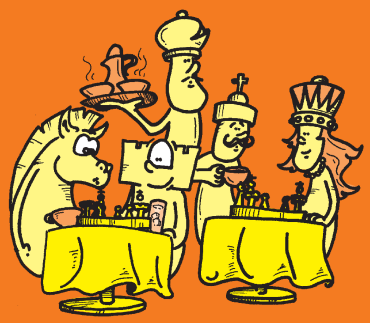


THE PUZZLING SIDE OF CHESS

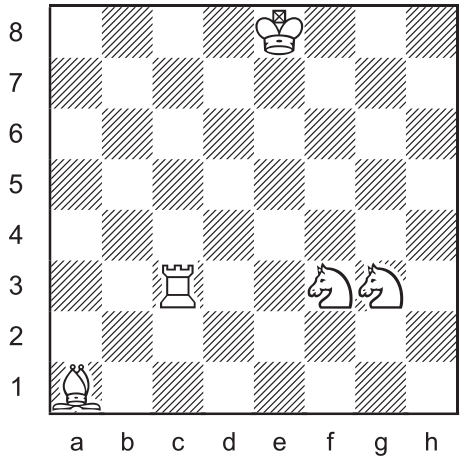
Jeff Coakley

NEURAL STUMPERS

number 190 May 31, 2020

Today's menu is a nine puzzle smorgasbord of treats and sweets. Food for thought to sharpen the wits.

Triple Loyd 82

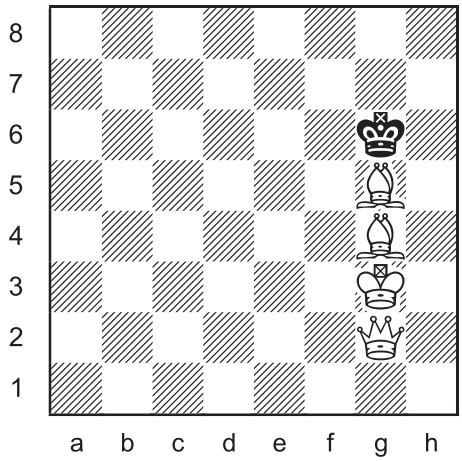


Place the black king on the board so that:

A. Black is in checkmate.
B. Black is in stalemate.
C. White has mate in 1.

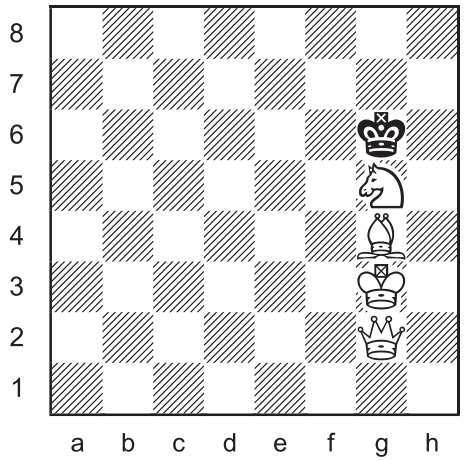
Several lifetimes ago, while teaching chess in Toronto, I collected a series of problems to use as *brain teasers* for the keener students. Most of the 150 compositions were mate in 2's. Many were miniatures with unusual settings. I called them "neural stumpers".

Neural Stumper 29



mate in 2

Neural Stumper 30



mate in 2

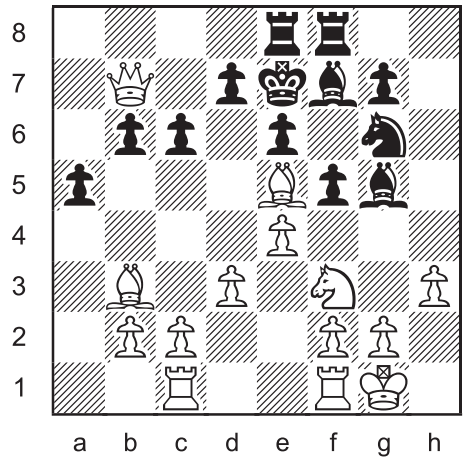
The Cogs of Cognition

Neurons are the nerve cells that transmit information within the brain and throughout the body by means of electrical impulses. Their signals travel at a speed of 120 metres per second. Think fast.

Dan Heisman is a U.S. national master, an award-winning author, and one of the most popular and successful online chess instructors. He occasionally includes a *switcheroo* in his lessons as an exercise in pattern recognition. If you're unfamiliar with this type of problem, the rules are given below.

The following switcheroo is the first to appear on the *Puzzling Side* since 2014. It was composed jointly by Dan and myself. There are six different switches that put the black king in checkmate, but only one is a legal position.

Switcheroo 68

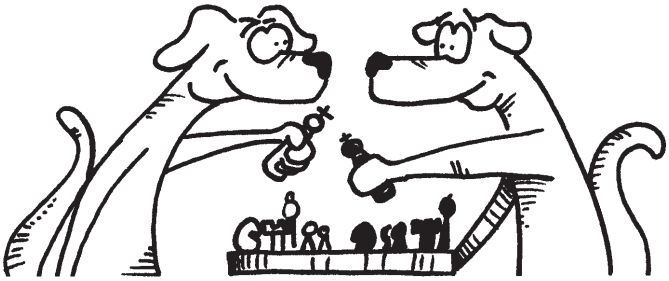


Switch two pieces so that
Black is in checkmate.

In a *switcheroo*, the goal is to put the black king in checkmate by switching the position of two pieces. No actual chess moves are made. The pieces simply swap squares.

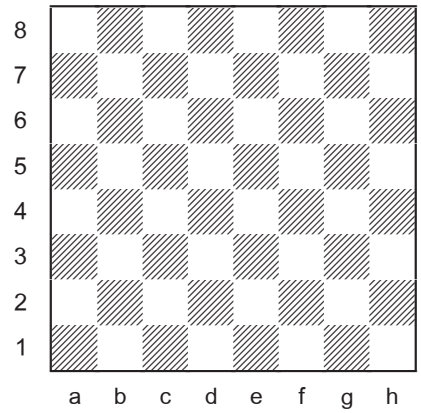
Any two pieces can switch places. Colours do not matter. You can trade white with white, black with black, or white with black. Switching the black king is a common trick.

The position after the switch must be legal. A position is legal if it could occur in an actual game. *Retrograde analysis* may be required to decide if the position after a switch is legal.



