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Baromorphs EMMANUEL SIEFERT, JOS BICO, ETIENNE REYSSAT, BENOIT ROMAN, PMMH (CNRS/ESPCI/Paris Diderot/UPMC) — A pneumatic network of millimetric channels is embedded into elastomer plates. Upon inflation or suction, we observe that initially planar sheets destabilize into 3D shapes with non-zero Gaussian curvature. The difference in air pressure between the inside and outside of the channels induces anisotropic strains which leads to variations in the metric of the plate and triggers buckling. We use the coupling of pressure driven pneumatic networks with mechanical instabilities of plates to design structures with programmed 3D shapes. The actuation of these sheets is reversible and shape changes occur in typically one second. We present the results of combined experimental and minimal models on these pressure-actuated structures/objects/devices.

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