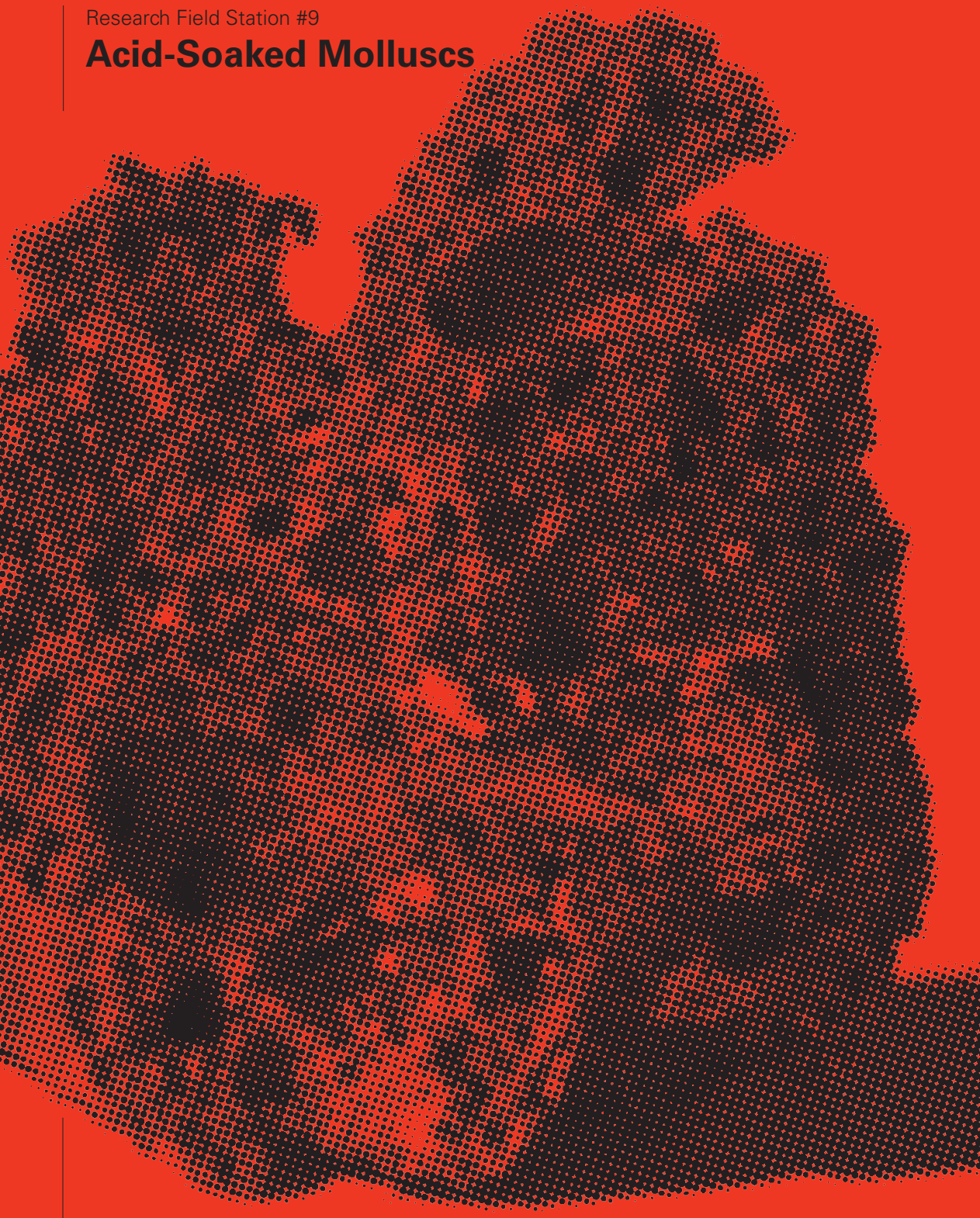
Research Field Station #9

Acid-Soaked Molluscs



by Julia McKinlay

"Joy to the snail! But they leave their proud slime on everything they touch."
Francis Ponge[1]

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Acid-soaked steel molluscs populate my work, their etched surfaces containing organic systems and pathways. Synthetic geology interacts with an ordered world of coils, ovals and voids. Molten slag has erupted from the furnace, frothing and flowing through the shell of a now extinct organism, leaving behind a fossil remnant. Like a soft-bodied creature, the work takes the form of collections that expand and contract within the space available to it. This can be a box, a series of prints, or a gallery space.

This Research Station draws out key themes from my PhD *Acid-Soaked Molluscs: a xenophoric approach to practising sculpture and print* (2018–2021), and focuses on the evolution of a proposed research methodology that developed from an encounter with a shell specimen the xenophora carrier snail. Through thinking *with* the xenophora and shadowing it's curating and collecting activities as a creative process, the xenophoric methodology utilises the snails tactile understanding and exploration of materials and processes demonstrated to find connections between ideas and strands of research within my studio practice. I have been working with processes in the studio that mimic events in nature through the involvement of chemical reactions, heat and pressure, and questioning the distinctions between the natural and industrial, print and sculpture. A significant material in recent work has been slag, a by-product of metal fabrication that imitates volcanic rock. By considering diverse subjects through a process-led xenophoric lens, I have found overlaps between snails and museums, printmaking and geology, and foundries and volcanoes. The resulting work has joined together these observations to make hybrid slag mollusc sculptures in *Coiled in a Single Plane, Skimmed and Separated*, 2019; a new species of metamorphic snail in *Mollusc Series*, 2019; and a portable xenophoric museum in *Feeling the Underside*, 2019.

Xenophora

Xenophora are marine gastropods, found throughout the world 'on the continental shelves and slopes of most tropical and temperate regions.'[2] A collector and curator, most species of xenophora gather mollusc shells, stones, fragments of coral, sea-urchins, sponges and grains of sand from the sea floor and attach this material to its shells.[3] Zhu Min-Da in his 1984 study of xenophora describes this process as one of 'agglutination', in which the snail's proboscis 'searches for and chooses an appropriate foreign body, then it grasps it, sets it on the shell into [the] appropriate position, then it secretes a mucus and cements the foreign matter.'[4] Over time, xenophora shells become museums of the sea floor, specific to their locality.