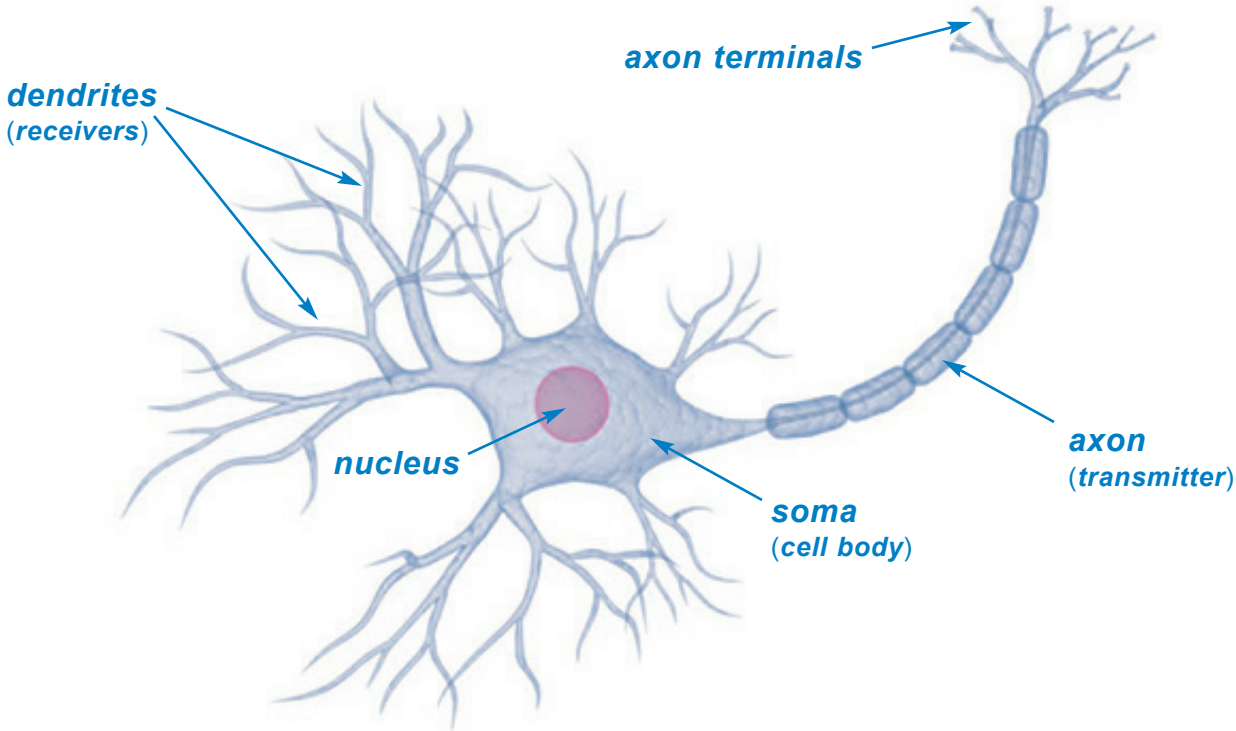
The next puzzle is a very basic construction task. It does not appear in the standard references for such problems, but I doubt that it is new.

Disco Check Maximizer



Construct a legal position in which
White has the most moves that give discovered check.

A. Without promoted pieces.
B. Promoted pieces allowed.

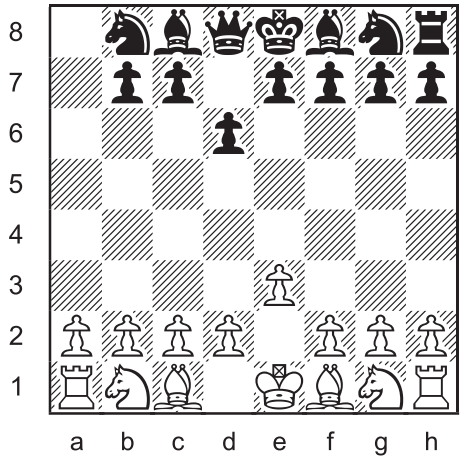


Neuron

The human nervous system consists of 100 billion neurons. Information is conveyed by connections called “synapses” from each cell’s axon to the dendrites of other cells. There are an estimated quadrillion synapses in the brain. A million million byways. Easy to go astray.

In proof games, the missing pieces are often a bigger clue than those still on the board. Some strange disappearances have occurred in this position. Can you piece together the solution?

Longer Proof Game 79 (4.5 moves)

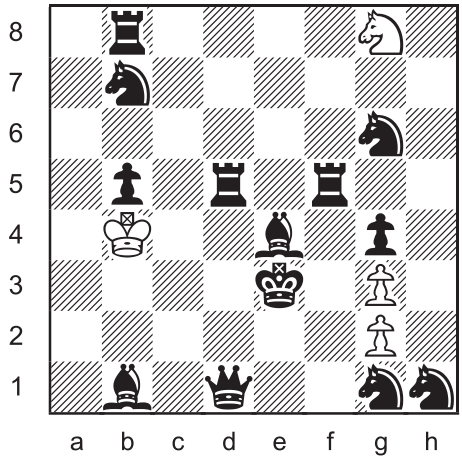


This position was reached after
White's fifth turn. What were the moves?

high speed chess processor

Smorgasbord XXVIII continues with a series-mate in 28.

Multi-Wham 47



series-mate in 28

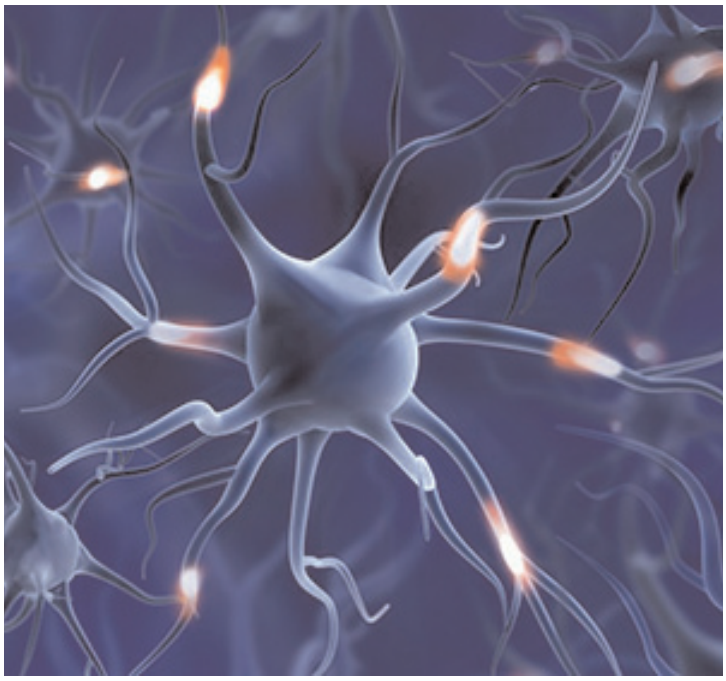
White plays twenty-eight moves in a row to mate Black.

Only the last move may give check. Captures are allowed. White may not place their own king in check. Black does not get a turn.

