THE

WORLD

WAS ENDING

AS IT HAD BEEN

DOING FOR MILLENNIA

Clip clop, clip clop, clip clop, clip clop. It always made me smile (...) tee hee (...) all these grown up men and women trotting about in their heels (...) clip clop, clip clop. Clip clop (...) On the stone floor (...) clip clop, clip clop, clip clop (...) the sound of horses (...) horsee don't you stop (...) neeeiiighhhheeeee!

All these men and women in their lab coats, and their immaculate pens – biros – pushed into the front pockets of their lab coats (...) clip clop, clip clop (...) like time running sideways in a horse universe (...) horse (...) smack (...) ketamine (...) horse tranquiliser (...) like time standingstill (...) clip clop, clip clop (...) was that the sound of the lids being replaced on biros heard by microbes? A horse-sounding rattle of heels on stone floors that echoes in their microbial earcanals (...) do microbes have ears?

It was a back room at the Natural History museum in London, not some awkward, foreshortened, Victorian corridor, but an expanse of wood-panelling like a gentleman's club in an Arthur Conan Doyle novel (...) leviathan. My height at the time put me at the same level as the giant squid's eye. Opaque and mirrored – it had an opalescent quality, as if threatening a loss of self as one plunged into its near abyss, language unscrambling as one fell. A black and impenetrable thing, and in that moment it seemed to take me in. leviathan (...) than, thanthan. At this point the room did shrink forming an elevated platform on which we both stood: 2 beings locked in an eternal embrace. than, thanthan, tan. And yet my longing, was met with a whiff of disgust, putrefaction entering my nostrils, like some carefully carved words (...) staccato conversation whittled like a bird out of some gnarled piece of decaying wood. mulch. Like some dark elder God, indifferent and withdrawn from my destiny, as if it had long ago scornfully ceased to play a part in human affairs. And yet for that brief moment before my father interrupted, we shared something leviathan < thn than tun like an unholy communion.

My father was a marine biologist, working as a researcher attached to the examination of the giant cephalopod, leviathan, then thin thong through some inter-institutional partnership, probably funded by some inappropriate subsidy from a pharmaceutical or agribusiness (agoraphobia, aggressive conglomeration) conglomerate. That said, I loved coming in here permitted, if only briefly, to gaze on such wondrous and dire possibility, ty tee too. Of this magnificent descendant of the Orthocone, prime predator of the Devonian seas (i see you). And yet if these were Gods (odds, oddats), what then were we? A malevolent species of monkey that had evolved hairlessness and sectarian conflict. I would like to say that we had done so on an epic scale, but that would just be monkey hubris, and considering the Orthocone ruled the sea, when there was nothing on land, except sea (icu) scorpions coming up to lay their eggs before feasting on their own young – a grand total of 650 million years ago – we have a lot to learn from the true master race. Or perhaps we are learning and the current phase of piracy is just a leaning, a pull from god knows whence (...) leviathan

Perhaps Lovecraft knew something of this in his dark ramblings about rumblings in cavernous recesses within the Earth itself, and in crannies of the mind that folded space in unseen, perverse ways that would only later simplify and flatten out into something that our perceptual field (yes a monkey perceptual field), could comprehend. Like bats in the night sky, screaming out their rage in perpetual diving and buzzing cacophonous civil war: the true symphony of the night of which we are barely even aware, or perhaps more accurately remain blissfully ignorant of in our delusion of being at the centre of all things. The centre of all things, all things are central to me/us. In our grand delusional malevolence. hence, fence dense>

Whether, or for that matter how, that might be said to be related to the spots that began multiplying and oscillating on the sun's surface was anybody's guess. But appear they did even to the naked eye. Initially it was speculated that they were the lagged appearance of solar storms. Or even the millions of years' delayed vestigial traces of gravitational waves. Appearing to our retina light years after their original manifestation. And so we were being obliterated through a complex time delay mechanism. Or perhaps a mechanism that squeezed matter and amplified the pressure on our sun, in a way that straddled our limited concepts of both space and time. Like something out of the Vedas, those ancient scientific manuals not speaking of mysticism in terms of all times and places co-existing (and co-habiting), but of factual consonance. As time began to accelerate and therefore coincide increasingly.

I preferred to think of them as scabs; scabs forming on our collective consciousness that reflected the taint of guilt that was indissoluble from our being. Less existential dread, than the more scientific fact of our over-presence on this globe since emerging in pole position from our poor Parthian cousins: the Neanderthals. Although we carried with us 1-4% of their DNA: a kind of embodied guilt at our own transcendence. Or should that be survival? Survival always seems so impoverished a notion, like a penitent existence. And yet here we were. Clinging like barnacles to the body of a dead whale. loch ness monster, loch ness monster.

