1116-68-1125 **H. A. Akitaya*** (hugo.alves_akitaya@tufts.edu), **K. C. Cheung**, **E. D. Demaine**, **T. Horiyama**, **T. C. Hull**, **J. S. Ku**, **T. Tachi** and **R. Uehara**. *Box Pleating is Hard.*

In their seminal 1996 paper, Bern and Hayes initiated investigation into the computational complexity of origami. At the end of their paper, they pose some interesting open questions to further their work. While most of them have been investigated since, two in particular have remained untouched until now. First, while the gadgets used in their hardness proof for unassigned crease patterns are relatively straightforward, their gadgets for assigned crease patterns are considerably more convoluted, and quite difficult to check. Is there a simpler way to achieve a correct result? Second, their reductions construct creases at a variety of unconstrained angles. Is deciding flat foldability easy under more restrictive inputs? For example box pleating, folding only along creases aligned at multiples of 45° to each other, is a subset of particular interest in transformational robotics and self-assembly. In this work we prove deciding flat foldability of box pleated crease patterns to be NP-hard in both the unassigned and assigned cases, using relatively simple gadgets containing no more than 21 layers at any point. (Received September 17, 2015)