The M system M_{bac} is supported by a polytopic tile system in R^3, defined as $T_{bac} = (Q, G, \gamma, d_g, S)$, where

Q contains the following tiles:

- ***oct_base*:** octagonal seed tile with edges of length 4; all edges are connectors with glue $g90o$ and connecting angle 90^o;
- ***oct_small*:** octagonal tile with edges of length 2, serving as a central part of the septum; all edges are connectors with glue $g180s$ and angle 180^o; there are two more point connectors at the center of the tile: one inside, with glue $gt90$ and angle 90^o, and another outside, glue $gt60$ and angle 20^o;
- ***trapezoid*:** trapezoidal tile with the outer edge of length 4 and connector c_4, and the inner edge of length 2 and connector c_2 :
  - c_4**:** glue $g90o$, angle 90^o;
  - c_2**:** glue $g180t2$, angle 180^o;
- ***rectangle*:** square tile with edges of length 4 forming shells of cell-like shapes; two opposite edges are connectors c_1, c_3 defined as follows:
  - c_1 : glue $g90$, angle 90^o;
  - c_3 : glue $g180h$, angle 180^o;
- ***inner_rod1*:** 1D rod of length 0.2, attaching to the inside center of a small octagon using end connector with glue $gr90$ and angle 90^o; and with another connector at the opposite end, glue $gx90$ and angle 0^o, to attach *inner_rod2*;
- ***inner_rod2*:** 1D rod of length 0.02, attaching to *inner_rod1* using end connector with glue $gy90$ and angle 0^o;
- ***outer_rod*:** 1D rod of length 16, attaching to the outside center of a small octagon using end connector with glue $gr60$ and angle 60^o; it helps to keep spatial distance of cells during the fission process.

$G = \{gx, ge, g90o, g90, g180h, g180s, g180t2, gr90, gt90, gx90, gy90, gr60, gt60\}$;

$\gamma = \{(g90o, g90), (g90, g90o), (g180h, g180h), (g180t2, g180s), (gt90, gr90), (gx90, gy90), (gt60, gr60)\}$;

$d_g = 0.001$;

$S = \{oct\_base\}$.

The whole M system is then defined as $M_{bac} = (F, P, T_{bac}, \mu, R, \sigma)$ where

F contains floating objects a, s with radius 0.05, mobility 10 and concentration (per cubic unit) $\epsilon(a) = 0.025$ and $\epsilon(s) = 0$;

$P = p_0$;

T_{bac} is the polytopic tile system defined above;

μ places one protion p_0 at the center of each tile *rectangle*;

R contains the following rules:

Creation rules produce tiles while consuming floating objects a (nutrients):
$a \to oct\_small$;
$a \to rectangle$;
$a \to trapezoid$;
$a \to inner\_rod\_1$;
$a \to inner\_rod\_2$;
$a \to outer\_rod$;

Destruction rule $a, outer\_rod \to \emptyset$
(destroys the auxiliary tile *outer_rod* when it is no longer needed);

Division rule $g180h \overset{s}{—} g180h \to g180h, g180h$
(divides two tiles connected by a pair of $g180h$ glues, consuming one floating object s);

Metabolic rule $a[p_0 \to [p_0 a$
(transports a floating object a through protion channel p_0 into a cell where it is used to produce septum and auxiliary tiles);

$\sigma(gx90, gy90) = \{s, s, s, s, s, s, s, s, s\}$.