A rash of suicides accompanied each new and increasing manifestation of sunspot activity. As if we were a mirror for something much bigger and more pressing than ourselves. A dark occlusion (contusion < confusion) of the sun was perhaps god's way of averting her – purr – gaze, or perhaps a blackening (quickening, slackening quackening) of the very source of light and heat, to transform it into the opaque and impenetrable gaze of the opaline and hermaphroditic forebear of that tentacled – leviathan – being that first issued from primordial chaos and formlessness. Although maybe rapture (snapchat, capture, scream) is a better collective noun when speaking of mass, wanton acts of self-destruction, particularly from an ecological or religious point of view. The world was ending as it had been doing for millennia. Only this time a level of fatigue seemed to permeate even the survivors, as if it was too much effort to continue to get up each day and eat and fuck quack, quack, quack, leviathan, and then sleep it off before more of the same the next day and the next. It was funny how after years of regulation the thing we feared most was not violation or violence, but boredom. Sex, like most things becomes boring if there are no longer any restraints placed on it. All those little monkeys jerking off to internet pornography: monkey on monkey, multiple monkey penetration, with and without plastic penetrative aids, monkey on goat etc. It's funny to have been something of an anarchist all along and to suddenly see the relevance of 'society'. And now as the short-term experiment we liked to call: 'society' was ending, each prophecy of the end of the world was finally coming to pass: the flood, fire, earthquake and saving the most Shakespearean (on a spectrum of melodrama) for last: The Tempest. The weather seeming to parallel the mood of Earth's remaining inhabitants. Sorry: monkeys. The animals didn't mind so much. they still like to fuck. Quack quack quack, clop clip clop, Aaaaaiiieeeeeeeaaarggggghhhhh.

Cut to image of a pack of dogs feeding off a corpse by the side of a river in India.

The older gods had decided on a cull.

Aaaarrrggghh! There was a stain on my trousers, spreading like some kind of hematoma. I had found some cold coffee and tried to heat it up over a makeshift camp-fire – loch ness monster, lochness monster. Like the limited pressing I'd picked up from Honest Jon's in my teens.

I burnt my finger on the kettle, although calling a tin can carved into a receptacle by a rusty pen knife a kettle, might be overstating the facts. aaarrrrggghhh, monster from the deep. the loch ness monster gonna creep (...) and boo! It got knocked over, and there I was jumping around and yelling to no-one in particular, with burning coffee down what was left of my jeans (...)

I found an open door. It had been forced, like so many of us. Did we even get a look in as to whether to top ourselves or not? Or was it programmed in advance? The jagged edges of glass, seemed to suggest a symphony in discordance. Crack, crrrrzzzzcrusssssshhhh, zzzzinngg (...)

I let myself in and up to an ex-council property on the 3rd floor. The owner had left it vacant and possibly done himself in elsewhere – very thoughtful.

There – king of the monsters, loch nesss monstaahhhh – was still some cold water in the tank, and whaddya know, the water heater was still working. Like some crazy machinery that hadn't been informed it was still toiling needlessly. This was cause for celebration, I was gonna wash me hair!

A pumice stone, nice: scrub, scrub, scrub, three men in a tub. Rub-a-dub-a-dub, bub-a-dub-a-dub. Dub will save the world.

Research

# Functioning ‘mechanical gears’ seen in nature for the first time


**Previously believed to be only man-made, a natural example of a functioning gear mechanism has been discovered in a common insect - showing that evolution developed interlocking cogs long before we did.**

The juvenile *Issus* - a plant-hopping insect found in gardens across Europe - has hind-leg joints with curved cog-like strips of opposing ‘teeth’ that intermesh, rotating like mechanical gears to synchronise the animal’s legs when it launches into a jump.

> *In Issus, the skeleton is used to solve a complex problem that the brain and nervous system can’t*
>
> — *Malcolm Burrows*

The finding demonstrates that gear mechanisms previously thought to be solely man-made have an evolutionary precedent. Scientists say this is the “first observation of mechanical gearing in a biological structure”.

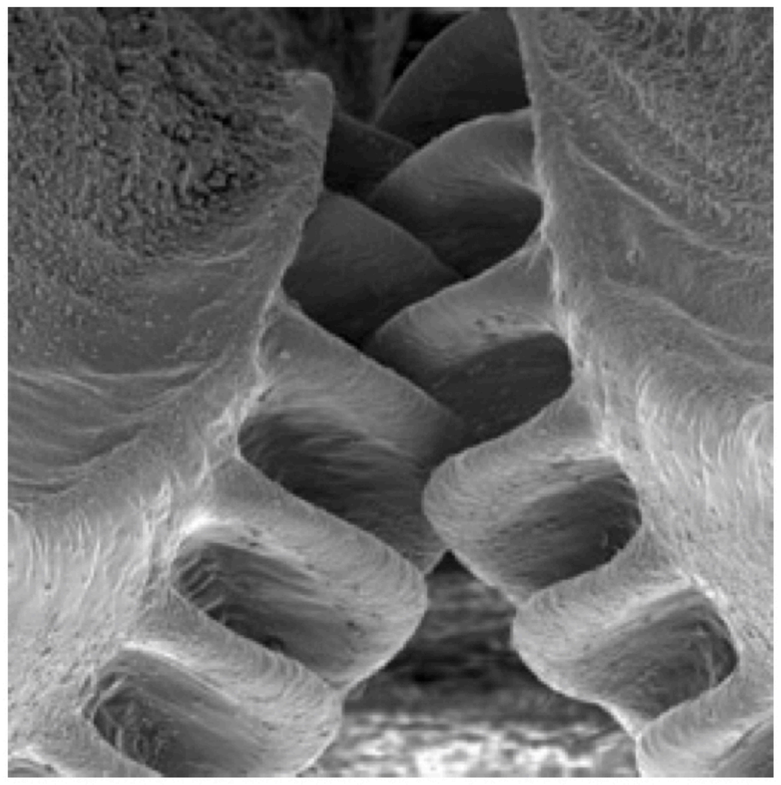
Through a combination of anatomical analysis and high-speed video capture of normal *Issus* movements, scientists from the University of Cambridge have been able to reveal these functioning natural gears for the first time. The findings are reported in the latest issue of the journal Science

(http://www.sciencemag.org/content/341/6151/1254.abstract?utm_content=&utm_medium=Twitter&utm_campaign=Science&utm_source=shortener) .