Why xenophora build foreign materials into their shells is still a matter of discussion amongst malacologists. Recent research by Gaia Crippa, Giovanni Pasinetti and Monica Dapiaggi aimed to discover more about why the snails behave in this way, specifically with *Xenophora crispa*, a species found in the Mediterranean. Their conclusion leans towards a combination of the 'snowshoe strategy', where the addition of found material increases the snail's surface area prevents it from sinking into the muddy ocean floor, with 'tactile and olfactory camouflage.'[5] Some xenophora show a preference for certain types of objects, such as stones or species of shell, which could be explained by the snail using the material that is available in a particular environment. However, it also interesting to consider the personalities and inclinations of individual xenophora. The mystery around this animal and its curious behaviour of collecting and displaying have led me to feel a particular affinity with it. Throughout this research I have been sharing a speculative mental space with the xenophora and have developed an approach to research that, I want to argue, shadows its habits as a creative process.

A snail's shell is made by the mantle, a specialised organ which generates an electrical current to solidify a mixture of calcium carbonate and proteins secreted at the mouth of the protoconch to start the formation of the shell.[6] It is like an organic form of 3D printing. In his poem 'Snails', from *Le parti pris des choses* (1942), Francis Ponge draws a direct comparison between making art and growing a shell: 'that shell, part of their essence, is at the same time a work of art, a monument. It lasts longer than they do.'[7] By harnessing a small electrical charge to solidify bodily material, the snail makes a sculptural 'monument' to its own life.[8] Throughout this research I have considered the shell making as a form of sculpture production, so I am particularly interested in how Ponge suggests that they make monuments and 'secrete form,'[9] drawing a direct comparison between human and non-human makers. This could be compared to many common sculptural processes such as welding, powder coating, or silicon mould-making that require electricity or a chemical catalyst to activate and re-form materials. Similarly, the 'silvery trail' left behind by land snails, could be seen as a drawing or monoprint of their bodies in motion.[10] My work moves between two- and three-dimensions and as the snail is both a printer and sculptor, they became the ideal creatures to align myself with and devise a methodology around.

It was encountering a xenophora specimen in a museum archive that caused me to identify additional commonalities between the xenophora's innate habits and my studio practice. The xenophora feels its way through its environment, carefully selecting and manipulating objects to become part of its shell. Gathering, handling, placing and displaying a unique assemblage of sea detritus. I was similarly intuitively connecting different subject matter that emerged from spending time in natural history archives, print studios, sculpture fabrication spaces and as a researcher with the team organising Yorkshire Sculpture International 2019. Between 2018 and 2021 I was a researcher with Yorkshire Sculpture International, a festival of international sculpture between Leeds and Wakefield.[11] Undertaking research in all of these contexts led to making individual strands of work, that were united to produce works like *Feeling the Underside*. I had little previous knowledge of conchology, metal casting or quarrying before this research project began, consequently I have been feeling my way through these new fields and bringing them together to develop three collections of work. The impurities drawn out of molten iron and the voids and channels cut into quarried stone seemed to have little in common with snail shells and etching. However, by combining these subjects together, as the xenophora combines its collection of sea detritus, I have found that they are bound by an investigation into the interrelationships between processes in nature with those in the studio. Liquid iron, stone, calcium carbonate shells and acid have coalesced to make new bodies of work.

The xenophoric approach is also open-ended and allows for dead-ends and the intervention of chance encounters. An example of an unforeseen encounter with slag, the waste by-product of metal casting. While working within the YSI festival team, I was asked to survey the existing facilities for making sculpture in Yorkshire. The aim of this was to assess what support structures currently exist for the fabrication of sculpture and what resources might be needed to retain and attract artists to the region. Throughout 2018 I visited several sculpture studios and workshops in the UK including industrial foundries in West Yorkshire. I became particularly interested in the foundry floor, which undulates with sand, silica and heaps of broken-up moulds. Walking through these spaces is like navigating a newly-formed landscape of materials in flux: car brake discs are melted down and re-cast; silica sand moulds are recycled; and the impurities of iron becomes slag.[12]

On a visit to H. Downs Foundry, an iron and aluminium foundry in Huddersfield, I came across the slag heap and the remnants of a recent casting. Slag had been

sprayed across the outdoor enclosure surrounding the furnace and pooled in a solid mass of glassy synthetic rock on the floor. The comparison between slag and volcanic rock is supported by D.W. Lewin's conference paper on the 'Properties and Uses of Steel and Iron Slag', which states that: 'It is a man-made molten rock, similar in many respects to volcanic lavas.'[13] Slag has been historically used for construction and road laying,[14] and continues to be widely used for this today.[15]

Slag

After encountering this kind of manufactured volcanic rock which is also called magma, I returned to the foundry on several occasions to collect blocks of the material and to collaborate with the furnace to coat sculptures in slag directly from the furnace. The final form of works like *Slag Coil* (2019), which was dipped and sprayed in slag by the furnace, emerged from giving the material agency to find its own form around the steel framework of the sculpture. It was through the xenophoric method that I learned of slag in the first place, and subsequently went on use it as a sculpture material as well as a subject and substrate for printing in both *Feeling the Underside* and *Coiled in a Single Plane*, *Skimmed and*

Separated. It continues to be a significant material in my practice because of its ambiguous materiality that lies between geology and industry, seen in recent works such as *Scoria* and *Key* (2021).

The cross-disciplinarity of this research corresponds with the origins of the word xenophora, which is derived from two Greek words: *xeno* (foreign) and *phora* (bearer). The xenophora snail is a host to a variety of foreign objects, dead marine lifeforms and occasionally living creatures. Similarly the clam shell box of *Feeling the Underside* contains a collection of prints, booklets and a small sculpture. The box performs as an imaginary xenophora shell, hosting the various subject matter for an audience to discover. It is an approach inspired by Ursula Le Guin's *The Carrier Bag Theory of Fiction*, in which she discussed how a container for a story can bring every aspect of a narrative into context, avoiding hierarchy and highlighting seemingly inconsequential occurrences and characters.[16] Le Guin identified the shell as a suitable container of narrative: 'A leaf a gourd a shell a net a bag a sling a sack a bottle a pot a box a container. A holder. A recipient.'[17] The contents of *Feeling the Underside* have their own individual stories, but the orange box binds the collection together, inviting the viewer to read these items in relation to each other, and to find connections and overlaps. Le Guin makes clear in her theory that everything in the carrier bag is equal and connects to

Scoria and Key.

Slag Coil

each other.[18] This lack of hierarchy is a key reason why *The Carrier Bag Theory of Fiction* is relevant to this body of work, like the characters and stories in Le Guin's carrier bag, the contents of *Feeling the Underside* are unfixed and without hierarchy, but brought together question the supposed opposition between nature and the man-made.

