endgame theory", pag. 12, diag. 4



FEN: 1k6/4K3/8/1B1N4/8/8/8/8/ w

White to play and mate in 7: 1. Bb5-a6

Results

Program	CPU/Mhz	Hash table	Move	Value	Plys/Max	Time	Notes
Chess Master 2175	P100	2 Mb	Bb5-a6	Mate7	13	00:00:53	level=infinite
Chess Genius 1.0	P100	320 Kb	Bb5-a6	Mate7	10/22	00:01:16	selec=12
Chess Genius 1.0	P100	320 Kb	Bb5-a6	Mate7	9/13	00:00:18	selec=4
Chess Genius 1.0	P100	320 Kb	Bb5-a6	Mate7	13/14	00:00:15	level=Mate7
Rebel Decade 1.2	P100	192 Kb	Ke7-d7	Mate8	11	00:02:32	sees mate in 8
Rebel Decade 1.2	P100	192 Kb	Bb5-a6	Mate7	13	00:25:55	level=Mate7
NEW Rebel Decade 2.0	P100	512 Kb	Bb5-a6	Mate7	10	00:07:23	seen at 2m 53s
KAI Crafty 12.6	Pentium Pro 200 MHz	24+16 Mb	Bb5-a6	Mate7	12	00:03:04	seen at 2m13s
KAI Chess Master 5500	Pentium Pro 200 Mhz	?	Bb5-a6	Mate7	11	00:00:37	

Notes:

This is a simple mate which happens in the final steps of a book mate with King, Knight and Bishop. As usual, **Chess Master 2175** needs the whole 13-ply search to find it, though it does not take very long.

In fact, **Chess Genius 1.0** takes even a little longer, needing 10+12 plies. In this position, the extra 12 plies is *overkill*, so reducing them to 9+4 plies finds the mate 4 times faster, almost as fast as the special Mate in 7 level.

Rebel Decade 1.2 in its infinite level, looks at some 3 million positions in double the time than **Chess Genius 1.0** with *selec=12*, but does not see the correct move, instead it sees a King move which results in a slower mate in 8.

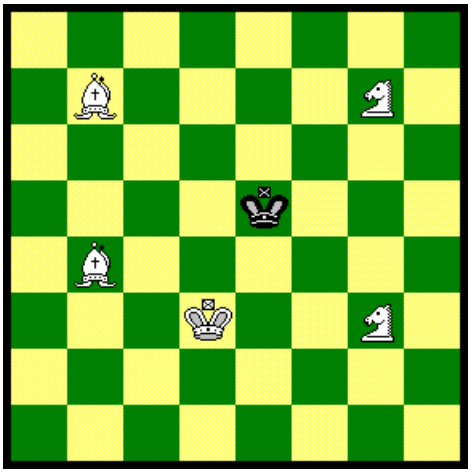
The correct move which achieves the required mate in 7 is found using the mate level, which goes down to 13 ply, looking at a daunting *111.772.695 positions*, and taking quite a long time, almost *100 times slower* than Chess Genius 1.0 !!

The newest version, **Rebel Decade 2.0** improves significantly on this result. It needs to look at one ply less, 10 plies, and finds the correct move evaluated as the required mate in 7, significantly slower than the best commercial programs, but on a par with freeware **Crafty 12.6**. It examined *8.307.270 positions*.

Crafty 12.6 finds the mate in 7, too, but it needs to search to 12 plies, and it takes longer than the other programs, despite the superior hardware and RAM. I don't know why, but this kind of mates are one of Crafty's *weaknesses*. See **Test 19** and **Test 20** for further examples of this.

On the other hand, **Chess Master 5500** has no problem finding the shortest mate in 7, and its timing is quite good taking into account that no special "Mate in 7" level was used.