The gears in the *Issus* hind-leg bear remarkable engineering resemblance to those found on every bicycle and inside every car gear-box. Each gear tooth has a rounded corner at the point it connects to the gear strip; a feature identical to man-made gears such as bike gears – essentially a shock-absorbing mechanism to stop teeth from shearing off.

The gear teeth on the opposing hind-legs lock together like those in a car gear-box, ensuring almost complete synchronicity in leg movement - the legs always move within 30 'microseconds' of each other, with one microsecond equal to a millionth of a second.

This is critical for the powerful jumps that are this insect's primary mode of transport, as even miniscule discrepancies in synchronisation between the velocities of its legs at the point of propulsion would result in "yaw rotation" - causing the *Issus* to spin hopelessly out of control.



"This precise synchronisation would be impossible to achieve through a nervous system, as neural impulses would take far too long for the extraordinarily tight coordination required," said lead author Professor Malcolm Burrows, from Cambridge's Department of Zoology.

"By developing mechanical gears, the Issus can just send nerve signals to its muscles to produce roughly the same amount of force - then if one leg starts to propel the jump the gears will interlock, creating absolute synchrony.

"In *Issus*, the skeleton is used to solve a complex problem that the brain and nervous system can't," said Burrows. "This emphasises the importance of considering the properties of the skeleton in how movement is produced."

"We usually think of gears as something that we see in human designed machinery, but we've found that that is only because we didn't look hard enough," added co-author Gregory Sutton, now at the University of Bristol.

"These gears are not designed; they are evolved - representing high speed and precision machinery evolved for synchronisation in the animal world."

Interestingly, the mechanistic gears are only found in the insect's juvenile – or 'nymph' – stages, and are lost in the final transition to adulthood. These transitions, called 'molts', are when animals cast off rigid skin at key points in their development in order to grow.

It's not yet known why the *Issus* loses its hind-leg gears on reaching adulthood. The scientists point out that a problem with any gear system is that if one tooth on the gear breaks, the effectiveness of the whole mechanism is damaged. While gear-teeth breakage in nymphs could be repaired in the next molt, any damage in adulthood remains permanent.

It may also be down to the larger size of adults and consequently their 'trochantera' – the insect equivalent of the femur or thigh bones. The bigger adult trochantera might allow them to create enough friction to power the enormous leaps from leaf to leaf without the need for intermeshing gear teeth to drive it, say the scientists.

Each gear strip in the juvenile *Issus* was around 400 micrometres long and had between 10 to 12 teeth, with both sides of the gear in each leg containing the same number – giving a gearing ratio of 1:1.

Unlike man-made gears, each gear tooth is asymmetrical and curved towards the point where the cogs interlock – as man-made gears need a symmetric shape to work in both rotational directions, whereas the *Issus* gears are only powering one way to launch the animal forward.

While there are examples of apparently ornamental cogs in the animal kingdom - such as on the shell of the cog wheel turtle or the back of the wheel bug - gears with a functional role either remain elusive or have been rendered defunct by evolution.

The *Issus* is the first example of a natural cog mechanism with an observable function, say the scientists.

*Inset image: an Issus nymph*

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# The Modern Things Lyrics

[Verse 1]
All the modern things
Like cars and such
Have always existed
They've just been waiting in a mountain
For the right moment
Listening to the irritating noises
Of dinosaurs and people
Dabbling outside

[Chorus 1]
Engin fylgist alveg
Sólin sekkur
Engin sér við mér

[Post-Chorus 1]
Það er sól þegar
Andar inn í mér
Hann bítur mig
Hann bítur mig
Já, hann kemur með
Fylgir eftir mér
Telur með
Siglir eftir mér

[Verse 2]
All the modern things
Have always existed
They've just been waiting
To come out
And multiply
And take over
It's their turn now

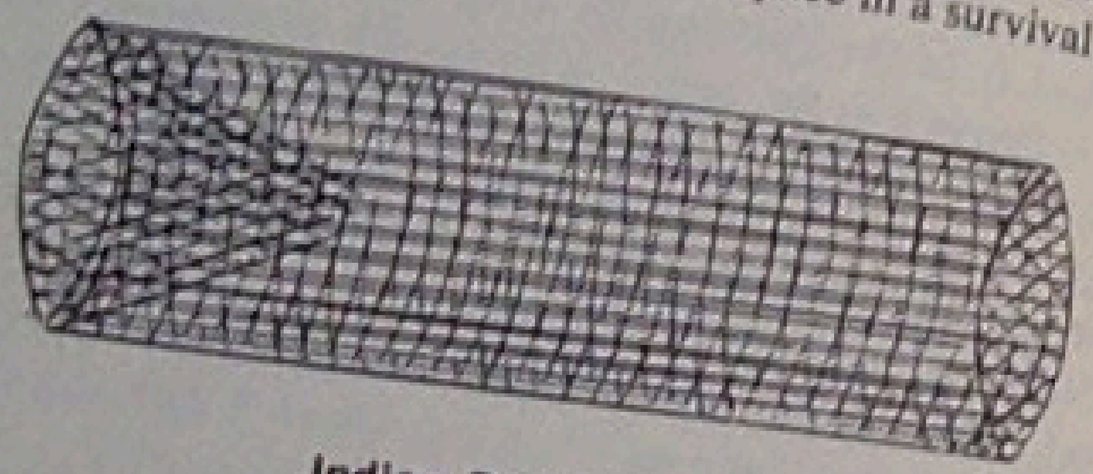
[Chorus 2]
Engin [?]
Engin [?]
[?]
Fylgir eftir mér

[Post-Chorus 2]
Hann bítur mig
Hann bítur mig
[?]
Hann kemur með
Fylgir eftir mér
Telur með
Siglir eftir mér
Kemur með
Fylgir eftir mér
Telur með

cannot get out again because they cannot find the small end of the funnel, which must be an inch or more above the floor of the trap. The trapped animals are removed from the trap through a slit made in the end or at one side of the trap, which is then wired shut. The Indians built these traps out of thin hardwood splints or withes, but wire is better because the trapped animal cannot gnaw its way out of the trap.

