PLANET PACKING IN TWO DIMENSIONS

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"Planet Packing" in the May 2001 Word Ways demonstrated that it is possible to use the 26-letter string MNVESARCPJLUPITHOURYANUSER to spell out each of the nine planet names in order. (Many other 26-letter strings are possible, but no 25-letter one has been found.) This article shows how to pack the planets in two dimensions. The loosest pack is, of course, the standard crossword. In the November 1998 Kickshaws, Jim Puder packed the planets (plus SUN, MOON and UNIVERSE) into a 9x12 rectangle. The planets alone can be contained in a 10x10 square, given below at the left, but one of smaller area appears impossible.

```
V
E A R T H       S
N             M A R S
U R A N U S     T
S       E       U
    J U P I T E R
        T       N
    P L U T O
        N
    M E R C U R Y
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```
M A R S
J M N U
U E E R
P R P A
I C T N
T U U U
E R N S
R Y E S
E P V A
A L E T
R U N U
T T U R
H O S N
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```
S N J P V E U
A E U L E A R
T P P U N R A
U T I T U T N
R U T O S H U
N N E M A R S
M E R C U R Y
```

A more compact packing is achieved by placing the planets in a rectangle with no space left over; since there are 52 letters, the only rectangle of interest is 13x4, shown above. If one allows five planet names to overlap (underlined letters), then they can be compacted into a 7x7 square, given above at the right. It is possible that a slight reduction in area can be achieved using word-search rules (names reading in any direction—up, down, right, left, diagonal).

Finally, a really tight packing can be achieved by arranging letters on a chessboard so that every name is spelled out by a king's move (diagonal or adjacent square move). The lower bound of 17 letters is, of course, impossible; the best pattern found so far uses five extra letters contained in a 5x6 square.

```
      V J L
  U R E P U
H T N Y T I
  A R U   O
M E S C
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