The three main studio projects represented in this exhibition were developed simultaneously, each exploring the core subjects of shell, stone and slag. It was through mimicking a xenophora during the making *Feeling the Underside* that these themes emerged more clearly. I identified my xenophoric approach to practice while encountering the writing of Donna J. Haraway and Anna Lowenhaupt Tsing which is associated with new materialism, a still-emerging field of theory that explores the agency of matter. New materialism is concerned with how nature, culture and science are interconnected and how matter and energy is constantly in flux, flowing between things and reconfiguring new entanglements. Essentially, the field, which is led by Karen Barad, Elizbeth Grosz, Jane Bennett, with the significant early influence of Gilles Deleuze and Felix Guattari amongst others, proposes that humans and non-humans are connected in a network of constantly changing relationships, questioning the assumptions of an anthropocentric approach.[19] Christopher Gamble, Joshua S. Hanan and Thomas Nial argue that 'the increasing prominence of 'new materialism' signals a growing cross-disciplinary effort to challenge longstanding assumptions about humans and the non- or other-than-human material world.'[20]

The ideas expressed by Haraway and Tsing on networks between lifeforms, and how recognising these structures can offer new ways of living in the age of the Anthropocene, shaped the development of the xenophoric methodology within my practice. I am interested in how individual xenophora collect and build an assemblage of objects that tell a story about their lives and environment. Their shells are a constantly growing monument, while also being an entanglement of other lifeforms and inert objects. It is this steady process of building and connecting through touch that I have drawn from the xenophora to understand my approach to research. Where I propose the xenophoric methodology contributes to the existing theories within new materialism is the importance of touch and tactility in the process of forming connections within the context of artistic production and reception.

Feeling the Underside

'Tentacular Thinking: Anthropocene, Capitalocene, Chthulucene,' Chapter Two of *Staying with the Trouble: Making Kin in the Chthulucene* by Donna J. Haraway has been particularly useful to consider my relationship with the xenophora. Haraway encourages the reader to reconsider how humans behave in relation to the earth and its other inhabitants and proposes that if we learn from more connected, tentacular organisms such as corals and octopi we could avert the damage done during the Anthropocene.[21] Her proposed epoch to counter the Anthropocene, the Chthulucene is one of 'ongoing multispecies stories and practices of becoming-with in times that remain at stake,'[22] recognising that non-humans are as crucial as humans on this earth: 'Diverse corals and diverse people and peoples are at stake to and with each other.'[23] Haraway encourages the reader to form productive, semi-symbiotic relationships the other creatures that we share space with. Haraway uses the term sympoiesis to define this interconnected approach to 'making with' other species, referring to the generative activities between organisms that live within larger 'ecological assemblages.'[24] Similarly in *The Mushroom at the End of the World*, Anna Lowenhaupt Tsing also uses the term assemblage to discuss how species interact, her main subject being the matsutake mushroom. This mushroom grows worldwide in environments that have been impacted by human activities, and its high value as a food has created a global network humans involved in collecting, transporting and consuming these mushrooms. Like Haraway, Tsing writes about how humans during the Anthropocene have ignored the divergent and interconnected web of lifeforms that we live amongst:

> Ecologists turned to assemblages to get around the sometimes fixed and bounded connotations of ecological 'community.' The question of how the varied species in a species assemblage influence each other–if at all–is never settled: some thwart (or eat) each other; others work together to make life possible; still others just happen to find themselves in the same place. Assemblages are open-ended gatherings.[25]

An 'open-ended gathering' feels like an appropriate description for the shells of xenophora, and collections of work discussed here. Assemblage recurs as a term within writing associated with material culture and new materialism, particularly in the writing of Jane Bennett and Tim Ingold, as a way of describing groupings of life forms and materials. Jane Bennett writes:

> Assemblages are ad hoc groupings of diverse elements, of vibrant materials of all sorts. Assemblages are living, throbbing confederations that are able to function despite the persistent presence of energies that confound them from within. […] Assemblages are not governed by any central head: no one materiality or type of material has sufficient competence to determine consistently the trajectory or impact of the group. […] Each member and proto-member of the assemblage has a certain vital force, but there is also an effectivity proper to the grouping as such: an agency of the assemblage.[26]

Assemblage is not a perfect fit for my work, as my collections of objects and images are carefully curated and not accidental, however the term and associated meanings do effectively capture the interconnectedness of the bodies of work I have produced. How each individual print, sculpture and drawing activates an overarching narrative, it connects my fictional ecosystems in works like *Coiled in a Single Plane, Skimmed and Separated* with real, ecological networks of lifeforms and highlights how making is universal across species.[27] After reading Haraway's compelling arguments for 'becoming-with' other

organisms, and Tsing's writing, which identifies the overlapping relationships between lifeforms, I have reconsidered my own creative practice. I cannot claim to have a truly 'sympoietic' connection with xenophora as I have been responding the relics of dead snails, not working with the living creatures themselves. However, my approach to practice-based research mirrors the xenophora's making activities and over time this snail has become a companion to my practice, helping me to identify how different material processes in nature, industry and the studio are connected. This body of work therefore supports and shows the value in Haraway's suggestion to 'make with' other species.

I think of xenophora shells and the bodies of work discussed here as self-contained worlds to be experienced in and embodied or tactile way. World-making is a concept that Tsing and Haraway both reference, Tsing has written, that '[m]aking worlds is not limited to humans.'[28] Tsing uses this term in relation to ecological assemblage to explain how bacteria, plants and animals are all making overlapping worlds that create room for other species, emphasising how interdependent life on earth is. Haraway, Tsing and Le Guin's writing about narrative, worlding and ecological assemblage has shown me how the xenophoric model for practice-based research is relevant to, and adds to, present theories around re-thinking human relationships with other species by thinking and making *with* the xenophora.

Coiled in a Single Plane, Skimmed and Separated

1

Feeling the Underside

2019
Artist's Book
Edition of 25
Box dimensions 31 x 42.5 x 8.5cm

Artworks and text by Julia McKinlay
Design by Marit Münzberg
Etchings and embossings printed by Ellen Burroughs, Sarah du Feu and Julia McKinlay
Booklets printed by Old Street Press
Booklets bound by Marit Münzberg and Jasmin Sieke
Box made by Downie Allison Downie Bookbinders

Feeling the Underside is an artist's book that brings together the subjects of stone, shells and slag. This work was commissioned and published by Yorkshire Sculpture International and Leeds Beckett University and launched at the Henry Moore Institute in 2019. Through making this book I tested for the first time the idea of imitating the xenophora snail by bringing together multiple open-ended strands of research into one complete collection. The title of the work emerged from handling a xenophora shell specimen in the Natural History Museum mollusc archives and noticing the ridged surface of the shell for the first time, my fingers were reading the ridged and surface of the shell, as they would the depth of etch on a copper plate or a prepared surface for welding. This moment helped me to understand how my knowledge as an artist was directing my engagement with other fields, and that my understanding of materials would give me an alternative insight into the shell specimens. It is important that *Feeling the Underside* is handled and viewed in private as well as seen within exhibition contexts, as the ideas running through it are dependent on a tactile interaction with the viewer.[29]

Feeling the Underside was produced with the designer Marit Münzberg, and made as a handmade edition of 25, which combined digital and traditional printmaking techniques across its four parts contained by an embossed clamshell box:

Part I	A series of eight etchings and one embossing, bound in a card folder.[30] Titles: *Xenophora, Igneous, Voids and Channels, Molten, Collection, Vitreous, Ore, Stony Waste Matter, Slag*.
Part II	Five digitally printed booklets of drawings and text bound in a card folder. Titles of drawings: *Fossil Collection* (2019), *Stone Arrangement* (2019), *Fingers* (2018), *Mollusc Collectors* (2018), *Magma Fragments* (2019).
Part III	*Xenophora Series*, a digitally printed booklet of drawings and text.
Part IV	*Magma*, a fragment of slag presented in a plastic box with a card label.