This trap can also be used for minnows, either to eat or to use as bait. The best bait for this trap is bread or grain, but grubs and crushed shellfish sometimes work well. Weight the trap so that it will not roll away and use a buoy on a line to mark its location. Remove the minnows by opening the slit.

Because this trap is easily made and can be used for fish as well as small animals, a sheet of rolled-up wire screening is a useful piece of survival equipment. It occupies but little space in a survival kit.



**Indian-Style Mousetrap**

## WEAPONS AND RUSES FOR TAKING BIRDS

The Indians often trapped and hunted birds such as eagles, turkeys, hawks, and the large woodpeckers to obtain feathers for decoration and for fletching arrows. The feathers of the turkey, turkey buzzard, and the various geese were used a great deal for fletching.

Small birds were seldom taken with bow and arrow, though some young hunters took them with very light, pronged spears or with arrows with blunt points that killed or stunned by impact. Boys of the Plains tribes were taught to snare birds with nooses made of horse-



hair. The small nooses were tied about six inches apart on a stick that was placed on the ground. Seeds or grain were scattered as bait. Some birds nearly always got their legs entangled in these snares, and the watching boys ran from cover to kill them before they could escape. The stick to which the nooses were tied acted as a drag.

### *Quail*

By studying the habits of quail, California Indians learned that the western forms of this game bird like to follow a low fence, natural hedge, or line of brush rather than fly over it. To trap the quail, they attached nooses made of fine thongs to bushes or branches at openings in the runways and also placed the nooses where the runways ended. Sometimes the Indians baited the ground near the nooses. From time to time, boys or women removed the birds caught in the snares, which were then reset.

### *Turkeys*

An odd, simple trap was used to catch the wary wild turkey. Two poles were driven into the ground about ten feet apart. A much lighter pole was tied between the two uprights about fourteen inches above the ground. The trap was then baited with grains of maize. Knowing the habits of the birds, the Indians knew the direction of their approach and scattered corn under the length of the pole and six to twelve inches beyond it. A few women and boys then hid nearby and stayed quiet. When the turkeys reached the trap and began feeding on the grain, they soon had to stretch their necks beneath the crossbar to reach the grain. A wild turkey does not seem to be able to withdraw its head from under a low horizontal pole. The hidden trappers rushed from their blind and snatched the self-trapped birds.

### *Geese*

Canada geese, snow geese, and blue geese were trapped in an equally simple way. A trench about eighteen feet long, eighteen inches deep, and fourteen inches wide was dug in the ground. Kernels of maize were sparingly scattered along the length of the trench, and the trench

trap was ready. The trappers took cover close to the trap. When the geese flew in, they began to eat the grain at the ends of the trench, then continued into the trench itself in search of more corn. When several geese were in the trench, the trappers rushed from cover and seized the birds. The geese could not fly away because they did not have enough room to spread their wings in the narrow trench.