Except for creatures like jellyfish, all animals have a brain. Some bigger than ours. Size is not a measure of intelligence, but the number of neurons in the cerebral cortex is a contributing factor. The following list shows the estimated count for various species.

Neurons in Cerebral Cortex

Whale	40,000,000,000
Human	16,000,000,000
Dolphin	13,000,000,000
Gorilla	9,000,000,000
Orangutan	8,000,000,000
Chimpanzee	7,000,000,000
Elephant	6,000,000,000
Walrus	4,000,000,000
Giraffe	1,700,000,000
Raven	1,200,000,000
Horse	1,200,000,000
Dog	500,000,000
Lion	500,000,000
Pig	400,000,000
Bear	250,000,000
Cat	250,000,000
Squirrel	80,000,000
Mouse	14,000,000

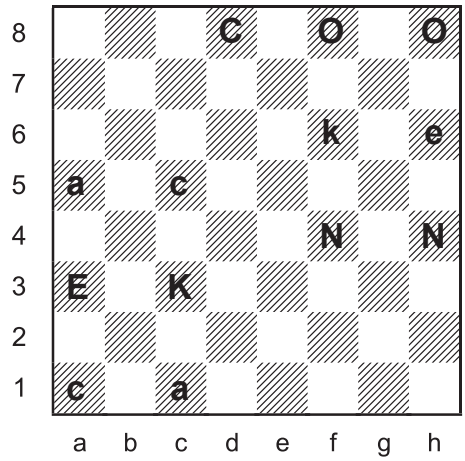


And though the cells were rather small,
They had to count them all.
Now they know how many cells
It takes to fill an empty skull.

This column concludes with a pair of rebuses. The first is a standard affair, perhaps more difficult than its simple geometry would suggest.

Rebus 34

"coke can"



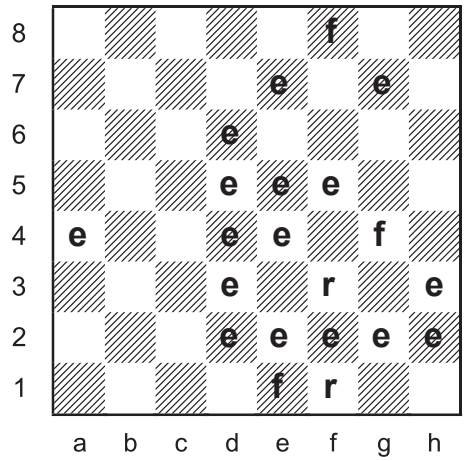
Each letter represents a different type of piece.
Uppercase is one colour, lowercase is the other.
Determine the position and, if possible, the last move.

The Inner Light

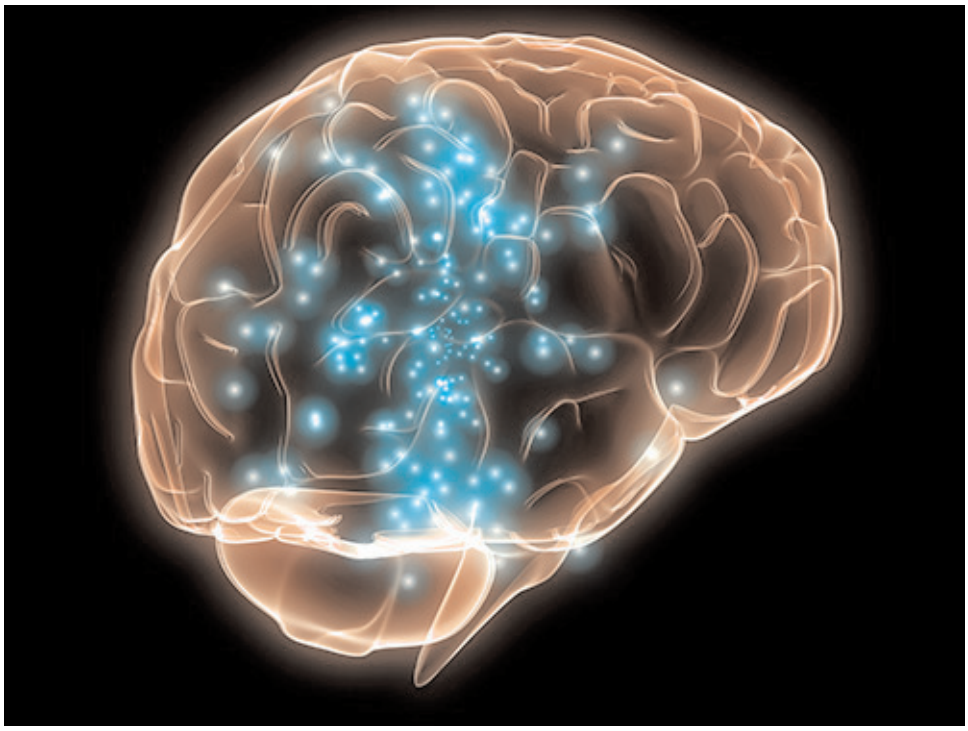
In column 188, it was noted that the record for fewest pieces in a *colour-free* rebus was 27. Since then, the mark has been notably lowered to 21. Feel “free” to do better. There is no computer program for rebuses. Just neurons firing through our minds.

Rebus 35

“free”



Each letter represents a different type of piece.
No indication is given for colour.
Some instances of a letter can be white,
other instances of the same letter can be black.
Determine the position.



How to Solve a Rebus

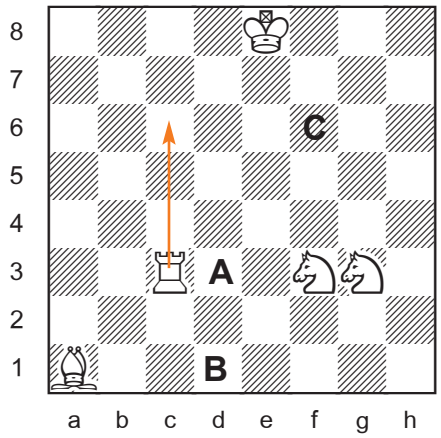
SOLUTIONS

All problems by J. Coakley, *Puzzling Side of Chess* (2020). Neural stumpers 29-30 appeared previously in *Winning Chess Exercises For Kids* (2004). Switcheroo 68 is a joint composition with Dan Heisman. Rebuses 34-35 are joint compositions with Andrey Frolkin.

PDF hyperlinks. You can advance to the solution of any puzzle by clicking on the underlined title above the diagram. To return to the puzzle, click on the title above the solution diagram.