The box in *Feeling the Underside* was designed to feel like a drawer in a museum, it is to be opened and explored and to spill out across whatever surface it is placed upon. It is symbolic of a xenophora's shell, a portable collection and exhibition space to view the contained works. Viewing this work involves what Dalia Judovitz referred to in relation to Marcel Duchamp's box works, a 'physical and conceptual intervention' generated by the viewers tangible engagement with the work.[31] New connections and relationships between ideas can be formed with each reading. *Feeling the Underside* was designed to be a tactile, spatial experience, reflecting on my own encounters with mollusc shells and fossils in museums, quarried stone in Japan and slag in Yorkshire foundries. Through print, drawing and sculpture, this work finds overlaps between processes in nature, industry and the studio. To better understand the experience of viewing *Feeling the Underside*, I gathered accounts from individual owners of the work. One such owner, Professor Craig Dworkin, compared the 'intellectual and sensual' unpacking of *Feeling the Underside* as being 'like entering a cabinet of curiosities', the items entering into dialogue with each other, revealing themselves to become 'more than the sum of its parts'.[32] In an email exchange, Dworkin confirmed the importance of the link between thinking and feeling in the work:

> there is a pervasive sense, from this project of a haptic understanding of a widely imprinting and imprintable world […] The *feeling* here is not only tactile, but affective: the emotional response to the aesthetic, intellectual, and artistic sensibility on sympathetic display.[33]

Dworkin recognised that as the maker, I had been feeling my way through researching and making the book literally and conceptually.

The inclusion of handmade etchings was partly a reference to the historic reliance of traditional print techniques to produce natural history collection catalogues.[34] However, I also chose to work with intaglio techniques to better explore the three-dimensionality of print and its tactile qualities. Jennifer L. Roberts catalogue essay 'The Metamorphic Press: Jasper Johns and the Monotype' is helpful for understanding how a tacit knowledge of printmaking enables the artists to translate information between the optical and conceptual:

> the press cannot 'see.' If one wants to print an image, one must first convert it into something that can be 'felt'; all merely optical information must be translated into textural, chemical, or material information: grooves, ridges, adhesion, viscosities. […] The entire project of matrix preparation in traditional printmaking is essentially an act of translation between optical or conceptual and material information, turning images and systems of human meaning into something the press can recognize.[35]

It is interesting to consider that the press is in fact feeling the plates as translates an image onto the paper, the whole process of print is contingent on the artist's and printing press's sensitivity to texture and viscosity. *Slag* is a varied edition of embossings in *Feeling the Underside*. The matrices were made by crushing slag into a grit and combining it with glue to make a paste that could be painted onto board and varnished. The resulting prints are heavily textured and three-dimensional as the etching paper moulded around the slag and reformed into a rocky landscape. Occasionally fragments of slag detached from the plate to become embedded in the print, a remnant of the print process visible in the work. It emerged during the proofing process, that the plates would only produce one good print before being crushed by the press. Like an exposed rock formation, the slag plates erode with time and use. Realising this, I decided to

change the outline of each plate, using the shape of a single fragment of slag as a motif and changing its orientation and size for each print. The entire surface of some of the prints are altered, these are more material than image. In others, positive and negative space contrast to suggest landscapes, lumps of rock or the slag heap.

Although *Slag* is not classified as a monotype, it has an equally unstable matrix and relates to ideas in Roberts' essay, for instance, she writes: 'Like a metamorphic rock, the monotype presents a record of transformation through pressure.'[36] I see *Slag* as a record of a material in flux, capturing it after its transformation from iron to liquid to waste. The potential for variation intentional or otherwise was also a factor in selecting traditional print techniques to produce *Feeling the Underside*: as each print has its own idiosyncrasies, echoing the infinite variety found in nature. The three varied editions, *Ore*, *Slag* and *Xenophora* exploit this idea further. *Xenophora* was printed onto suminagashi marbled paper, the marbling process is unpredictable and only produces one print each time, therefore each print in this edition is unique. The subsequent variation in each box is part of its content. Each snail shell is unique despite following the same genetic matrix of its species; even the most consistently printed edition will have slight mutations that define each impression.

Feeling the Underside (details)

Mollusc Series

A series of over 35 etchings, each print is part of a small, varied edition.

Mollusc I, 2019. Etching, 70 x 50cm, 1/2, V/E
Mollusc II, 2019. Etching, 70 x 50cm, 1/2, V/E
Mollusc III, 2019. Etching, 70 x 50cm, 1/2, V/E
Mollusc IV, 2019. Etching, 70 x 50cm, 1/2, V/E
Mollusc V, 2019. Etching, 70 x 50cm, 1/2, V/E

Mollusc Series is a series of 16 etchings, printed from steel plates that were later incorporated into the sculptures of *Coiled in a Single Plane, Skimmed and Separated* (2019). These prints evolved from seeing the molten surface of the iron crucible the marbled strata and the volcanic formation of slag, combined with ongoing research into mollusc shells.

Through making these etchings, I wanted to explore the sculptural properties and processes of print. Etchings and embossings have an inherent three-dimensional profile because the paper moulds itself around plate and any lines or tone etched into it, embossing a physical and pictorial image. In 'Sentences on Printed Art', Richard S. Field has written: 'The imperceptible space of the prints – evoked by the deformation of the paper by plates, blocks, and stones – is an important part of their content and operates as an analogue for mental space.'[37] The voids inside the plates of *Mollusc Series* were inverted through printing, to create new orogenic landmasses that rise up from the surface of the paper, this narrow three-dimensional space is therefore part of their content. In 'The Metamorphic Press: Jasper Johns and the Monotype', Jennifer L. Roberts compares printmaking with geology, saying that monotype 'awakens the printing press as a metamorphic agent'.[38] This definition of the press as 'metamorphic' chimes with my understanding and experience of print, as with *Mollusc Series*, the etching press has formed new organic worlds within the paper.

