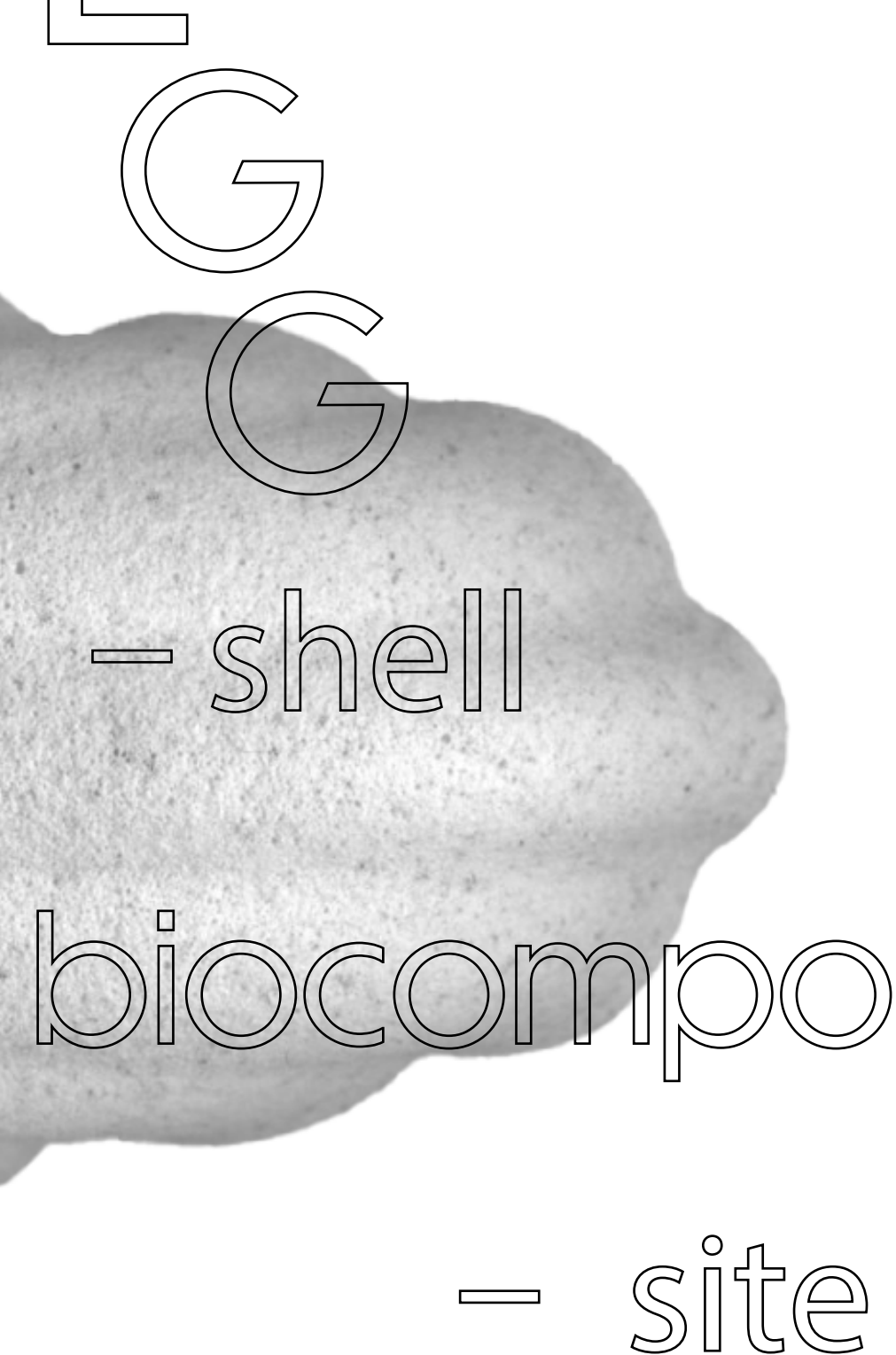






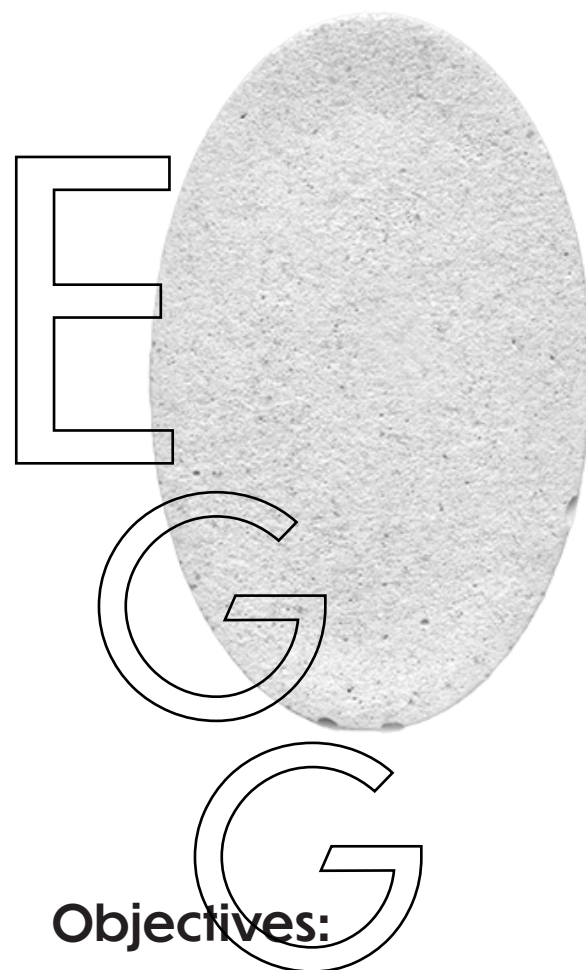
This research was made possible through a lovely collaboration and co-creation process with Alexandra Bachmayer at the Speculative Life Biolab at the Milieux Institute, who shared her space, knowledge, humour, and Babybell cheese!

This publication was produced by the FOFA Gallery as part of its Exploring Sustainability Across the Arts initiative, a research and outreach program aimed at developing material and eco-friendly practices in cultural venues. Each publication in this series is the result of research conducted by the initiative's collaborators.



Canada Council
for the Arts

Conseil des arts
du Canada



Objectives:

- () Reorient waste materials for use in the gallery
- () Create potential material for reuseable signage letters
- () Test structural integrity / freestanding
- () Test ability to laser engrave and laser cut material
- () Test with different thicknesses
- () Test potential ability to be rehydrated and reused
- () Create eggshell-based chalk for signage use

Base Recipe

Makes approximately
one madeleine

INGREDIENTS

10g gelatin
2g glycerine
24mL water
48g eggshell

Method

PREPARE EGGSHELL:

Remove membrane from eggshells, if possible.

Boil eggshells to kill bacteria.

Dry eggshells in oven until they make a tinkling porcelain sound.

Grind eggshells in food processor or grinder until they reach a sandy / powdery consistency (or whatever texture is desired).

>>>>>>>>

GATHER INGREDIENTS:

50g gelatin · 10g glycerine
120 mL water · 240g eggshell



MIX:

In a stainless-steel pot on a stove or hot plate, combine gelatin and glycerine like you are creaming butter and sugar.

With the pot on medium heat, add water to the gelatine-glycerine mixture until smooth and almost foaming.

Add ground eggshell and mix until a slightly viscous and sandy-like paste is reached.

Gelatin molecules break down very easily in very hot water, so avoid boiling or cooking the eggshell mixture for longer than necessary (ie. a few minutes, or until eggshells are fully incorporated).

FORM:

Pour the eggshell mix into your desired mould.

DRY:

This may take a few days. Small, compact objects can be removed from mould after a day or so. If you are trying to make a flat sheet, see further instructions.

//////////

Adapted from a recipe by Sofía Perales (via Materiom)

HOW **NOT** TO MAKE A FLAT SHEET OF EGG SHELL BIOCOMPOSITE:

Don't try to just dry the sheet in the mould—the material will warp into something resembling a parabolic curve. The egg yearns to return to its initial form!

(How much should you listen to the material? What does it want to do?)

Don't try to dry it in between two sheets of drywall—it will mold and **NEVER** dry.

Don't try to dry it in between two sheets of plaster—it will mold even faster and also probably never dry.

Don't try to dehydrate it in the oven between two sheets of drywall—it will melt and fuse the drywall sheets together **FOREVER**.

Don't resist adding more glycerine as a plasticizer—you can still get a nice crispy material without stressing it out unnecessarily.

HOW TO MAKE A FLAT SHEET OF EGG SHELL BIOCOMPOSITE:

Make 6x the original recipe for 9 x 12" rectangular mould.