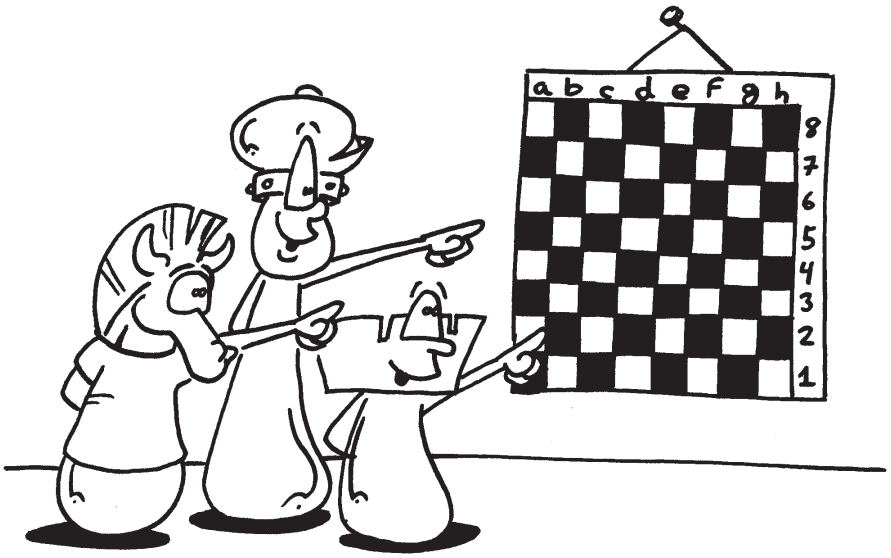
Archives. Past columns are available in the *Puzzling Side* archives.

Triple Loyd 82



A. Kd3#
B. Kd1 =
C. Kf6 (Rc6#)

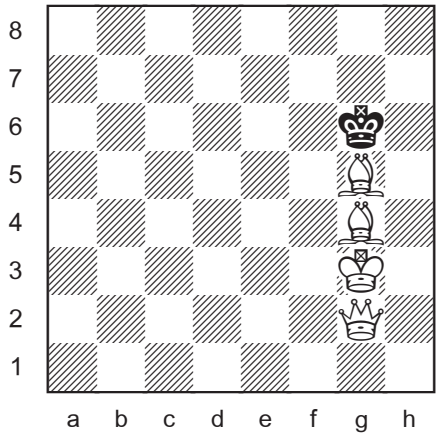
Double check and mate.



Neural Stumper 29

J. Coakley 1987

Winning Chess Exercises For Kids (2004)



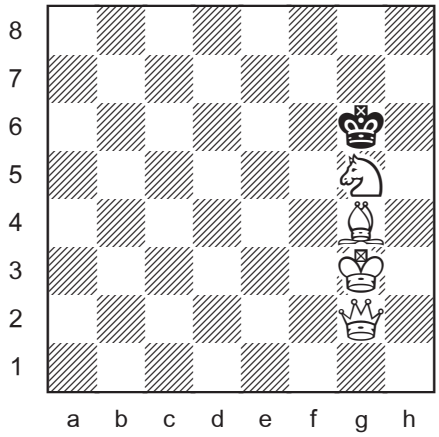
1.Qb7 Kxg5 2.Qg7#

Good times on the g-file.

Neural Stumper 30

J. Coakley 1987

Winning Chess Exercises For Kids (2004)



1.Qb2

1...Kxg5 2.Qg7#

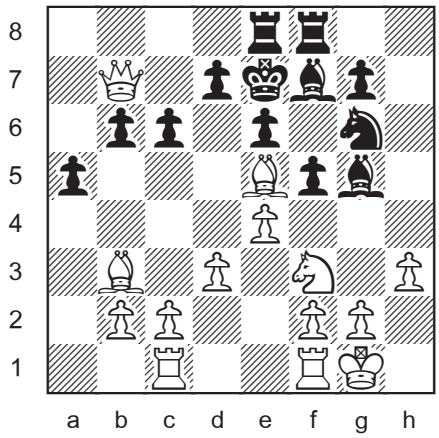
1...Kh6 2.Qf6#

Most *neural stumpers* were much harder than these two problems. They didn't always stump, but they did force students to think. And solving the composed mates definitely widened their analytic horizons.

Switcheroo 68

Jeff Coakley & Dan Heisman 2020

Puzzling Side of Chess



c6↔Nf3

The white knight ignores the pinned pawn on d7. The resulting position is legal. The black pawn on f3 came from the h-file, making two captures (knight and promoted a-pawn).

There are five other switches that place Black in checkmate, but all are illegal positions.

Ke7↔Rc1? The black king cannot be on the 1st rank with white pawns on b2 c2 f2 g2.

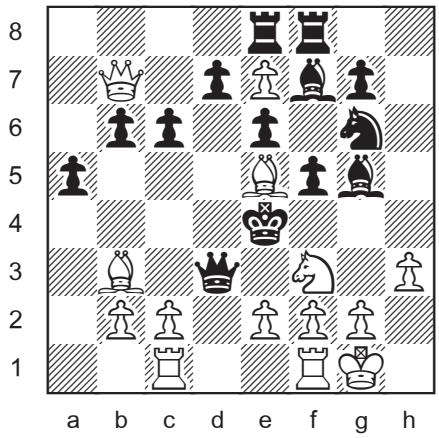
Bb3↔Bg5? Black has 2 light-square Bs and 7 pawns. The missing h-pawn could not escape from h1 if it promoted there (after capturing the two missing white pieces).

Qb7↔Bg5? Same as Bb3↔Bg5.

Ke7↔f5? With black pawns on e7 g7, the black dark-square bishop could not have escaped the 8th rank. The missing black h-pawn would need 3 captures to promote on the dark square g1. White is only missing 2 pieces.

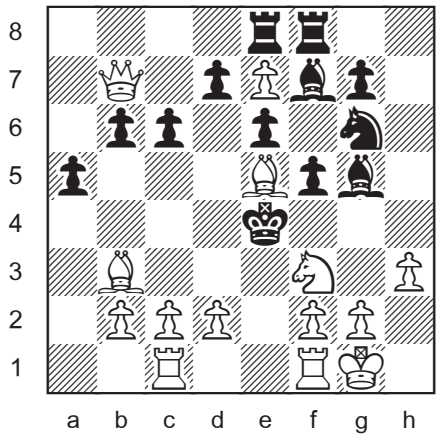
e4↔Ke7? See next page.

e4↔Ke7? The last move was either 1.e2xd3# or 1.d2-d3#.



position before 1.e2xd3#

If 1.e2xd3#, the white light-square bishop never escaped the 1st rank (pawns e2 g2). So the bishop on b3 has to be a promoted a-pawn. White is only missing one other piece (N) besides the bishop from f1, so the black h-pawn could not have promoted because that would require two captures. That leaves two other missing black pieces (QN). One was captured on d3 and the other by the pawn on e7. Therefore the white a-pawn did not promote on a8 or c8 because that would require two captures.