During the marbling process used to etch the plates, the oily ground and acidic water bath repel each other, coating the steel plates with a network of biological systems, veins and nodules. It is an unpredictable process and each time the plate emerged from the water bath I would turn it over to discover the resulting physical evidence of the interaction between oil and acid. As a method of image making, it imitates the infinite variations found in nature, asking to be collected and catalogued like a new species of mollusc. The steel plates used for these etchings were submerged in copper sulphate solution multiple times, sometimes for up to 48 hours to deeply etch their surfaces with marbled markings. Creating a surface for the printing press to read and convert into an image, while also being defined enough to be clearly visible when incorporated into sculptures. This process created an unanticipated link between this project and historic shell collecting practices as the recommended method of cleaning shells for display in the 18th century was to use a dilution of nitric acid (aquafortis) to dissolve hard accumulations of unwanted material. This process was discussed by Beth Fowkes Tobin in *The Duchess's Shells*, where she referenced Hannah Robertson's description of the process from *The Young Ladies School of Arts* (1767):

2

> A shell that is rough, foul, and crusty, or covered with a tartareous coat, must be left a whole day steeping in hot water; […] it is to be rubbed with rough emery on a stick, or with the blade of a knife, in order to get off the coat; after this it may be dipped in diluted aquafortis, spirit of salt, or any other acid; […] this will greatly add to the speed of the work[.][39]

The plates for Mollusc Series were cut, sanded and polished, and afterwards exposed to copper sulphate with added salt to speed up the etching process. All of these materials and processes connect this body of work to the historic treatment of shells and the material culture of shell collecting.

Plate for *Mollusc IV*

Mollusc II, 2019.
Etching, 70 x 50cm, 1/2, V/E

Mollusc IV, 2019.
Etching, 70 x 50cm, 1/2, V/E

Sketchbook of drawings made at Leeds Discovery Centre and the Natural History Museum

Pen on paper
Book size 25 x 17.8cm

Xenophora range from microscopic, neatly ordered shells to huge, flamboyant specimens that are barely contained by their boxes. Some shells display only one type of object, like pebbles, whereas others accommodate a more chaotic mixture of shells, stones, corals and sponges. Some of the examples I looked at were stained with the remains of live oysters, xenophora, seemingly do not discriminate between the living and the dead. Occasionally a shell is found on a xenophora that has never been documented before.[40] These snails could be contributing to scientific study by collecting new species.

This sketchbook contains observational pen drawings made directly from xenophora specimens in the archives at Leeds Discovery Centre and the Natural History Museum, London. They have been reproduced in Part III *Xenophora Series* in Feeling the Underside. Made at speed during limited viewing sessions at each museum, my focus was to capture how the shells were constructed by the snail, their scale and surface texture as well as the variety of objects that they carried. Drawing has been a primary process used to study and understanding the different subject explored across the PhD, and subsequently is important to the xenophoric research methodology. In these drawings I attempted to translate the tactility and materiality of the shells through line and mark making.

3

Xenophora corrugata

2020
Pencil on paper
13 x 17.5cm

Drawing has been a way to think about how the xenophora builds its shell over time, integrating found objects like shells and corals into its structure. The collection they carry is an indication of the other lifeforms they live alongside in their specific habitats. Throughout this research I have thought of the xenophora as a curator and sculptor and have been considering that they may be bringing together objects not only for their usefulness as a form of defence, but also their aesthetic and tactile qualities. Xenophora shells tell a story about their life on the continental shelf of the oceans they inhabit, they are also as unique and individual as collections made by humans.

4

5

Xenophora

2019

Steel, acid etched steel, varnish

24 x 34 x 24cm

Xenophora is part of multi-part installation *Coiled in a Single Plane, Skimmed and Separated* (2019), and was exhibited in *Kuroko* at Gallery House, Leeds in 2019. The installation was created to represent the surface of an imaginary xenophora shell, where various sculptures that explored slag and molluscs had been collected and displayed. The viewer is invited to enter this installation physically to have an embodied experience of the space. This sculpture symbolises the xenophora itself, and acts as a key to the whole installation. It is constructed from hand coiled steel bar which supports three etched steel forms, representing a fictional hybrid molten metal mollusc. The small scale of this sculpture was also important; lightly larger than most xenophora, it was one of the smallest objects in *Coiled in a Single Plane, Skimmed and Separated* inviting the viewer to peer down to the ground and explore the installation physically as well as imaginatively.

Feeler

2019

Slag, steel, iron paste

25 x 40 x 8cm

In the hybrid molluscan world of *Coiled in a Single Plane, Skimmed and Separated*, Feeler is a connector between the themes of slag and snails. Headed with a lump of synthetic rock, *Feeler* creeps between other sculptures, a messenger between fictional metallurgical ecosystems.

