[Main Page](#) - [Back](#)

Death Blossom

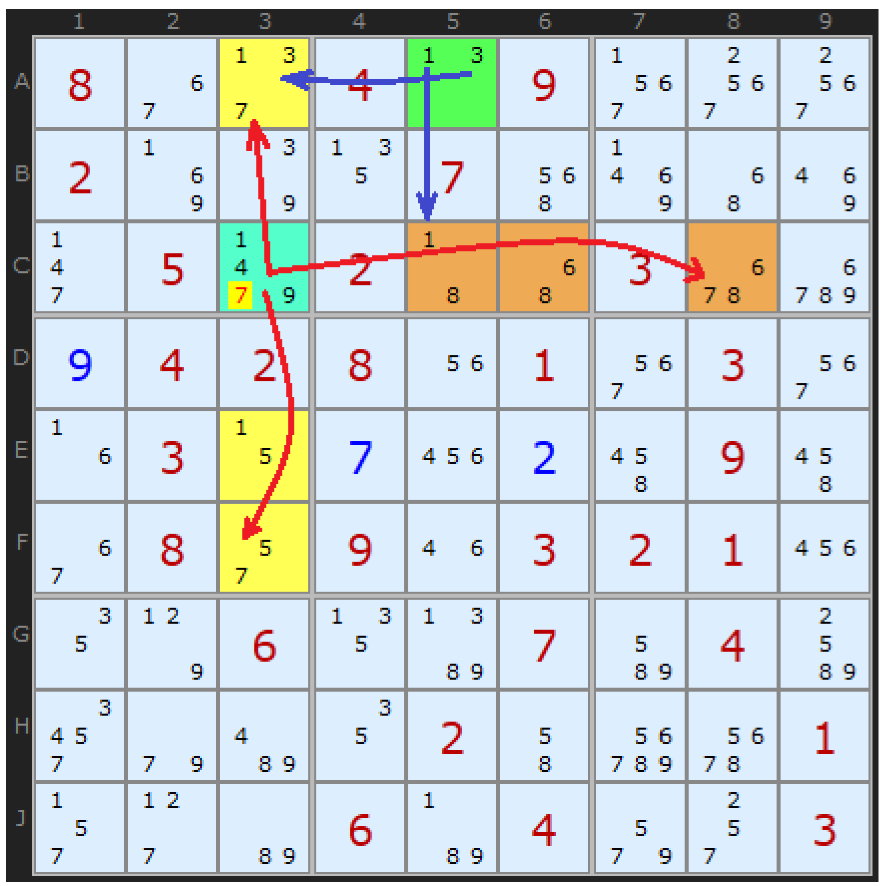
From sudokuwiki.org, the puzzle solver's site

(a.k.a. Aligned ALS Exclusion)

This strategy is based on extending Aligned Pair Exclusion but uses Almost Locked Sets to make some clever reductions. From the components used it could be named Aligned ALS Exclusion but Mike Barker, who formulated it first in this thread, hit on "Death Blossom" because it starts with a cell designated as the "stem" which points to Almost Locked Sets, or the "petals", and is a great deal more flowery.

An **Almost Locked Set** is any group of N cells (that can all see each other) with N+1 candidates between them . This includes bi-value cells. A **Locked Set**, by contrast, contains exactly the right number of candidates for the group, examples of which are Naked Pairs and Triples.

To get a feel for what's going it worth working backwards from the elimination of 7 in **C3** in this first example. We have two Almost Locked Sets **{A3,E3,F3}** and **{C5,C6,C8}** and they both have 7 as a common number between them. If **C3** did have 7 as a solution it would reduce the first Almost Locked Set to a 5 on **F3**, 1 on **E3** and lastly 3 on **A3**. The second ALS would reduce to a Naked Pair of 6/8 forcing **C5** to be 1. If **A3** is 3 and **C5** is 1 then the stem cell (coloured green) **A5** is left with nothing. This confirms that **C3** is not 7.