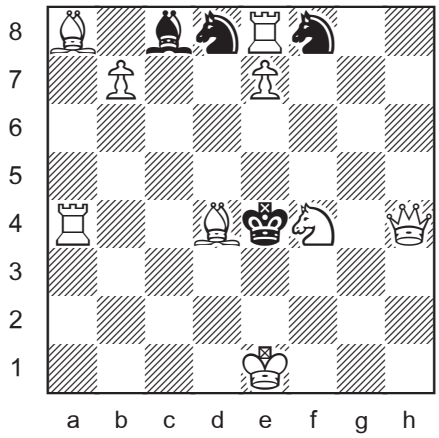


position before 1.d2-d3#

If 1.d2-d3#, the white dark-square bishop never escaped the 1st rank (pawns b2 d2). So the bishop on e5 has to be a promoted a-pawn. White is only missing one other piece (N) besides the bishop from c1, so the black h-pawn could not have promoted. That leaves two other missing black pieces (QN). Both had to be captured by the white pawn on e7 in order for it to get behind the black pawn on e6. Therefore the white a-pawn could not have promoted on b8, which would require a capture.

Disco Check Maximizer

A. No promoted pieces



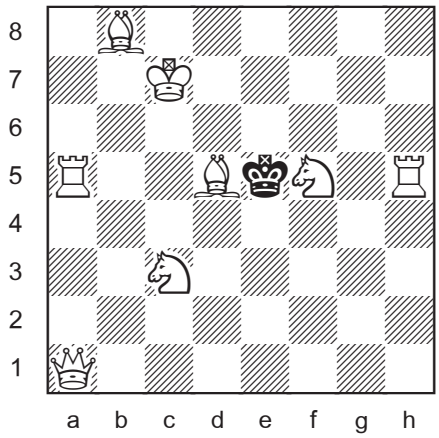
37 discovered checks

Each different promotion counts separately.

For example, 1.b8=Q+, 1.b8=R+, 1.b8=B+, 1.b8=N+ are four moves.

(8/b7 + 13/Bd5 + 8/e7 + 8/Nf4)

If moves by promoting pawns are not allowed, then only 34 discovered checks are possible.



34 discovered checks

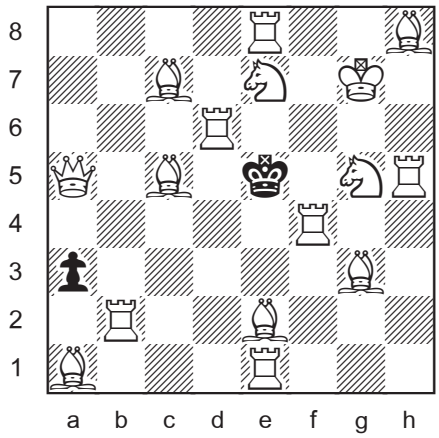
(7/Nc3 + 6/Kc7 + 13/Bd5 + 8/Nf5)

Four disco batteries is the max with no promoted pieces.

Which kind of piece cannot move to give a discovered check?

Disco Check Maximizer

B. Promoted pieces allowed

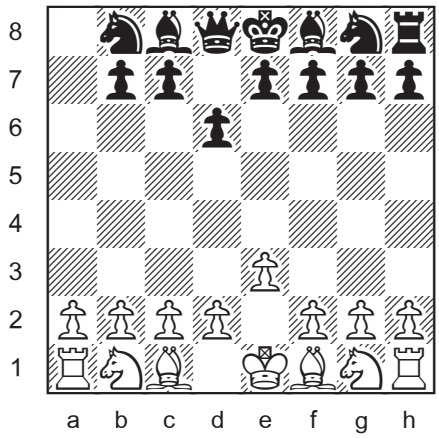


72 discovered checks
All are mate!

(10/Rb2 + 8/Bc5 + 14/Rd6 + 8/Be2 + 6/Ne7 + 14/Rf4 + 6/Ng5 + 6/Kg7)

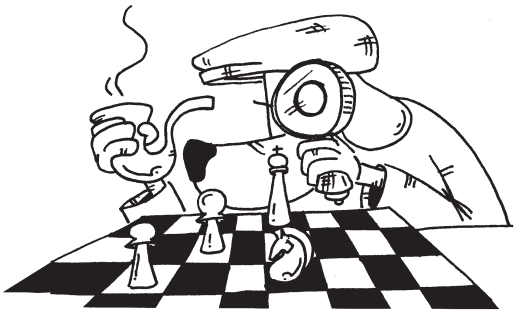
The position is legal. White has 16 pieces, with 8 promoted pieces.
The black pawn is included to give a legal last move, 1...a4-a3.

Longer Proof Game 79 (4.5 moves)

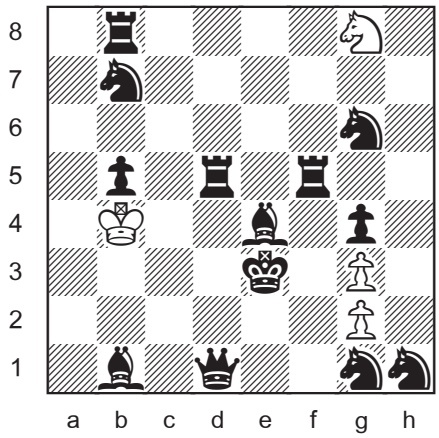


1.e3 a6 2.Qe2 Ra7 3.Qxa6 Rxa6 4.Bxa6 d6 5.Bf1

Black rook tempo and white bishop switchback.



Multi-Wham 47

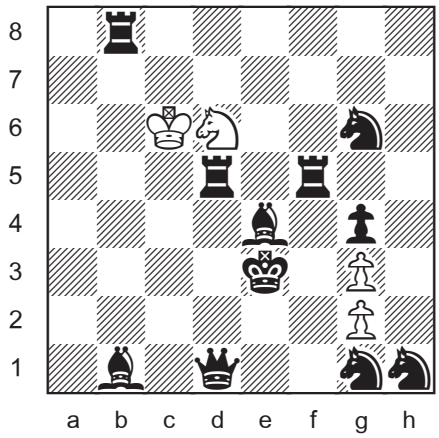


series-mate in 28

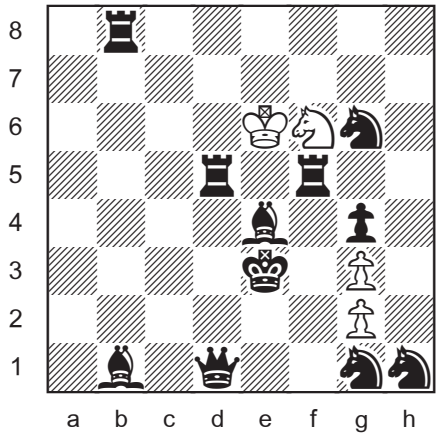
To promote a pawn, White must first capture the black g-pawn. Taking with the knight would be check, so it's up to the king to cross the board to g4. To assist his journey, the diligent knight will build four bridges and set up one road block.