24.- Never before published problem from myself (Valentin Albillo)



FEN: 8/1B4N1/8/4k3/1B7/3K2N1/8/8/ w

White to play and mate in 6:
1. Ng3-e4 e5-f4 2. d3-e2 f4-e5

Results

Program	CPU/Mhz	Hash table	Move	Value	Plys/Max	Time	Notes
Chess Master 2175	P100	2 Mb	Ng3-e4	Mate6	11	00:02:12	level=infinite
Chess Genius 1.0	P100	320 Kb	Ng3-e4	Mate6	8/20	00:01:58	selec=12
Chess Genius 1.0	P100	320 Kb	Ng3-e4	Mate6	7/11	00:00:19	selec=4
Chess Genius 1.0	P100	320 Kb	Ng3-e4	Mate6	11/12	00:04:23	level=mate6
Rebel Decade 1.2	P100	192 Kb	Ng3-e4	Mate7	9	00:04:07	sees mate in 7
Rebel Decade 1.2	P100	192 Kb	Ng3-e4	Mate6	11	00:10:33	level=mate6
NEW Rebel Decade 2.0	P100	512 Kb	Ng3-e4	Mate9	9	00:10:50	seen at 3m 8s
KAI Crafty 12.6	Pentium Pro 200 MHz	24+16 Mb	Ng3-e4	Mate6	9	00:02:36	seen at 2m25s
KAI Chess Master 5500	Pentium Pro 200 Mhz	?	Ng3-e4	Mate6	8	00:00:08	sees Mate7 in 5 sec
KAI MChess Pro 5.0	Pentium Pro 200 Mhz	10 Mb	Ng3-e4	Mate7	?	00:00:35	see notes

Notes:

This is a difficult (for a human player) mate in 6, with minor pieces in an open position, with the enemy King in the center of the board, to make it last longer.

Chess Master 2175 needs the full 11-ply search, and takes a somewhat long time. **Chess Genius 1.0** finds it no less than 5 times faster, even using a 8+12 ply search. Reducing the extra plies to 4, finds the mate using just 7+4 plies, 6 times faster still.

In this case, the special Mate in 6 level is **15 times slower**, much to my surprise !

Rebel Decade 1.2 in its infinite level sees the correct move, but evaluates it as a Mate in 7. On the other hand, its special mate level delivers the required mate in 6, but it has to look at *39.545.051 positions*, and that takes a somewhat long time, more than 2 times slower than **Chess Genius 1.0**.

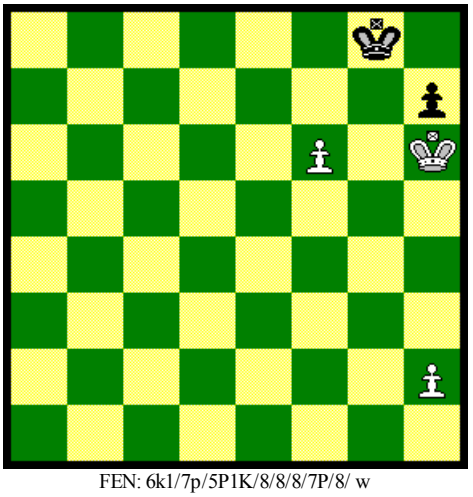
Rebel Decade 2.0, the newer version, does it worse than the old. To begin with, it needs more time to find and deliver the mate. Second, it evaluates the correct move as a *mate in 9*, while RD1.2 thought it was a *mate in 7*. Actually, it's a *mate in 6*, but none of the versions were aware in their infinite levels. By the time the mate (in 9) was found and the search stopped, it had examined *13.026.083 positions*.

Crafty 12.6 finds the required mate in 6, but though it has the advantage of faster hardware and more RAM, its timings are *worse* than that of CG1.0, specially as it needs to search to 9 plies, while CG1.0 does it with just 7 or 8.

Chess Master 5500 does brilliantly for this one: it finds the correct mate in 6, and in one of the shortest times, while looking at only 8 plies.

MChess Pro 5.0 fares worse: it finds the correct move, but evaluates it as a mate in 7, taking *4 times longer* than **Chess Master 5500**. No mate in 6 was found under 6 minutes.

25.- Position taken from "How computers play chess"