6

Excavated Topography

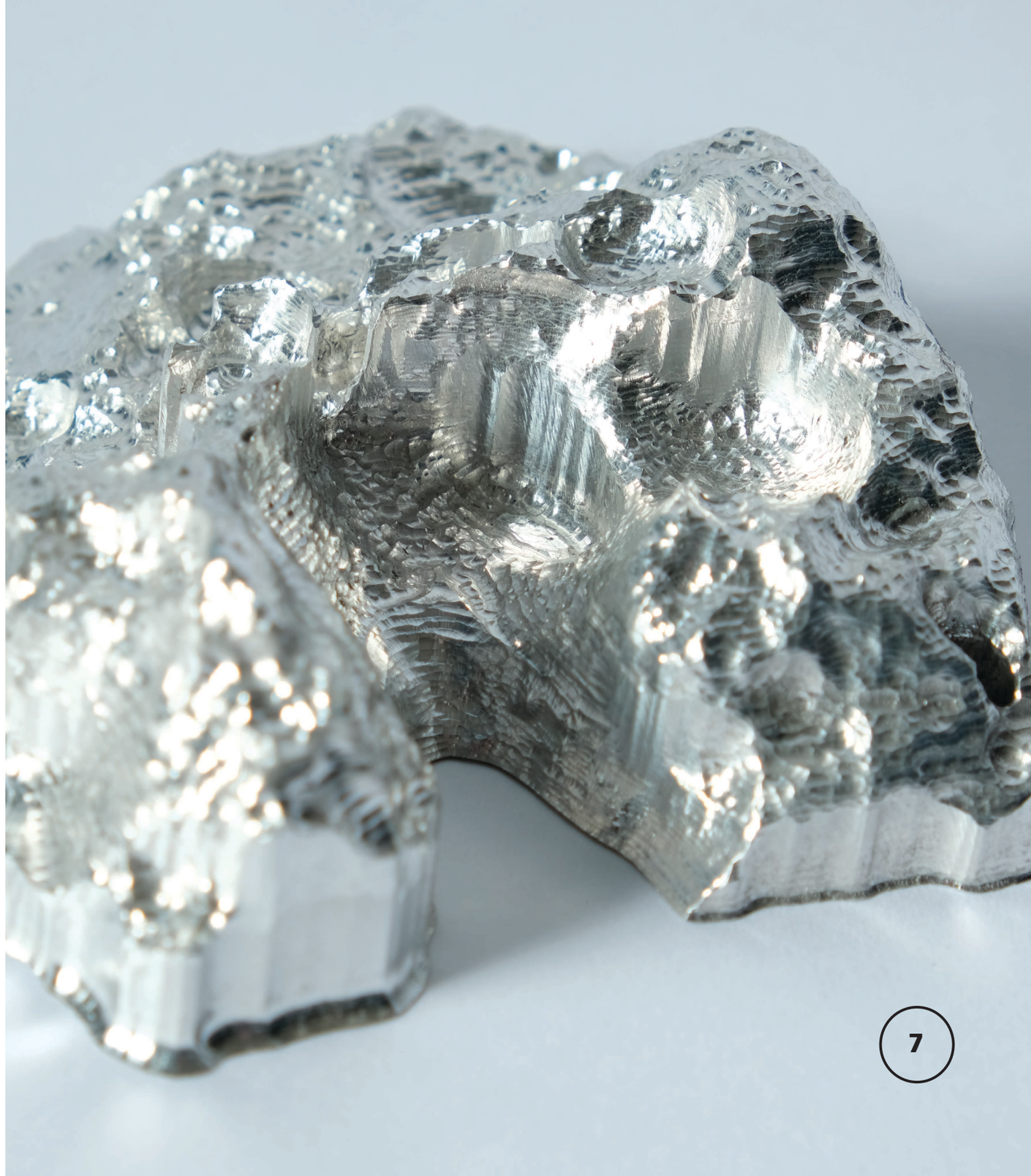
2019
Aluminium
3.5 x 20.5 x 20.5cm

This sculpture is a digitally fabricated, aluminium copy of a fragment of slag. A photographic rendering directed a CNC router to carve the slice of the slag from block of aluminium.[41] The aluminium was milled away in concentric layers, to reveal a metallic copy of the original. The use of aluminium is also significant as it is the most abundant metal on earth, making up approximately 8% of the earth's crust, and the third most abundant element after oxygen and silicon.[42] The pathway of the drill left behind a topography of aluminium that suggests the idea of a miniature landscape, aided by the inaccuracies of the translation from material to digital file to material again. The sculpture is not a perfect duplicate of the original slag piece; the process has inserted a column of material that does not exist in the original. Slag, a metal by-product has been returned to a metal state, questioning the origins of sculpture materials, which generally come from the earth and are re-configured.

The sculpture also represents a collaboration between an organic material, a human maker and digital technology. Jane Bennett's writing about 'vitality intrinsic to materiality,' has been valuable for thinking around the semi-autonomous interaction of the CNC machine and metal in this sculpture.[43] When examining the agency of materials and assemblages in *Vibrant Matter*, Bennett says that:

> 'material agency is likely to be a stronger counter to human exceptionalism, to, that is, the human tendency to understate the degree to which people, animals, artefacts, technologies, and elemental forces share powers and operate in dissonant conjunction with each other.'[44]

In the case of *Excavated Topography*; humans, technology, mechanical force, and metals have operated in relation to each other to produce something new.



7

Scoria and Key

2021
Slag, steel, lacquer
35 x 30 x 35cm

Magma/slag has continued to be an important material in my work. In 2021 I produced *Scoria*, a new series of sculptures incorporating slag in an exhibition at Threshold, an artist-led outdoor gallery space for sculpture in the garden of a back-to-back terraced house in Leeds.[45] This work was exhibited alongside a companion text by Jacob Farrell titled *A Snake Shaped Key*.[46] In his text, Farrell explores the etymological roots of words associated with metallurgic waste, and the linguistic connections between industrial processes, materiality and insults.

> Under the forges and ingles
> of the first demiurges and metallurgists,
> the ground was thick with scoria and slag,
> tailings and spoil, helixes of swarf and
> scobs of dross,[47]

Together the text and sculptures explored the material hierarches surrounding industrial processes and the histories of common place objects like keys and corkscrews. I am at the start of my relationship with this material, which, exists in an ambiguous place between natural and industrial. Slag is made from earthbound materials including iron, silicon, carbon, manganese and limestone but only exists because of human intervention. The body of work produced for Threshold was titled after *scoria*: the Latin word for the material that is drawn out of molten metal, and the frothy lava produced by volcanic eruptions. *Scoria and Key* is one sculpture from this body of work, which centred around a group of steel display structures that interact with blocks of slag. These structures present slag outside of its industrial context, asking the viewer to consider its organic qualities and treating it as a precious material rather than a waste by-product.

8

Scoria and Key

Installtion view of
Scoria at Threshold

9

Keys 1-3

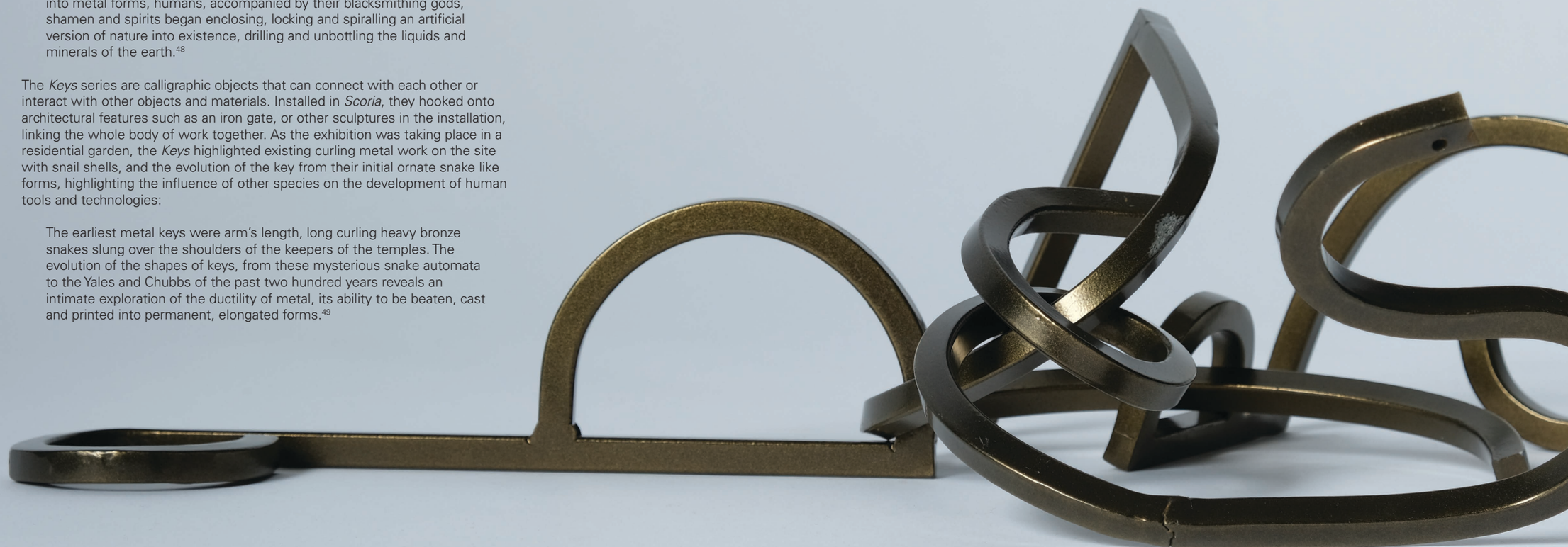
2021
Steel and lacquer
Each approx. 10 x 15 x 20cm