1.Nf6 2.Nd7 3.Nc5 Bridge 1, allowing the king to cross the 5th rank.

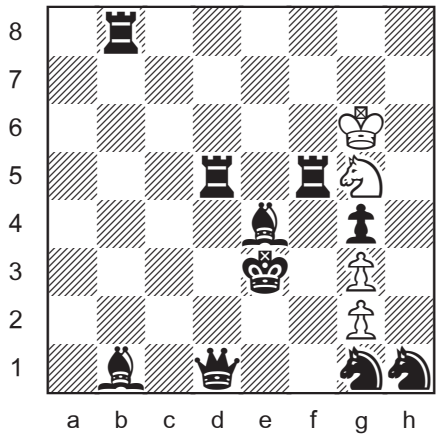
4.Kxb5 5.Kc6 6.Nxb7 7.Nd6 Bridge 2, over the d-file.



8.Kd7 9.Ke6 10.Ne8 11.Nf6 Bridge 3, spanning the f-file.



12.Kf7 13.Kxg6 14.Nh7 15.Ng5 Bridge 4, back across the 5th rank.

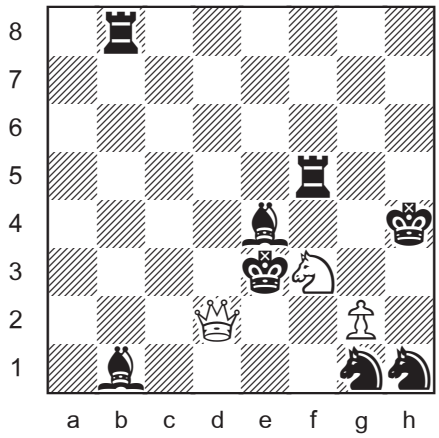


16.Kh5 17.Kh4 18.Nf3 Road block on the d1-h5 diagonal.

19.Kxg4 20.Kh4 The g-file is clear. Time to march the pawn.

21.g4 22.g5 23.g6 24.g7 25.g8=Q Now the queen mates in 3.

26.Qxd5 27.Qxd1 28.Qd2#

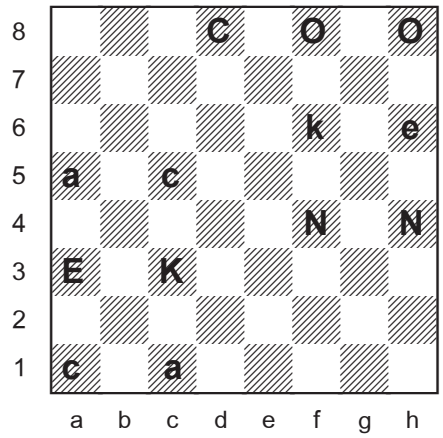


Rebus 34

Andrey Frolkin & Jeff Coakley 2020

Puzzling Side of Chess

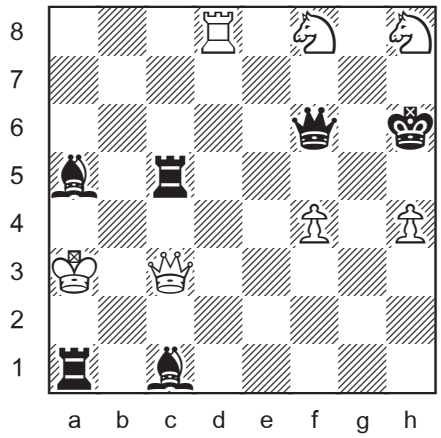
"coke can"



C = rook
O = knight
K = queen
E = king
A = bishop
N = pawn

caps = white

last move:
1...b2xa1=R++



(7 + 6)

♔ = (KE) Letters with one uppercase, one lowercase.

♕ = (KE) C ≠ ♕ Impossible double check (a1 c5), regardless of which letter (KE) is king.

A ≠ ♕ Impossible double check (a5 c1).

N ≠ ♕ Impossible double check (f4 h4).

O ≠ ♕ If O = ♕ Double check (f8 h8) by promoting with 1.gxf8=Q++ or 1.gxh8=Q++

AC ≠ ♗ On 1st rank.

A ≠ ♝ Check (a5 or c1). Both kings in check.

A ≠ ♖ Check (a5 or c1). Both kings in check.

A = ♘

C ≠ ♝ Check (a1 or c5). Both kings in check.

C ≠ ♖ Check (a1 or c5). Both kings in check.

C = Ø? No piece can be assigned to letter C.

N = ♗ Only letter besides KE not on 1st or 8th rank.

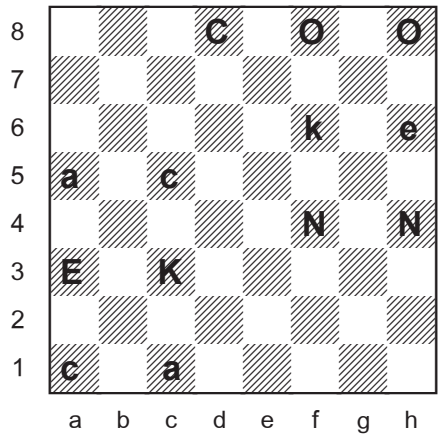
COA = (♖♝♘)

O = ♘ O ≠ ♖ If O = ♖ Check (f8 or h8).

♝ = (AC) Check (a1 or a5 or c1 or c5). Both kings in check.

O ≠ ♝ If O = ♝ Check (f8 or h8).

♖ = (AC) Check (a1 or a5 or c1 or c5). Both kings in check.



E = ♔ If K = ♔

C ≠ ♗ Both kings in check (a1 d8).

C = ♖ Check (c5).

A = ♗ Check (a5). Impossible double check.

K = ♕

C ≠ ♗ If C = ♗ Check (c5).