### *Magpies*

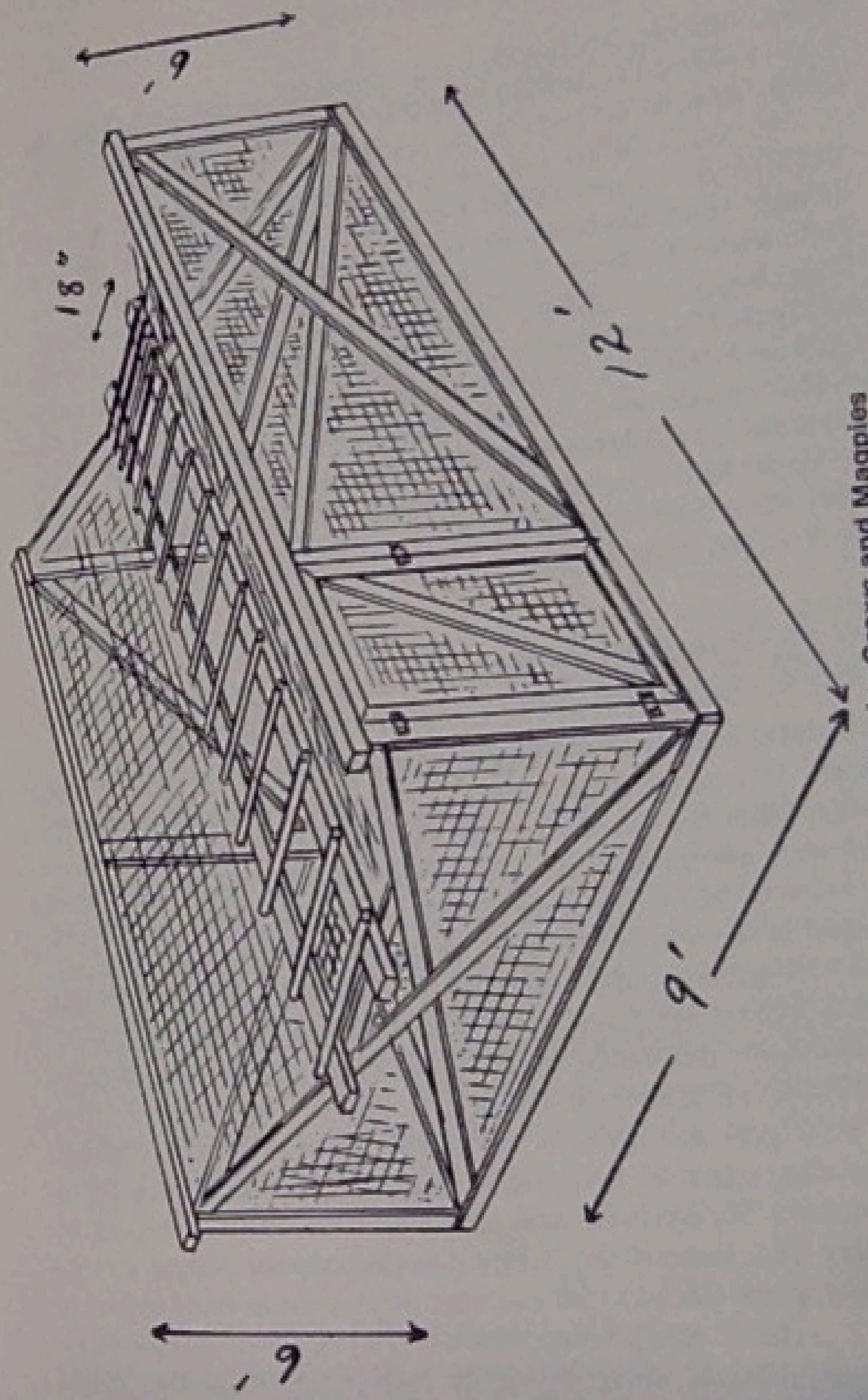
Boys and young men who needed magpie feathers for decoration asked help from the wind. The ungainly tail of a magpie is very awkward on gusty days. When shaken out of their roost in tall bushes or low trees during windy weather, the birds flew so erratically that they were easily caught by hand.

### *Crows*

It was a difficult feat to catch crows by hand, but it was done. The trappers hid in clumps of evergreens and covered themselves with branches to which tempting pieces of meat and fat were fastened with thin, strong thongs. When a crow landed on a baited branch, the bird was seized through the camouflaging branches. Crows came to these ambushes if the bait was used in an area where crows fed regularly; so calls were seldom used to bring them in. Magpies were also taken in this way. Some tribes in California flushed low-roosting crows at night and caught them in their confused flight by using fan-shaped nets.

Shown in the drawing is an effective live trap for crows and magpies. It could be used for other birds too. Though modern materials are used, it follows the general lines of several traps that were used by Indians. Trappers, farmers, and gun clubs have used this trap to advantage to eliminate the destructive birds.

This type of trap can be used to catch from ten to fifty or even more crows with one baiting, depending on the size of the trap. The trap is best made from old, weathered poles or saplings, carefully covered with 1½-inch, used wire mesh. It can also be made from finished lumber and new chicken wire, but it usually won't work well until the materials become weathered, since crows are alert, sus-




Trap for Crows and Magpies

picious birds which often shy away from shiny, unnatural-looking objects. A door or small hatch should be made in one end of the trap so that it can be baited and emptied easily.

A horizontal ladder runs along the entire top of the trap. It is attached to the open, V-shaped top of the trap and forms the open roof through which the crows enter. The rungs of the ladder should be about ten inches apart. Though the crows enter the trap without difficulty by dropping through the ladder, they are unable to climb or fly out again. The open wings of the birds will not pass through the small openings between the rungs in the ladder.

The frenzied cries of a few trapped crows will bring more to the trap, most of which join those already inside. Since the first birds will eat up the bait, it is a good idea to leave a few crows in the trap all the time, since their cries act as the most effective bait. Pieces of raw meat or corn are good baits.

### *Trojan Horse Techniques for Ambushing Waterfowl*

Woodland Indians caught waterfowl in a unique way. A round wicker basket was woven from withes. A thong was fastened across the basket about halfway between the top and the bottom. Two or three slits were cut through the sides of the basket as peepholes. Armed with a few thin thongs with nooses in their ends, the trapper submerged at the shore of the lake. He swam silently toward the waterfowl with the basket over his head and shoulders, held down and controlled with the horizontal thong. The taut thong inside the basket was tucked under the trapper's chin or held between his teeth when he needed the free use of both hands.

The trapper swam slowly and silently toward the birds. The unsuspecting waterfowl were seldom alarmed by the basket floating on the surface. The hidden trapper seized two birds, one in each hand, by the legs from underneath. The most skillful trappers slipped a thong noose over the feet of a bird and went on to noose as many as four or five. The end of each line was attached to a peg driven into the shore. They swam ashore, then, tugging the ends of the thongs, they pulled the struggling birds ashore.

Some tribes used hollowed-out pumpkins instead of baskets. When the birds were wary, the Indians often left several empty pumpkins floating on the stream or pond. When the waterfowl became used to seeing the pumpkins, the trapper could approach them easily with a hollow pumpkin over his head.