As I was bending and connecting lengths of steel bar to make the sculptures for *Scoria*, traces of snail shapes also emerged in some of the sculptures. I formed the metal into curves and spirals, like swarf, corkscrews or mollusc shells. In his text, Farrell identifies some of the overlaps between commonplace forms and objects like drills and corkscrews, connecting them to the development of blacksmithing and other species:

> A spring or spiral is found throughout nature, often in the whorls and sutures of the exoskeletons of gastropods, spiralling from an aperture to an apex. When these forms were first imitated, beaten and smelted into metal forms, humans, accompanied by their blacksmithing gods, shamen and spirits began enclosing, locking and spiralling an artificial version of nature into existence, drilling and unbottling the liquids and minerals of the earth.[48]

The *Keys* series are calligraphic objects that can connect with each other or interact with other objects and materials. Installed in *Scoria*, they hooked onto architectural features such as an iron gate, or other sculptures in the installation, linking the whole body of work together. As the exhibition was taking place in a residential garden, the *Keys* highlighted existing curling metal work on the site with snail shells, and the evolution of the key from their initial ornate snake like forms, highlighting the influence of other species on the development of human tools and technologies:

> The earliest metal keys were arm's length, long curling heavy bronze snakes slung over the shoulders of the keepers of the temples. The evolution of the shapes of keys, from these mysterious snake automata to the Yales and Chubbs of the past two hundred years reveals an intimate exploration of the ductility of metal, its ability to be beaten, cast and printed into permanent, elongated forms.[49]



Conclusion

Through working in series and multi-part installation, I identified with the xenophora because they adorn their shells with an assemblage of found objects that give us a glimpse into their environment, the story of their lives, and in my opinion, their individuality and personality. The process of attachment is meticulous and relies on the tactile abilities of the xenophora snail.[50] My approach to research has similarly been driven by my haptic understanding of materials. By working with processes in the studio that mimic events in nature through the involvement of chemical reactions, heat and pressure, I have been questioning the distinctions between the natural and industrial, print and sculpture. The bodies of work discussed here represent fictional worlds and collections of objects and subjects for the viewer to explore either tactilely or through an embodied knowledge of material and form.
Interestingly, my shadowing of the xenophora as a creative process also extends to the audience of my work. In his account of viewing *Feeling the Underside*, Professor Craig Dworkin compared himself to the xenophora and wrote:

> The snail's own itinerant collecting–a kind of collage and sculpture (on account of its cementing)–suggests an activity reflecting back on the artist, of course, but it also holds up a kind of mirror to a viewer like myself, lucky enough to have the box–as the beautiful box enters my own collection of varied, various, disparate books and artworks, I become xenophora-like in my aesthetic activities, in my curation, in my accumulation. The genre of the work, whatever else, is thus a kind of portrait of its owners, as well as an institutional critique of every collection it enters.[51]

"That is the example that snails offer us: saints who make masterpieces of their lives, works of art of their own perfection. They secrete form."
Francis Ponge[52]

Key 2
Installtion view of Scoria at Threshold

End Notes

1 Francis Ponge, *Partisan of Things*, trans. Joshua Corey and Jean-Luc Garneau (Chicago: Kenning Editions, 2016), 20.

2 W F Ponder, *A Revision of the Recent Xenophoridae of the World and of the Australian Fossil Species (Mollusca: Gastropoda)*, Australian Museum Scientific Publications, Memoir 17 (Sydney: The Australian Museum, 1983), 2, https://media.australianmuseum.net.au/media/Uploads/Journals/17611/393_complete.pdf.

3 Zhu Min-Da, 'Le phénomène d'agglutination dans le genre Xenophora', in *Nouvelles archives du Muséum d'histoire naturelle de Lyon*, vol. 22 (Publications du musée des Confluences, 1984), 1, https://www.persee.fr/doc/mhnly_0373-6636_1984_num_22_1_1055. Syntax of the translation corrected.

4 Min-Da, 1. For further detail on the xenophora's habit of attaching foreign material to its shell see: Ponder, *A Revision of the Recent Xenophoridae of the World and of the Australian Fossil Species (Mollusca: Gastropoda)*; Robert M. Linsley and Ellis L. Yochelson, 'Devonian Carrier Shells (Euomphalidae) from North America and Germany', *United States Department of the Interior Geological Survey Professional Paper*, no. 824 (1973), https://pubs.usgs.gov/pp/0824/report.pdf.

5 Gaia Crippa, Giovanni Pasinetti, and Monica Dapiaggi, 'How Did the Carrier Shell Xenophora Crispa (König, 1825) Build Its Shell? Evidence from the Recent and Fossil Record', *Lethaia* 53, no. 4 (7 January 2020): 449, https://doi.org/10.1111/let.12367.

6 The protoconch is the first stage of the shell (the start of the spiral), grown while the snail is still in the egg. Once born, the mantle adds material (calcium carbonate and protein) to the small opening on the protoconch to grow the shell. Mark Mancini, 'How Do Snails Get Their Shells?', HowStuffWorks, 3 May 2018, https://animals.howstuffworks.com/marine-life/do-snails-get-shells.htm. The mantle continues to secrete minerals and protein throughout the snail's life, enlarging the shell to accommodate the growing body of the snail: 'This pattern of growth results in three distinct shell layers: an outer proteinaceous periosteum (uncalcified), a prismatic layer (calcified) and an inner pearly layer of nacre (calcified).' Francis Horne, 'How Are Seashells Created? Or Any Other Shell, Such as a Snail's or a Turtle's?', *Scientific American*, 23 October 2006, https://www.scientificamerican.com/article/how-are-seashells-created/.