Death Blossom 1 : From the Start

Reversing direction will help illuminate the Death Blossom idea since we start with green "stem" cell. **A5** with {1/3} must be able to see at least two ALSs which contain all its candidates. It is important that the 3 in **A5** can see all of the 3's in the yellow coloured ALS and the 1 in **A5** can see all of the 1's in the brown coloured ALS (one instance each in this case). But **A5** overall does not have to see every single cell in all the ALSs, just the cells it shares candidates with.

Now, the two ALSs must have a candidate **Z** in common which the "stem" cell does not have. Because ALSs contain exactly one extra candidate for the number of cells they occupy (the N+1 candidates for N cells rule), we can assert that ANY cell that can see all the **Zs** in both ALS but is not part of those ALSs or the stem cell can be removed. Such a cell is **C3**.

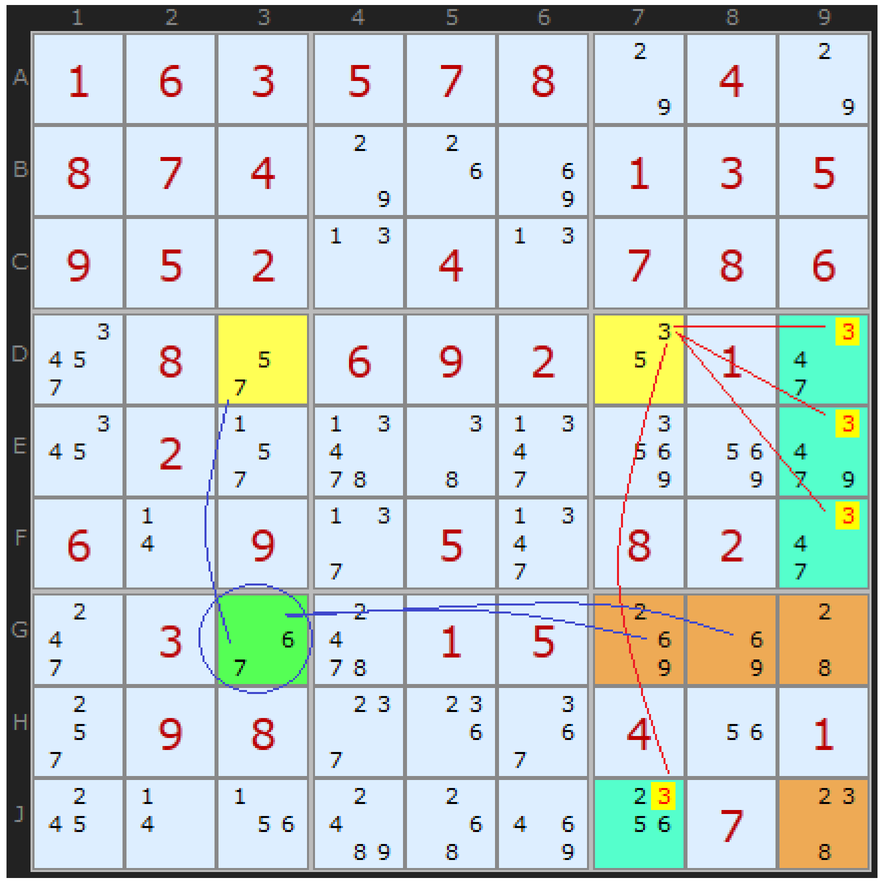
Death Blossom was discovered by extending Aligned Pair Exclusion (APE) and asking if there was generalisation beyond the pairs and triples discussed in Aligned Pair Exclusion. With Almost Locked Sets there is. The stem cell **A5** and the elimination cell **C3** can't see each other – they not aligned, but the pairs they can make do affect the board. In our example, consider the pairs that can be made between the 7 in **C3** and the 1/3 in **A5**. These are 1/7 and 3/7 in **C3** and **A5** respectively. Both these turn out to be illegal since they would reduce our ALSs to having less candidates than cells. So whatever the solutions to the two disparate cells **C3** and A5, **C3** will never contain a 7.