The Déné Indians of the Northwest trapped many kinds of waterfowl by snaring them with thin thong nooses pegged out in shallow water. The Carrier Indians caught waterfowl by disguising themselves. They wore a headdress made of the head, neck, and forebody of a swan or goose which covered the trapper's head but allowed him to breathe. The trappers swam out toward the birds with thong nooses. The end of each long thong was fastened securely to a peg driven into the shore. When these trappers reached the feeding geese, ducks, or other waterfowl, they slipped nooses over the legs of as many birds as they could reach without disturbing the others. When all nooses were used, the trappers swam ashore and pulled in the birds.

Experienced trappers knew countless ruses and often planned large-scale trapping of waterfowl. When a tribal group decided to trap a large number of ducks feeding on a lake, they made use of the counsel of an elder who was wise in trapping and had participated in many mass trappings.

After the elder had studied the wind, water, and the habits of the wildfowl on the lake, he directed the operation. Huge nets were mounted on long, strong poles and set up on two sides of a square or in the form of a crescent the night before the trap was to be used. In the early morning when the waterfowl were feeding close to the nets, beaters rushed from the opposite shore and waded or swam toward the birds. Sometimes, canoes were used. When the startled ducks and other waterfowl took off, they flew directly into the nets. This type of trapping depended on expert placement of the nets, position of the flocks, and perfect timing.

## TRAPS FOR SNAPPING TURTLES

When food was scarce, Indians hunted and trapped snapping turtles. Today, many people relish snapper cutlets and snapper soup. The common snapper sometimes weighs as much as 50 pounds. The alligator snapping turtle of the South often weighs as much as 100,

If space biomedicine does not take on a biopolitical concern with controlling generative life processes it also is not concerned with *end* of life processes. Astronaut life in space exists in a kind of biopolitical holding pattern with respect to birth and death,



since the astronaut body on a mission is more than a human life, it is an operationalized biological element within that mission environmental system. Astronaut death, then, is problematized not just as loss of human life but also as a systemic failure. Two longtime aerospace physicians I encountered stated that the human dimension of astronaut death in space is such problem for the agency that until recently development of crew escape technologies was considered programmatically "optional" and even as a possible "threat" to the image of human spaceflight system design as "safe." "There isn't even a body bag on the Space Station" one flight surgeon told me with undisguised disdain, shaking his head. In addition, an engineer who trained to participate in aerospace accident investigations recounted that the remains of humans in one Shuttle disaster were not immediately put into body bags or ambulances, but into shipping containers carried in the backs of unmarked trucks. If I may detour Foucault's description of how autopsies enabled "anatomopolitics" that abstracted life in terms of disease processes, the space biomedical acts described to me do not reveal but obscure "the dotted outline of the corpse"[27] on the body of the living astronaut. They foreground instead that body's abstracted equivalency with other damaged hardware or systems that are investigated as elements of a failed "mission environment."

talents, and skills, and political action is something that only they can do. Both models are instructive, and together they help us begin to discern the politics of vital materialism.

## The "Small Agency" of Worms

Darwin watched English worms: many, many of them for many, many hours. He watched how they moved, where they went, and what they did, and, most of all, he watched how they made topsoil or "vegetable mould": after digesting "earthly matter," they would deposit the castings at the mouth of their burrows, thus continually bringing to the surface a refined layer of vegetable mold. It is, writes Darwin, "a marvellous reflection that the whole of the . . . mould over any . . . expanse has passed, and will again pass, every few years through the bodies of worms."[1] But the claim with which Darwin ends his *Formation of Vegetable Mould through the Actions of Worms with Observations on Their Habits* (1881) is not about biology or agronomy but about history: "Worms have played a more important part in the history of the world than most persons would at first assume" (*Mould*, 305). How do worms make history? They make it by making vegetable mold, which makes possible "seedlings of all kinds," which makes possible an earth hospitable to humans, which

makes possible the cultural artifacts, rituals, plans, and endeavors of human history (*Mould*, 309). Worms also "make history" by preserving the artifacts that humans make: worms protect "for an indefinitely long period every object, not liable to decay, which is dropped on the surface of the land, by burying it beneath their castings," a service for which "archaeologists ought to be grateful to worms" (*Mould*, 308).

Darwin claims that worms inaugurate human culture and then, working alongside people and their endeavors, help preserve what people and worms together have made. Darwin does not claim that worms intend to have this effect so beneficial to humankind, or that any divine intention is at work through them. Rather, that the exertions of worms contribute to human history and culture is the unplanned result of worms acting in conjunction and competition with other (biological, bacterial, chemical, human) agents. Darwin describes the activities of worms as one of many "small agencies" whose "accumulated effects" turn out to be quite big.[2] It would be consistent with Darwin to say that worms participate in heterogeneous assemblages in which agency has no single locus, no mastermind, but is distributed across a swarm of various and variegated vibrant materialities.[3]

Worms do not intend to enable human culture, but worms do, according to Darwin, pursue what appear to be prospective endeavors. His close observations of worms led him to conclude that worm actions are *not* the result of "an unvarying inherited impulse" (*Mould*, 64–65), but are intelligent improvisations. For example, in "plugging up the mouths of their burrows" with leaves, worms "act in nearly the same manner as would a man"—that is, they make apparently free, or at least unpredictable, decisions based on the available materials. Though they usually seize leaves (to be dragged to their burrows) by their pointed ends, "they do not act in the same unvarying manner in all cases," but adjust their technique to the particular situation and its set of possibilities: Which leaves are available? Is the ground wet or dry? What other creatures are around? (*Mould*, 312). Further evidence of a certain freedom to their acts is the phenomenon of a worm *overriding* a normal physiological response, as when a worm fails to recoil and retreat to its burrow when exposed to a bright light. Darwin notes that this overruling occurs when a worm is focused closely on a task, such as eating, dragging leaves, or mating:



> When a worm is suddenly illuminated and dashes like a rabbit into its burrow . . . we are at first led to look at the action as a reflex one. The irritation of the cerebral ganglia appears to cause certain muscles to contract in an inevitable manner, independently of the will or consciousness . . . , as if it were an automaton. But [this is contested by] . . . the fact that a worm when in any way employed and in the intervals of such employment, whatever set of muscles and ganglia may then have been brought into play, is often regardless of light. . . . With the higher animals, when close attention to some object leads to the disregard of the impressions which other objects must be producing on them, we attribute this to their attention being then absorbed; and attention implies the presence of a mind. (*Mould*, 23–24)

Darwin's worms pay attention, and they respond appropriately to unprecedented situations, displaying what Hans Driesch called the power of "individual correspondence." Their actions are neither an expression of divine purpose nor reducible to an unvarying mechanical instinct. Let us call the assemblage in which these wiggling actants participate not (as in Baruch Spinoza) God or Nature, but History or Nature, or, to be more precise, British History or England's Nature. This assemblage is an ecology in the sense that it is an interconnected series of parts, but it is not a fixed order of parts, for the order is always being reworked in accordance with a certain "freedom of choice" exercised by its actants.

In *Pandora's Hope*, Latour tells a story about Amazonian rather than English worms, and again we see that worms play a more important part in the history of (that part of) the world than most persons would at first suppose. The story begins with the puzzling presence, about ten meters into the rainforest, of trees typical only of the savanna. The soil under these trees is "more clayey than the savanna but less so than the forest." How was the border between savanna and forest breached? Did "the forest cast its own soil before it to create conditions favorable to its expansion," or is the savanna "degrading the woodland humus as it prepares to invade the forest"?[4] This question presumes a kind of vegetal agency in a natural system understood not as a mechanical order of fixed laws but as the scene of not-fully-predictable encounters between multiple kinds of actants. Savanna vegetation, forest trees, soil, soil microorganisms, and humans native and exotic to the rainforest are all responding, in real time and without predetermined outcome, to each other and to the collective force of the shifting configurations that form

The task at hand for humans is to find a more horizontal representation of the relation between human and nonhuman actants in order to be more faithful to the style of action pursued by each.

Latour and the scientists he is observing eventually conclude that, for reasons unknown to the humans, worms had gathered at the border and produced a lot of aluminum, which transformed the silica of the sandy soil into the clay more amenable to forest trees, and so it was the forest that was advancing into the savanna.[5] It is difficult to pinpoint just who or what was the key operator or "assemblage converter" here:[6] The worms? Their diet? The aluminum excrement? Had the human inhabitants of the rainforest done something to make the worms migrate? These various materialities do not exercise exactly the same kind of agency, but neither is it easy to arrange them into a hierarchy, for in some times and places, the "small agency" of the lowly worm makes more of a difference than the grand agency of humans.

We consider it a political act, for example, when people distribute themselves into racially and economically segregated neighborhoods, even if, in doing so, they are following a cultural trend and do not explicitly intend, endorse, or even consider the impact of their movements on, say, municipal finances, crime rates, or transportation policy. There are many affinities between the act of persons dragging their belongings to their new homes in the suburbs and the acts of worms dragging leaves to their burrows or migrating to a savanna-forest border.

*change in color with viewing angle."*[3] This is what is meant by the claim that iridescence *is* only insofar as it is seen.

*Iridescence is a phenomenon that has been formally recognized since as early as classical antiquity, as evinced by poikilos*, a secular Greek word used to refer to dappled coloring, such as the skin of a leopard or the many-colored, indeed iridescent, scales of a snake. And throughout history, this phenomenon has recurrently caught the attention of the likes of Newton and Darwin.[4] But it is only recently that concerted, systematic efforts—across various fields—have been made to study this phenomenon. But here we are not so much interested in the scientific history of iridescence, but rather in gleaning from these observations new dimensions of this puzzling, dazzling, seemingly superficial play of light and color.

Just as much as iridescence scintillatingly seduces, this shine is also its cunning. It is precisely this element of iridescence that won it a place alongside *métis*, that classical notion of the especially (most) cunning form of cleverness:

> This many-coloured sheen or complex of appearances produces an effect of iridescence, shimmering, an interplay of reflections which the Greeks perceived as the ceaseless vibrations of light. In this sense, what is *poikilos*, many-coloured, is close to what is *aioios*, which refers to fast movement. Thus it is that the changing surface of liver which is sometimes propitious and sometimes the reverse is called *poikilos* just as are good fortune which is so inconstant and changing and also the deity which endlessly guides the destinies of men from one side to the other, first in one direction and then in the other. Plato associates what is *poikilos* with what is never the same as itself.[5]



Detienne and Vernant also point out, for instance, that Aesop "remarks in a fable that if the panther has a mottled skin, the fox, for its part, has a mind which is *poikilos*."[6] What is being discussed here is basically the phenomenon of camouflage. Indeed, iridescence—as a phenomenon in animalia—*is* a form of camouflage.

Consider iridophores, a class of color-producing cells that are found in a wide variety of animals, from crustaceans to bacteria.[7] Sometimes they are akin to a luminescent accident happening at or just beyond the final layer of skin, fur, chitin—whatever that external-most layer might be. Consider the particular iridophores we find in the species of squid *Lolliguncula brevis*; here, iridophores are produced from within the flesh of the animal. Embedded within the flesh of this specific squid, but also found in similar instances throughout the animal kingdom, iridescence is always a marker of this interior-exterior negotiation. It is a kind of sign, secreted from within the being of the animal, working its way toward the external world.