Add more glycerine if desired, for a more relaxed and slightly flexible sheet (play around with it!).

Don't cook for more than a few minutes after eggshells have been incorporated—this causes the biomaterial to overthicken, making it tricky to spread into an even surface.

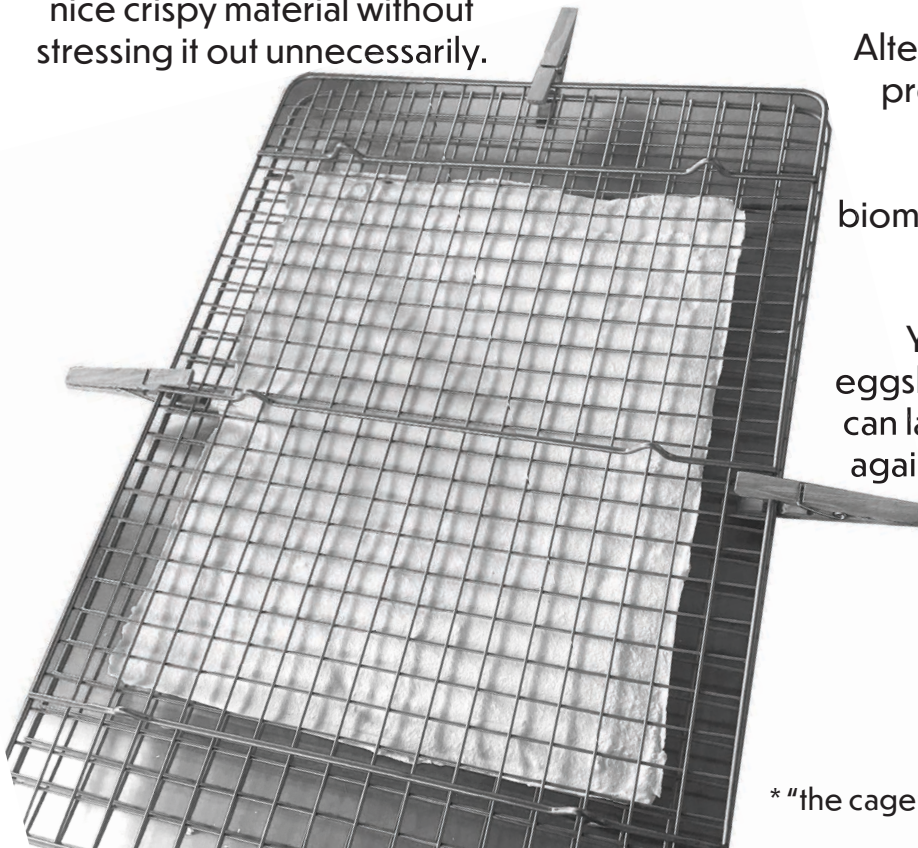
Spray with ethanol / alcohol after pouring into mould.

Once the material has solidified, trim 1-2cm off the edges to even out the rest of the drying process.

Transfer to "the cage"*: sandwich the material between two flat cookie cooling racks and secure them together with clothespins.

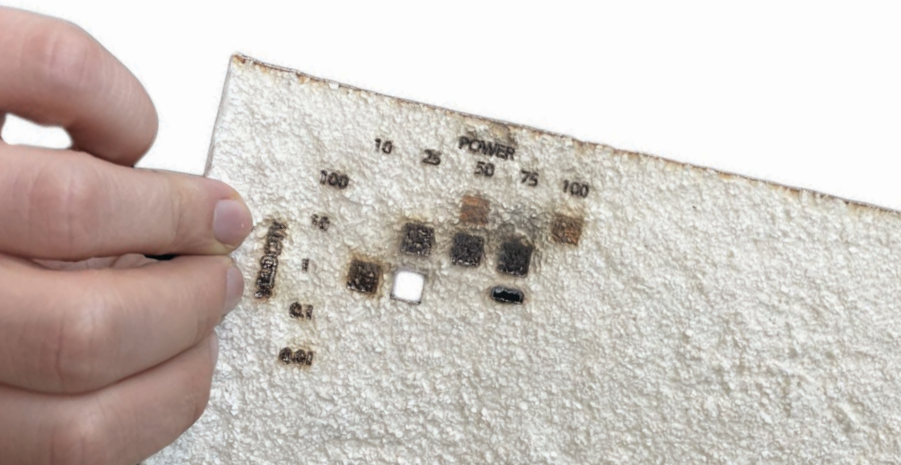
Alternate between the cage and pressing the biomaterial under several heavy books (for 4-8 hours), until the biomaterial is fully cured. This may take about a week.