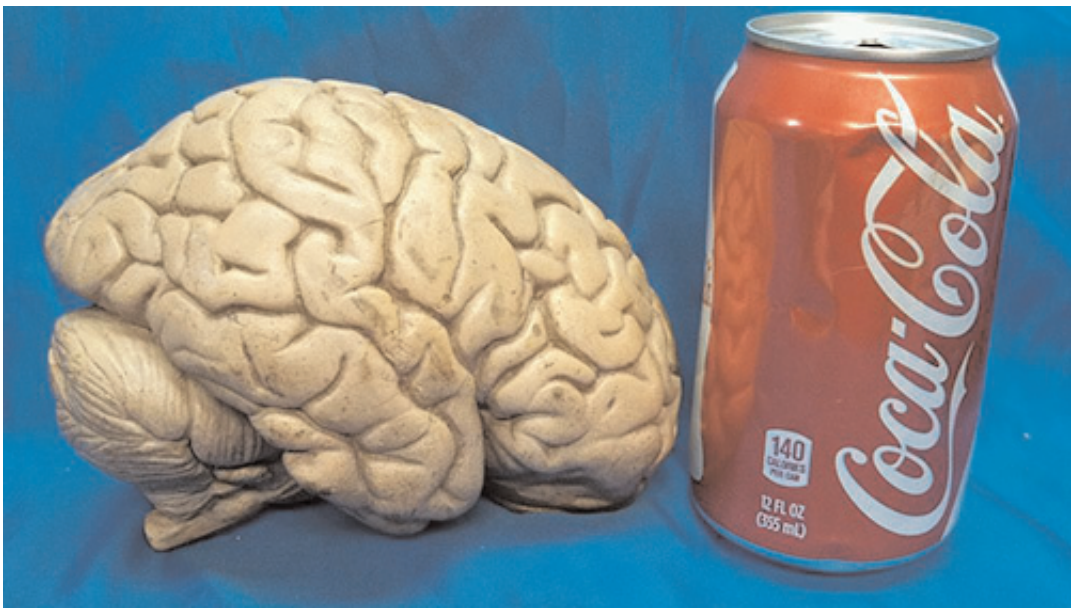
A = ♖ Check (a5). Impossible double check.

C = ♖ Check (a1).

A = ♗ Check (c1).

last move: 1...b2xa1=R++ Only way to explain the double check. The type of piece captured is indeducible.

caps = white Lowercase promotion on 1st rank.



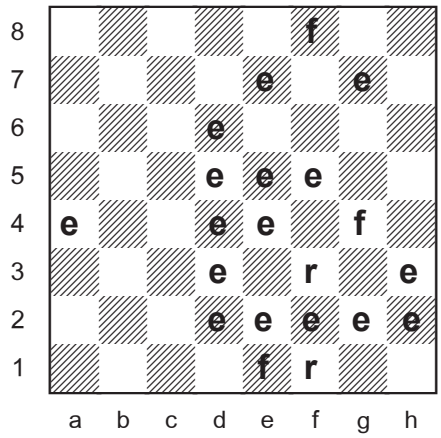
The Real Thing?

Rebus 35

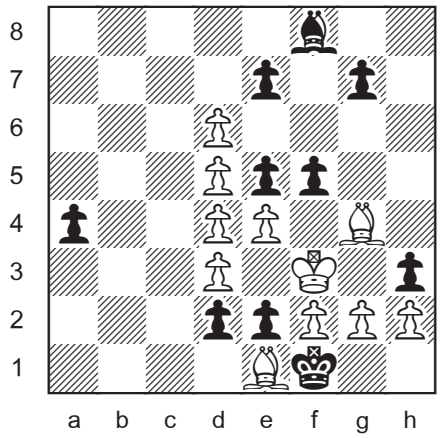
Andrey Frolkin & Jeff Coakley 2020

Puzzling Side of Chess

"free"



f = bishop
r = king
e = pawn



(11 + 10)

R = ♔ Only letter with two instances.

E ≠ ♖ If E = ♖ Impossible check (f2) regardless of colours.

E ≠ ♗ If E = ♗ Impossible multiple checks (e2 g2).

E ≠ ♘ If E = ♘ Impossible multiple checks (d2 h2).

E ≠ ♗ If E = ♕ Impossible multiple checks (e2 f2 g2).

E = ♙

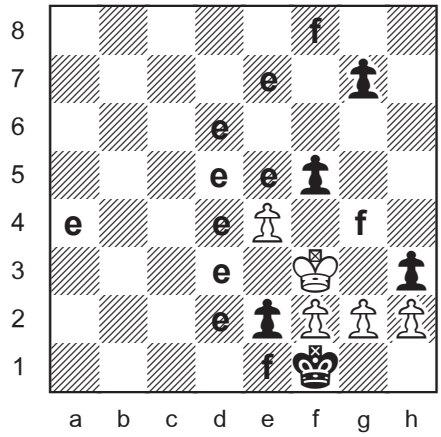
There are 16 pawns on the board. The 9 pawns on the de-files required 11 captures. There are 11 missing pieces. That "closes the material balance". No other captures were possible.

Therefore the pawns on f2 g2 h2 are white and the pawns on f5 g7 h3 are black.

♔**/f3** is white. If ♔/f3 was black, impossible check by pawn g2.

♙**/e2** is black. If ♙/e2 was white, then White's light-square bishop never moved and was captured on f1 (unmoved pawns e2 g2). There would be insufficent missing pieces to account for 9 pawns on de-files.

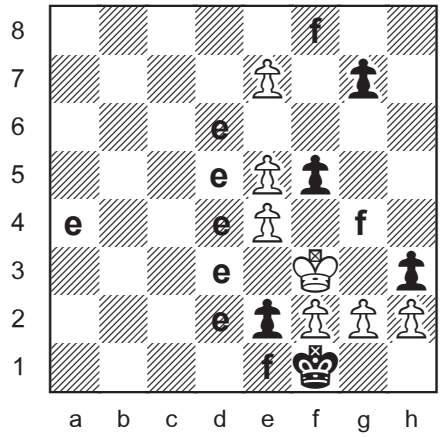
♙**/e4** is white. If ♙/e4 was black, then impossible check.



What we know so far

There are four possibilities for the other two pawns on the e-file.

a) e5 white, e7 white
b) e5 white, e7 black
c) e5 black, e7 white
d) e5 black, e7 black

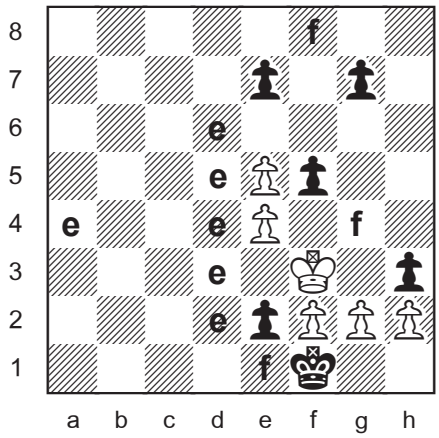


a) e5 white, e7 white

If the black pawn on e2 is the pawn that started on e7 and it never made a capture, then the white pawn that started on e2 had to make two captures to get "above" the black pawn on e2.

If the black pawn on e2 captured from the d-file to reach the e-file, then the black pawn that started on e7 captured "in the wrong direction" towards the queenside.

In both cases, the extra captures make the overall pawn formation impossible. So at least one of the pawns on e5 and e7 is black.