7 Ponge, *Partisan of Things*, 22.

8 Ponge, 22.

9 Ponge, 22.

10 Ponge, 20.

11 I was embedded in the team delivering the 2019 festival and supported the delivery of public programming and sculpture commissions. Many of the situations that informed the development of the work in this document occurred because of this placement with YSI.

12 Car break disks have a very high iron content and are ideal for melting down and re-casting.

13 D. W. Lewis, 'Properties and Uses of Iron and Steel Slags' (Symposium on Slag, National Institute for Transport and Road Research South Africa: National Slag Association, 1982), 1, http://www.nationalslag.org/sites/nationalslag/files/documents/nsa_182-6_properties_and_uses_slag.pdf.

14 Lewis, 1.

15 The slag at H. Downs Foundry is sold as an aggregate for road laying. The modern uses of slag are also discussed in: Lewis, 5–7.

16 Ursula Le Guin, *The Carrier Bag Theory of Fiction* (n.p.: Ignota Books, 2019), 25–37.

17 Le Guin, 29.

18 Le Guin, 34–35.

19 For background on new materialism see: Jane Bennett, *Vibrant Matter: A Political Ecology of Things* (Durham and London: Duke University Press, 2010); Petra Lange-Berndt, ed., *Materiality: Documents of Contemporary Art* (London: Whitechapel Gallery, 2015).

20 Christopher N. Gamble, Joshua S. Hanan, and Thomas Nail, 'What Is New Materialism?', *Angelaki* 24, no. 6 (2 November 2019): 111, https://doi.org/10.1080/0969725X.2019.1684704.

21 Donna J. Haraway, *Staying with the Trouble: Making Kin in the Chthulucene* (London: Duke University Press, 2016), 55–56.

22 Haraway, 55.

23 Haraway, 56.

24 Haraway, 58.

25 Anna Lowenhaupt Tsing, T*he Mushroom at the End of the World: On the Possibility of Life in Capitalist Ruins* (Princeton, NJ: Princeton University Press, 2015), 22–23.

26 Jane Bennett, *Vibrant Matter: A Political Ecology of Things* (Durham and London: Duke University Press, 2010), 23–24.

27 Beth Fawkes Tobin also refers to natural history collections as assemblages in Beth Fowkes Tobin, *The Duchess's Shells: Natural History Collecting in the Age of Cook's Voyages* (New Haven, CT: Yale University Press, 2014), 20.

28 Tsing, *The Mushroom at the End of the World*, 22.

29 *Feeling the Underside* is now in the collection of several individuals as well as Leeds Museums and Galleries, Yorkshire Sculpture International and The Laurence Sterne Trust at Shandy Hall.

30 Embossings are 'inkless images produced by impressing dampened paper into the surface of any relief or intaglio plate. The result is essentially a low-relief sculpture.' In Bill Fick and Beth Grabowski, *Printmaking: A Complete Guide to Materials & Processes*, Second edition (London: Laurence King Publishing, 2015), 16.

31 Dalia Judovitz, *Unpacking Duchamp: Art in Transit* (Berkeley: University of California Press, 1998), 4. Marcel Duchamp's *The Bride Stripped Bare by her Bachelors Even (The Green Box)* (1934), and *The Box in a Valise* (1941), alongside Mark Dion's *World in a Box* (2015) informed the development of *Feeling the Underside*.

32 Dworkin.

33 Dworkin.

34 A key document for my research has been the *Historiæ Sive Synopsis Methodicae Conchyliorum* (1685-1692) by Dr Martin Lister, which was the first ever comprehensive study of molluscs. This book contains hundreds of engravings of molluscs produced by Martin Lister's teenage daughters Anna Lister and Susanna Lister. The illustrations were so accurate they are still valuable for research today. For more information on this book see: Anna Marie Roos, *Martin Lister and His Remarkable Daughters: The Art of Science in the Seventeenth Century* (Oxford, UK: The Bodleian Library, 2018).

35 Jennifer L. Roberts, 'The Metamorphic Press: Jasper Johns and the Monotype', in *Jasper Johns:*

Catalogue Raisonné of Monotypes, by Susan Dackerman and Jennifer L. Roberts, Hardback (New York, NY: Matthew Marks Gallery, 2017), 14.

36 Roberts, 'The Metamorphic Press: Jasper Johns and the Monotype', 15.

37 Richard S Field, 'Sentences on Printed Art', in *Perspectives on Contemporary Printmaking: Critical Writing since 1986*, ed. Ruth Pelzer-Montada (Manchester: Manchester University Press, 2018), 70.

38 Roberts, 'The Metamorphic Press: Jasper Johns and the Monotype', 11.

39 Tobin, *The Duchess's Shells*, 89.

40 Andreia Salvador, Conversation with Andreia Salvador, Senior Curator of Marine Gastropoda and Historical Collections at the Natural History Museum, London., interview by Julia McKinlay, Waveform audio file, 01:36:13, 25 April 2019.

41 Thanks to artist Klavs Kurpniek fabricating this work.

42 Alice Channer and Jennifer Boyd, *Skinned and Detouched* (Birmingham: Eastside Projects; Berlin: Motto Books, 2018), Skinned, no pagination.

43 Bennett, *Vibrant Matter*, 3.

44 Haraway, *Staying with the Trouble*, 96.

45 Threshold was founded in 2021 as a space for outdoor exhibitions of sculpture in Leeds, which has a lack of reliable exhibition spaces for temporary exhibitions. The space is the front garden of a traditional back-to-back terraced house in the residential area of Burley. For more information about the programme of exhibitions at Threshold see: Threshold, 'Threshold', accessed 20 November 2021, https://thresholdsculpture.space.Threshold.

46 Jacob Farrell, *A Snake Shaped Key* (Leeds: Threshold, 2021). For more information on the exhibition see: Threshold, 'Threshold: Scoria', accessed 20 November 2021, https://thresholdsculpture.space.

47 Farrell, A Snake Shaped Key, 3.

48 Farrell, 14.

49 Jacob Farrell, *A Snake Shaped Key* (Leeds: Threshold, 2021), 50.

50 For further information about the process of attachment see: Linsley and Yochelson, 'Devonian Carrier Shells (Euomphalidae) from North America and Germany', 1–7.

51 Dworkin, 'Email from Professor Craig Dworkin', 14 August 2021.

52 Ponge, *Partisan of Things*, 22.

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