You have made a flat sheet of eggshell biocomposite! Now you can laser cut or engrave it, prop it against a wall, or use it as a tray to serve madeleines.



* "the cage"

LASER TESTS



Crisp and toasty results!



FOR A FLAT BUT
FLEXIBLE SHEET, TRY:
EGGSHELL BIOLINOLEUM

(Adapted from a recipe by Loes Bogers, via Fabricademy)

For 9x12"
rectangular mould

INGREDIENTS

48g gelatin
36g glycerine
400mL water
110g eggshell

Method

Follow the same procedure as in the Eggshell Biocomposite recipe, but simmer the gelatin-glycerine-water mixture at a low temperature for around 30-40 min. This allows the water to evaporate slowly, which will cause less shrinkage while drying.

The eggshells can be added to the mixture after simmering and before pouring into the mould.

Use the alternating "cage" / heavy books drying method as outlined above.

The resulting bioplastic will be flat but pliable, firm but bendy – much like linoleum.

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/////



A glycerine-less recipe works well for small objects such as these!

EGGSHELL

CHALK

INGREDIENTS

1.5 tsp finely ground eggshell

1.5 tsp flour

2 tsp hot water

Method

1. Mix eggshell and flour, then add hot water.

2. Knead the mixture to fully incorporate, adding more water if necessary.

3. Form into chalk sticks! Let dry for 2-3 days.

*If using natural pigment: Add 1 tsp pigment and reduce eggshell and flour by 0.5 tsp each. Combine with hot water first, then add the other dry ingredients.

REHYDRATION

JELLY

An attempt to rehydrate a small 4.9g sample by adding 20g water—as it dried, all the excess water rose to the top and formed a jelly-like substance that dried like a gelatin enamel. The underside dried very hard, seemingly denser than before. Half the water would have done! (To be continued!)

gelatin enamel

hard underside



More tests to be done!

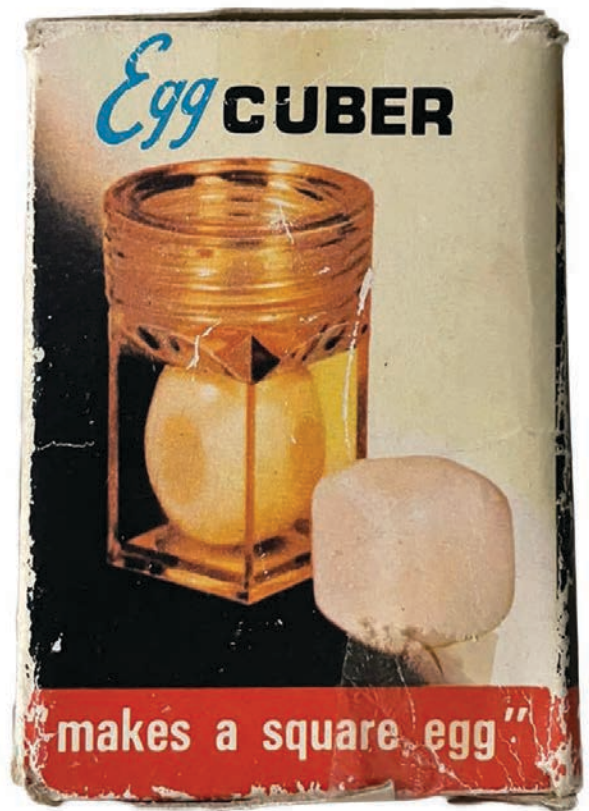


Quite a hard chalk but works well on rough surfaces!