FEN: 6k1/7p/5P1K/8/8/8/7P/8/ w

White to play and mate in 16: 1. Kh6-g5

Results

Program	CPU/Mhz	Hash table	Move	Value	Plys/Max	Time	Notes
Cray Blitz	Cray	Yes	Kh6-g5	Mate19	37	00:00:10	sees mate in 19
Chess Master 2175	P100	2 Mb	Kh6-g5	+4.18	21	00:01:22	can't see mate
Chess Genius 1.0	P100	320 Kb	Kh6-g5	+11.45	22/32	01:49:07	can't see mate
NEW Comet-A.75	P100	13786 Kb	Kh6-g5	+13.17	18	00:17:00	can't see mate
NEW Rebel Decade 2.0	P100	512 Kb	Kh6-g5	+4.49	20/23	03:03:36	can't see mate
Crafty 12.7	P100	6 Mb + 640k	Kh6-g5	+11.826	21/25	00:10:10	can't see mate
KAI Crafty 12.6	Pentium Pro 200 MHz	24+16 Mb	Kh6-g5	Mate16	19	00:03:24	sees the mate
KAI Crafty 12.8	Pentium Pro 200 MHz	24+16 Mb	Kh6-g5	Mate16	18	00:00:36	sees the mate
KAI Chess Master 5500	Pentium Pro 200 Mhz	?	Kh6-g5	+13.03	21	00:18:05	can't see mate
KAI MChess Pro 5.0	Pentium Pro 200 Mhz	10 Mb	Kh6-g5	+11.77	16	00:02:13	see notes

Notes:

A lengthy problem, you have first to find a way to *promote a pawn* (which takes some 11 moves) and then you have to mate (another 5 moves), for a total of 16 moves.

Cray Blitz, running on a Cray supercomputer and with a large hash table, solves this position in a mere 10 seconds, but announcing mate in 19.

The much more modest **Chess Master 2175**, searches as far as it can, to 21 plies, in a reasonable time (thanks to its large hash table, which is ideally suited for this kind of positions), but *cannot* see neither the *mate* nor even *the promotion* itself.

Chess Genius 1.0, having a much more reduced hash table of just 0.32 Mb, suffers considerably to search to 22 full plies, plus 10 extra plies for captures, checks, and promotions, and though it takes quite a long time, at least *sees the promotion*, if not the mate.

Same goes for **Rebel Decade 2.0**, which also has a small 512 Kb hash table. It looks at 20 plies in some 3 hours, and finds the correct move with a reasonable evaluation, but despite the fact that it examined a hefty *219.002.541 positions*, it couldn't see the mate.

Speaking of hash tables, **Crafty 12.7** uses a 6 Mb one, and this serves it well to look at 21 full plies (plus 4 of extended search) *in a tenth of the time* **Chess Genius 1.0** took. At this depth, it *sees the promotion*, but not the mate. That would require either reaching 31 plies, or using the corresponding *endgame tablebases*.

Finally, **Crafty 12.6**, using the fastest hardware, more RAM, and all 3-men and 4-men endgame tablebases, *does find the Mate in 16*, and in quite a short time, too. Its newest, sharpest incarnation, **Crafty 12.8** does it too, and *six times faster*, which is an amazing result !

Freeware **Comet-A.75** does quite well: it reaches a depth of 18 plies in a reasonable amount of time, and discovers the correct move with the largest gain, but no mate. It evaluated *27.076.561 positions* in the process.

The new **Chess Master 5500** doesn't find the mate either, though it looks at 21 plies. It does find the correct move, like all other programs tested, but doesn't see any mate.

Same thing goes for **MChess Pro 5.0**, which looks to 16 plies very fast and sees more or less the same gain **Chess Genius 1.0** sees when searching 22/32 plies deep, but of course it doesn't find any mate. Actually, it never had a chance, as **MChess Pro 5.0** *is hard limited to 26 plies*, and seeing this mate requires *at least* 32 plies.

Why a modern chess program such as **MChess Pro 5.0** is limited to only 26 plies, *beats me !* This reminds me of the 640k RAM limit of ancient PCs !.

Addendum:

I stated originally that this problem was a mate in 19, because that is what **Cray Blitz** announced, and I was unable to find the mate with the programs I tried. But **Kai Luebke** sent an e-mail telling me that both **Crafty 12.6** and 12.8 say it's really a mate in 16, and I'll take his word for it. Thanks, Kai.

Also **Robert Hyatt**, author of both **Cray Blitz** and **Crafty**, sent me an e-mail stating that, contrary to my assumption that **Cray Blitz** used precompiled endgame databases, in fact it didn't use any at all. It found the mate in 19 by pure calculation, without endgame tables lookup. He also said that he couldn't remember whether it had used a large hash table or not, specifically he said that

*" ... it might easily have had a hash table of 500 *million* entries, for all I know. We ran on 16 Gbyte machines quite often, which allowed 1.5 billion hash table entries. So I have no real idea of what I used when I ran those ...".*

Thanks, Robert.

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