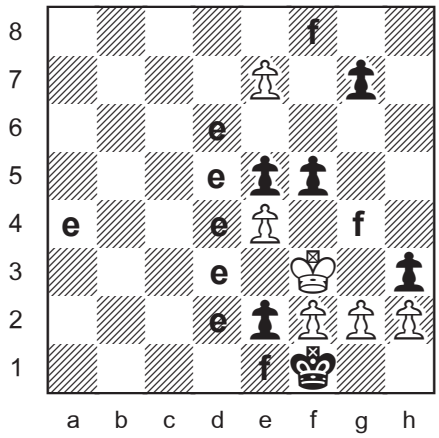


b) e5 white, e7 black

If E/a4 is white, then two E's on the d-file are white and three E's on the d-file are black. The black pawn formation would take 7 captures, which is impossible since White is missing at most 6 pieces. (One of the F's must be white.)

If E/a4 is black, then three E's on the d-file are white. The white pawn formation would take 7 captures, which is also impossible.

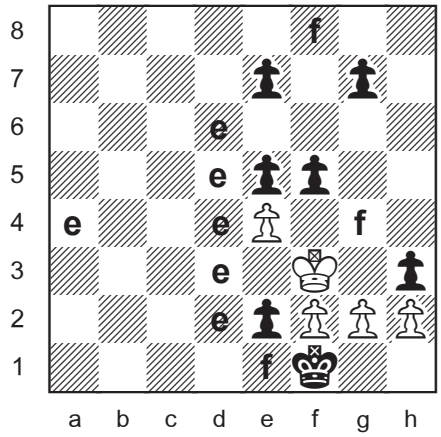
Therefore possibility b is not the solution.



c) e5 black, e7 white

The same argument as above (possibility b) proves that this formation is also impossible.

That only leaves possibility d. It must be right. The pawns on e5 and e7 are both black.

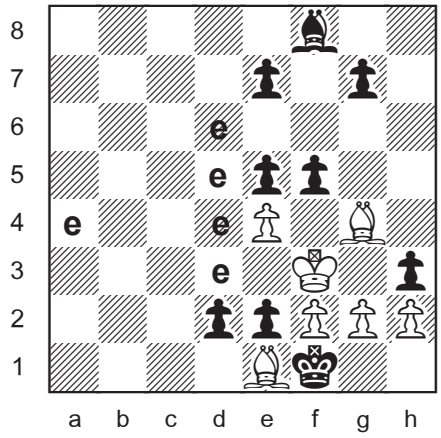


d) e5 black, e7 black

F = ♗ If F ≠ ♗, then Black's dark-square bishop never moved and was captured on f8 (unmoved pawns e7 g7). There would be insufficent missing pieces to account for 9 pawns on de-files.

The bishop on f8 is black, so the dark-square bishop on e1 must be white. This also means that the pawn on d2 is black. Otherwise a bishop could not be on e1.

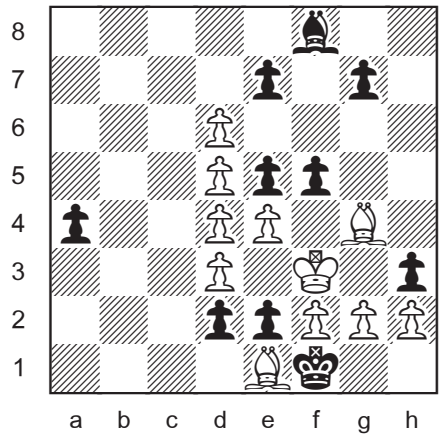
The bishop on g4 is white. If it were black, there is an impossible check. The last move would have to be a capture (...Bh5xg4+) but all missing pieces were captured earlier by pawns.



What we know so far

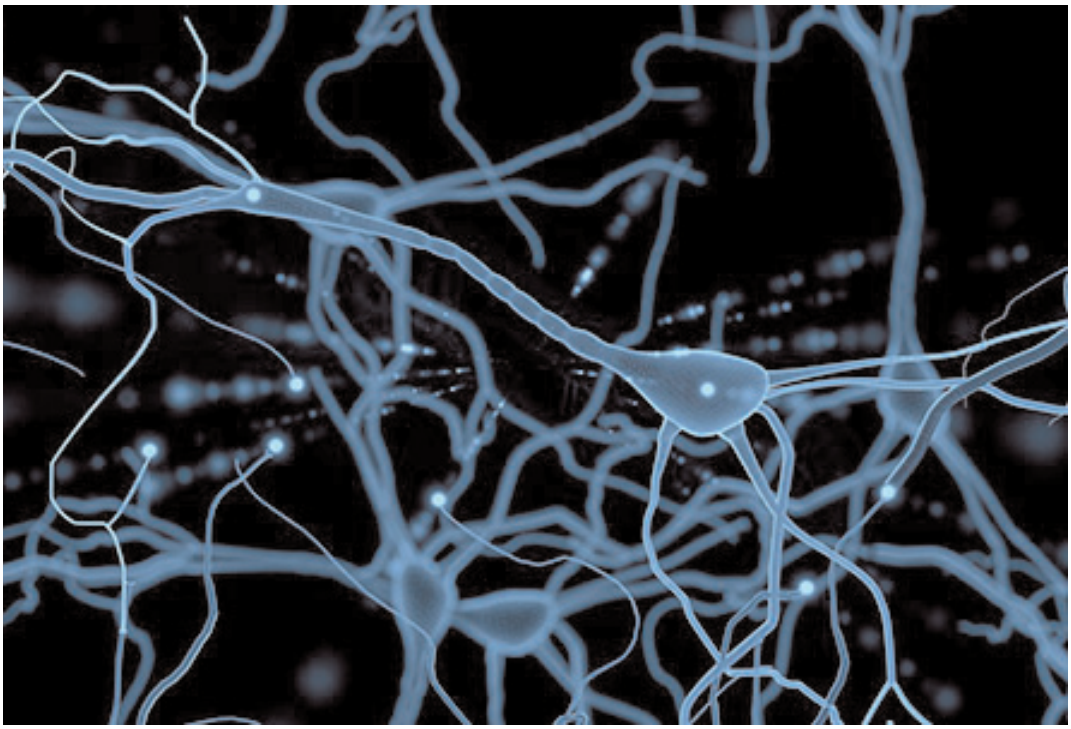
The pawn on a4 is black. If a4 were white, then the black pawn formation (with two black pawns on the d-file) would require an impossible 8 captures.

Therefore the remaining pawns on the d-file are white.



The position is legal. The white pawns needed 6 captures and there are 6 missing black pieces. The black pawns needed 5 captures and there are 5 missing white pieces.

Record for fewest pieces (21) in a colour-free rebus.



Until next time!