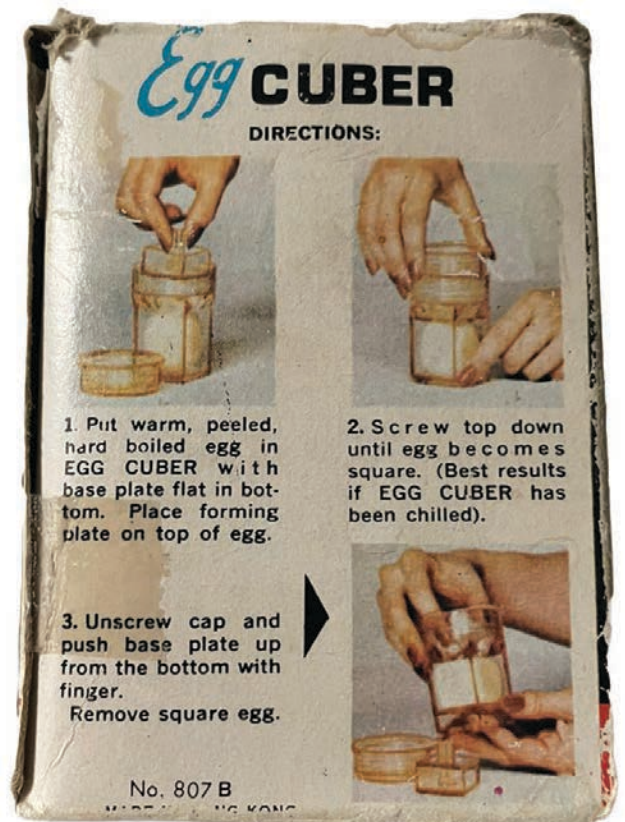
Michikazu Sakai (photographer), "Egg Container," devised by farmers in the Yamagata Prefecture in northern Japan, in Hideyuki Oka, *How to Wrap Five*

Eggs: Japanese Design in Traditional Packaging (Harper and Row, 1967), 22.



Josh and Joé found this vintage Egg Cuber in a Trois Rivières Value Village and thoughtfully brought it back for some expanded egg experimentation. It asks us to consider the act of "[making] a square egg" (a very simple delight).

What's more foundational than an egg?



Eggstates; on a colloidal methodology

The eggshells used in this research a few months by FOFA Gallery staff, As the shells accumulated on my kitchen I began to wonder if it would be more buying entire flats of eggs to support began to wonder what exactly was "a lot sense of expansion and contraction had never seen so many shells brought baking sheet, or room. And yet, while still also mostly air; when broken into pieces, oven, what at first seemed like an absurd seem like not much at all. They could takeout containers. When ground into a into just one container—but I was struck our shared egg leftovers.

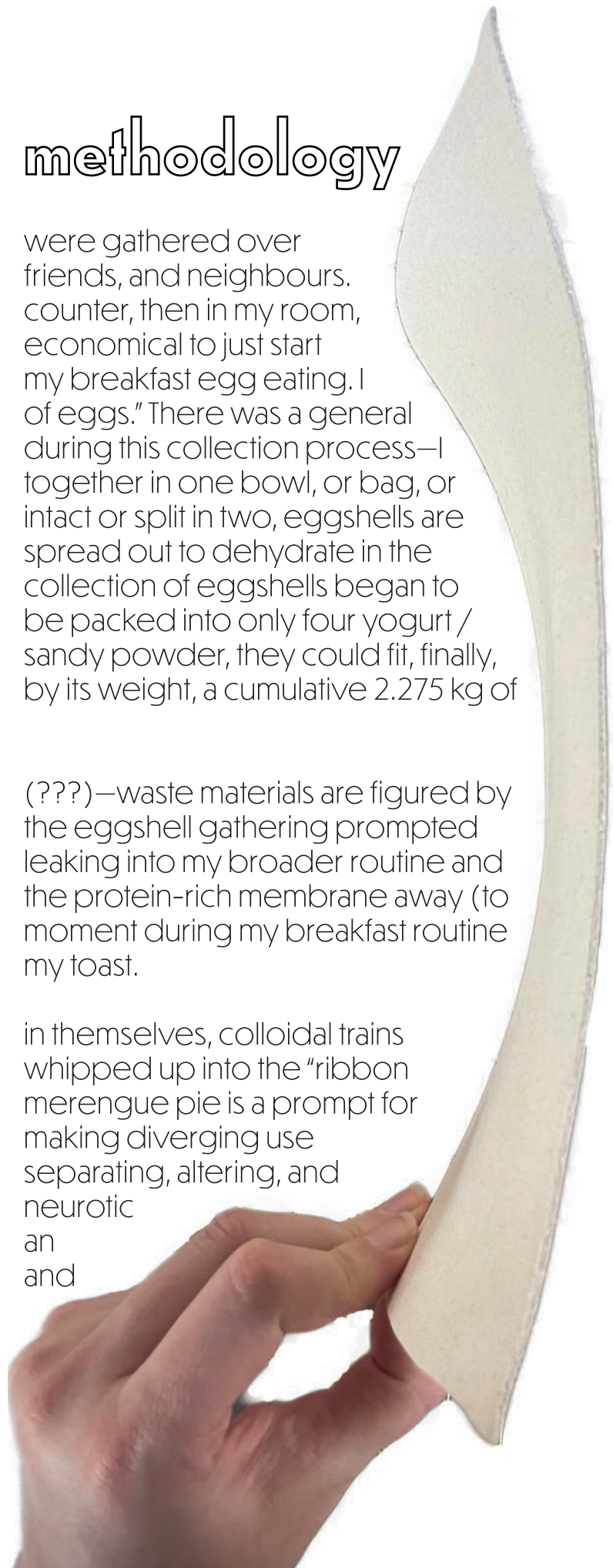
"Waste" is kind of a temporal question and necessitate a prior use. In this way, another shift in scale, expanding and daily passages. I learned how to peel prevent potential molding) at the right so as to not overcook my eggs nor burn

