JOURNAL OF COMBINATORIAL THEORY, Series A 51, 125–126 (1989)

Note

The *Y*-Hexomino Has Order 92

KARL A. DAHLKE

603 Manville Hall, 2745 Bancroft Way, Berkeley, California 94720

Communicated by the Managing Editors

Received October 12, 1987

In 1966, S. Golomb [1] asked whether the "*Y*-hexomino" can tile a rectangle. As shown in Fig. 1, the answer is "yes," and the 23×24 rectangle is in fact the *smallest* rectangle which can be so tiled. Thus, in the terminology of D. Klarner [2], the *Y*-hexomino has order 92, the highest order (by more than a factor of 5) of any hexomino.

The solution in Fig. 1 was found after three days of computation on a microcomputer using a small *C*-language program. Exhaustive search alone proved highly inefficient, since unexpected interactions (e.g., among strips of width 2 and width 9, as shown in Fig. 2) produce long periodic patterns. A bit-wise comparison of columns was introduced to detect periodicities, since none will be present in a minimum rectangle.

A column periodicity of 6 first arises when there are 16 rows (cf. [2, Fig. 7]). When there are 23 rows, periods in excess of 200 are not uncommon. The successful version of the program, which found the example in Fig. 1 in 3 h, rejected all patterns containing periodicities.

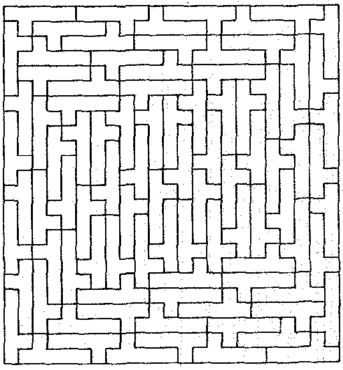

FIG. 1. The minimum rectangle, 23×24, tiled with *Y*-hexominoes.

0097-3165/89 $3.00

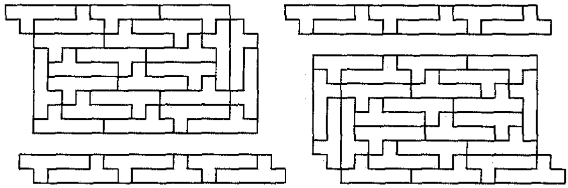

FIG. 2. Interaction among strips of width 2 and width 9.

A subroutine for crosscorrelating patterns to determine when one pattern would complete a rectangle started by another was also written, but before it was incorporated into the main program the 23 × 24 solution had already appeared.

ACKNOWLEDGMENTS

I would like to thank Dorothy Harris, David Klarner, and John Masley for verifying these results and helping with the accompanying figures.

REFERENCES

1. S. GOLOMB, Tiling with polyominoes, *J. Combin. Theory* **1**, No. 2 (1966), 280–296.
2. D. KLARNER, Packing a rectangle with congruent *N*-ominoes, *J. Combin. Theory* **7**, No. 2 (1969), 107–115.