In Figure 2 quite a different arrangement is apparent but the logic is identical. The two yellow coloured cells form a two-cell ALS with the values {3/5/7}. At the bottom there is a four-cell ALS with {2/3/6/8/9}. Our stem cell again contains only two candidates {6/7} (coloured green) but don't think this is a restriction. There could be five or six numbers in the stem cell. As long as there are sufficient Almost Locked Sets that the candidates can see then the pattern can be made to work.

There is another way to look at this example which mirrors some strategies already covered. Starting in **G3**

If G3 is 7 -> D3=5 -> D7=3 therefore D9,E9,F9,J7 <> 3

If G3 is 6 -> G8=9 -> G7=2 -> G9=8 -> J9=3 therefore D9,E9,F9,J7 <> 3



Death Blossom 2 : Load Example

Much of the first-sight complexity seems to evaporate when traced through in this manner.

Note: Example 2 cannot be found by the solver unless Digit, Cell and Unit Forcing Chains are turned off. I retain it as an example because it's the best one to show multiple eliminations. Indeed 4 eliminations is a pretty good hit. Unfortunately I can't find the orginal Sudoku to give a start position.

Here is a fun one by Klaus: two massive ALSs in a DB puzzle in only 2 boxes.

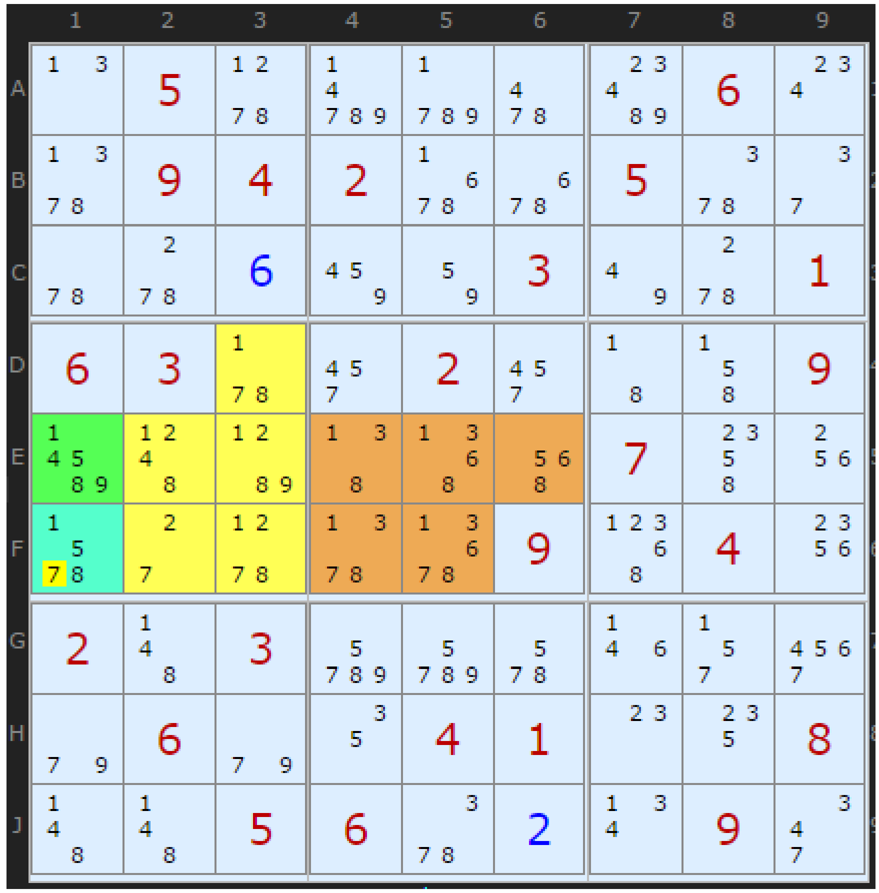
Death Blossom
(ALS:{D3|E2|E3|F2|F3} and ALS:{E4|E5|E6|F4|F5}) + Stem:E1 means 7 can be removed from F1

Update August 2013:

Other fun examples Klaus Brenner has found include a Death Blossom with six eliminations and a Death Blossom with all its ALS in only one Box.

Go back to Sue-de-Coq

Continue to Bowman's Bingo



Massive DB : Load Example or : From the Start