Egg whites and yolks offered prompts of thought—sugar, whites and yolks state," frothy and thick. A lemon tidy, no-waste material transformation, of both the yolks and the whites— finally reuniting them in a new form. A sensibility is actually a plus when making egg recipe—you have to be gentle attentive when handling them, to coax them from the initial foam to a self-supporting viscous substance, or your angel food cake will fall!

were gathered over friends, and neighbours. counter, then in my room, economical to just start my breakfast egg eating. I of eggs." There was a general during this collection process—I together in one bowl, or bag, or intact or split in two, eggshells are spread out to dehydrate in the collection of eggshells began to be packed into only four yogurt / sandy powder, they could fit, finally, by its weight, a cumulative 2.275 kg of

(???)—waste materials are figured by the eggshell gathering prompted leaking into my broader routine and the protein-rich membrane away (to moment during my breakfast routine my toast.

in themselves, colloidal trains whipped up into the "ribbon merengue pie is a prompt for making diverging use separating, altering, and neurotic an and



Eggs are not only fickle but they are when worked too long, or not long sense of possibility in this indeterminacy,

slippery, sneaking into different states enough. There is a kind of exciting however. As Freddie Mason writes:

The curious internal marriage of ways of switching between realities. illusionistic potential, one where the carnivalesque inversion. Colloids find substance within colloids offers This switching constructs a place of rules can seem suddenly to change in their allure as substances of escapism.¹

Colloids are produced when one into liquid, liquid into solid, forming a appears homogenous. They often but also kind of a liquid—gooey, also usually involved in the process we use in the eggshell biomaterial, is which, in a culinary context, is also used recipe, a colloidal structure is formed dispersed in water, congealing, in which initially jelly-like, the water evaporates ceramic-like eggshell surface.

material is dispersed into another—solid heterogenous internal structure that exist in a viscous state, kind of a solid slimy, gel-y. Colloidal structures are of making biomaterials. Gelatin, which a substance derived from collagen, to make jellies, aspics, and chiffons. In our when the gelatin and glycerine are the eggshell is then suspended. While as the biomaterial sets, leaving a crispy,

Could the kind of leakage of one reality another—merengue-making, for and I noticed that, when ground up, briny and creamy. Alex pointed out that are largely composed of calcium component of gastropod shells, shellfish can also play a role in fossilization, the internal forms of organisms. It's sort offering temporary shelter as well A colloidal methodology (!) might material histories be whipped up into

or process—biomaterial research—into instance—be a bit colloidal in itself? Alex eggshells smell like the seaside, kind of perhaps this was because eggshells carbonate, which is also the primary skeletons, and pearls. Calcium carbonate forming mineral deposits that preserve of a hospitable material, in that sense, as hosting archaeological memory. propose a commingling, that these the biomaterial, or the merengue.

Alex has a madeleine mould in the lab, discussed by Marcel Proust in his novel different kinds of memory processes, of involuntary memory: the taste of of his childhood, something of the the material would react to different seemed delightful and amusing and are the scaffolding of the genoise madeleines should also be made—and, shared their eggshells.

for the shell-shaped genoise pastries In *Search of Lost Time*. Writing about he uses madeleines as an example the madeleine evoked memories "essence" of the past. As we tested how moulds, a Proustian-eggshell-madeleine impossible to resist. Because eggs pastry structure, it follows that edible in turn, shared with some of those who

When
making

make sure your eggs
are at room temperature
before beginning. Beat
eggs and sugar until you reach
the ribbon state: doubled
in size, thick, pale, leaving a
ribbon-like trail when the beater is
lifted, or, as Julia Child writes, "are
the consistency of a heavy mayonnaise."
Add vanilla and lemon zest. In a
separate bowl, whisk flour, baking
powder, and salt. Gently fold this into
the egg mixture; if overworked, the
eggs will deflate. Then fold in melted
butter, also at room temperature.

Cool batter in fridge for at least a
half-hour while the oven preheats, but not
longer than an hour, to prevent the batter from
solidifying. Coat the shells in the madeleine
pan with melted butter and scoop about a
tablespoon's worth of batter into each shell.
Bake until golden and eat within a day or two,
preferably with co-conspirators. 2

(Yields 18- 20 madeleines)

1/2 cup	unsalted butter
(plus 2tbsp	for the pan)
2 large eggs,	at room temperature
1/2 cup	granulated sugar
2tsp	lemon zest
1tsp	pure vanilla extract
1 cup	all purpose flour
1/2 tsp	baking powder
1/8 tsp	salt

Beyond literary allusion, the Proustian-memory. Eggshells are indexical, can in the material world and its ecological carbonate to shells, fossils, chalk, circulate around and inhabit its many lack of material memory; to use Heather way through."³ Or to look to The endless polymorphism. And therein lies anything but is inherently nothing recyclers often point out."⁴ Plastic's itself, slowing ecological metabolism.

eggshell-madeleines contain material be contextualized—they're enmeshed cycles, chemically linked via calcium limestone, and all the living things that forms. We could contrast this with plastic's Davis' phrase, plastic is "surface, all the Synthetic Collective: plasticity "is not our predicament: plastic can become (natural or genuine) in itself—a quandary rapid accumulation only leads back to

Working with eggshells is admittedly its shifting, expanding substances and whites, gelatin folded into glycerin, digestion, I think. I think slippage good for the ecosystem, so to speak. hot and cold coexist, sustainable material metabolism and expansion—prompting delight.

a slow and sticky and circular process; states, however—air whipped into egg madeleines to share—encourage between methods and processes is Like merengue-y baked Alaska, in which research can be a process that mixes commingling, emulsion, commensality,

Works cited:

- ¹ Freddie Mason, *The Viscous: Slime, Stickiness, Fondling, Mixtures* (Punctum Books, 2020), 206.
- ² Julia Child, *From Julia Child's Kitchen* (Knopf, 1975), 575-576, 586-587.
- ³ Heather Davis, "Plastic: Accumulation without Metabolism," in *Placing the Golden Spike: Landscapes of the Anthropocene* (INOVA, 2015), 70.
- ⁴ The Synthetic Collective, "Case Study: Plastic Heart: Surface All the Way Through," in *Plastic Heart: A DIY Fieldguide for Reducing the Environmental Impact of Art Exhibitions* (University of Toronto, 2021), 22.





Hannah Ferguson

Hannah Ferguson (she/her) is an artist and writer working in Tiohtiá:ke/Mooniyang/Montreal. Working primarily across textiles, print media, and biomaterials, she uses material and visual culture—dust, jelly, televisual ephemera—as prompts to explore spatial, material, and affective histories. Ferguson holds a BFA from Concordia University in Art History and Studio Art, with a minor in Film Studies (2022). Her writing and work has most recently been presented by The Pit, Needlebound, In the Mood Magazine, Cyber Love Garden, and the Icelandic Textile Centre.

Thank you to all who shared their eggshells:

Alex Bachmayer (boiled / over-easy / scrambled eggs with spinach, sourdough waffles, frittata, ice cream, challah)

Hannah Blair (Easter lamb carrot cake, lemon curd, crêpes)

Nicole Burisch (scrambled eggs, fried egg sandwiches, the occasional pancakes and baking)

Pierina Corzo-Valero (scrambled eggs and shakshuka)

María Escalona De Abreu ("boozy" eggnog, quesillo [caramel flan], tres leches [moist cake with condensed milk, regular milk, and evaporated milk], scrambled eggs)

Merav Epstein and Julian Schwartzel (shakshuka)

María de Fatima De Abreu (egg white omelets)

Josh Jensen (lots of boiled eggs, the odd banana bread or muffins)

Madison Strizic (soft boiled eggs, Montreal-style bagel / malted Victoria sponge cake)

Amanda Ventrudo (scrambled eggs, hojicha cake, chai cake)