Iridescence, then, as a particularly scintillating instantiation of camouflage, literally dazzling the potential predator, is a demonstration of a particular interior-exterior negotiation that ultimately results in a suspension of the appearance-reality distinction. The specific crypsis that is camouflage is so interesting because it is a rehearsal of the problem of the relationship between reality and appearance. It is the case when, indeed, this distinction appears to be suspended. In fact, it is imperative that this strict distinction somehow dissipates; otherwise, camouflage fails and the

organism dies. The cunning of iridescence, however, goes beyond its deployment as an undermining of the apparent rigidity of the animal integument. Precisely as a mechanism of decomposing the mediums of vision, iridescence seems to mark the site where a surface begins to emerge, where a surface surfaces.

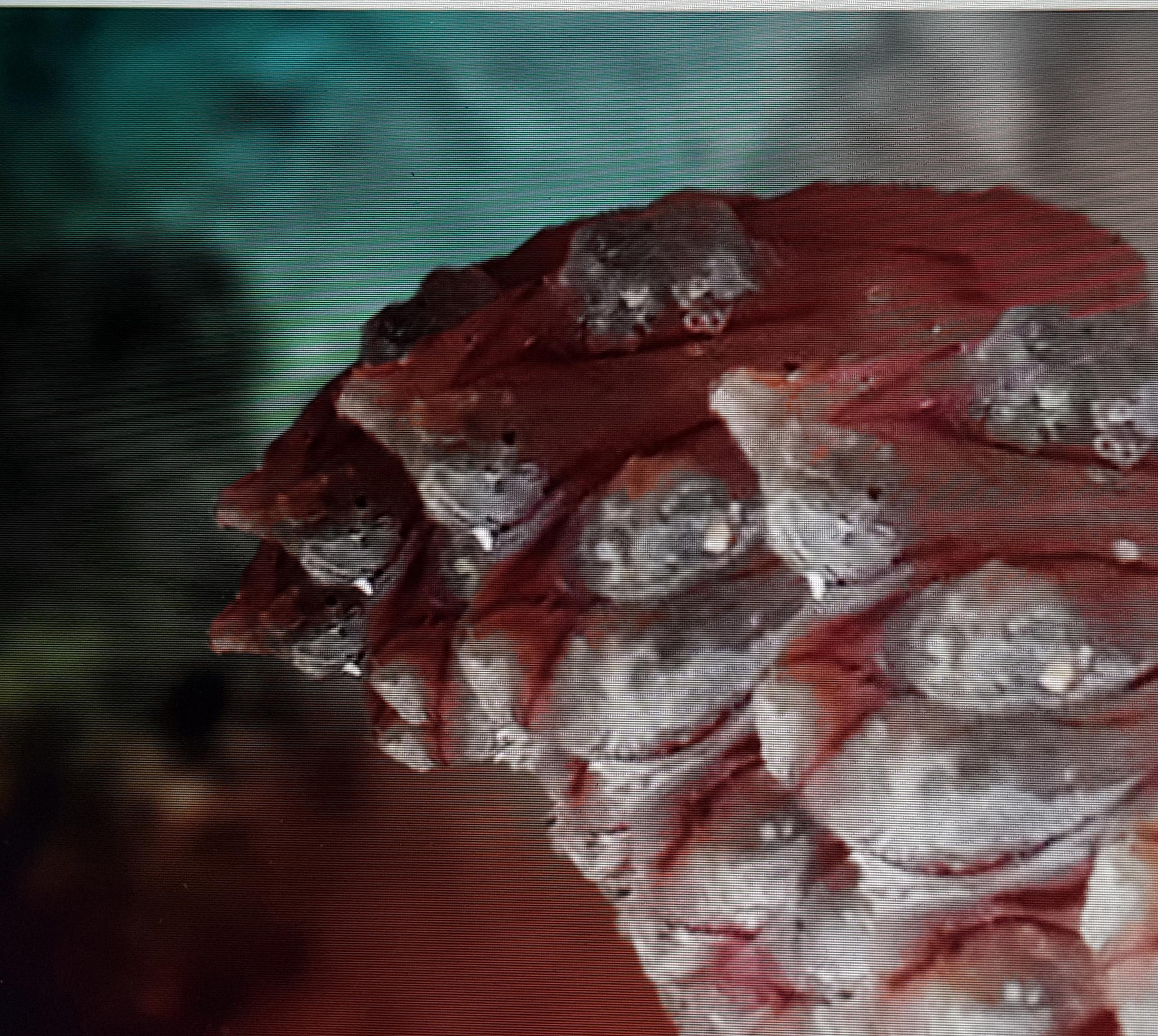


To witness iridescence is to encounter a phenomenon where the axis of reality is perhaps no longer the mundanely given but rather one that is shifted toward a heterotopic convergence of images with different degrees of reality, cohering into a single image: the apparent—the really apparent and apparently real—of the perceived shine. This is not an epistemological valorization of the purely experiential at the cost of all other possible perspectives of considering the apparent phenomenon at hand; but nor is it an argument to enhance the understanding of that peculiarly puzzling and seductive phenomenon that is visible, for instance, in the animal kingdom. Iridescence, as Denkfigur, allows us to constellate a conception of the surface precisely not as boundary, but as a scintillating site of intractable multiplicities. Iridescence, then, appears as a Denkfigur for surfaces surfacing.

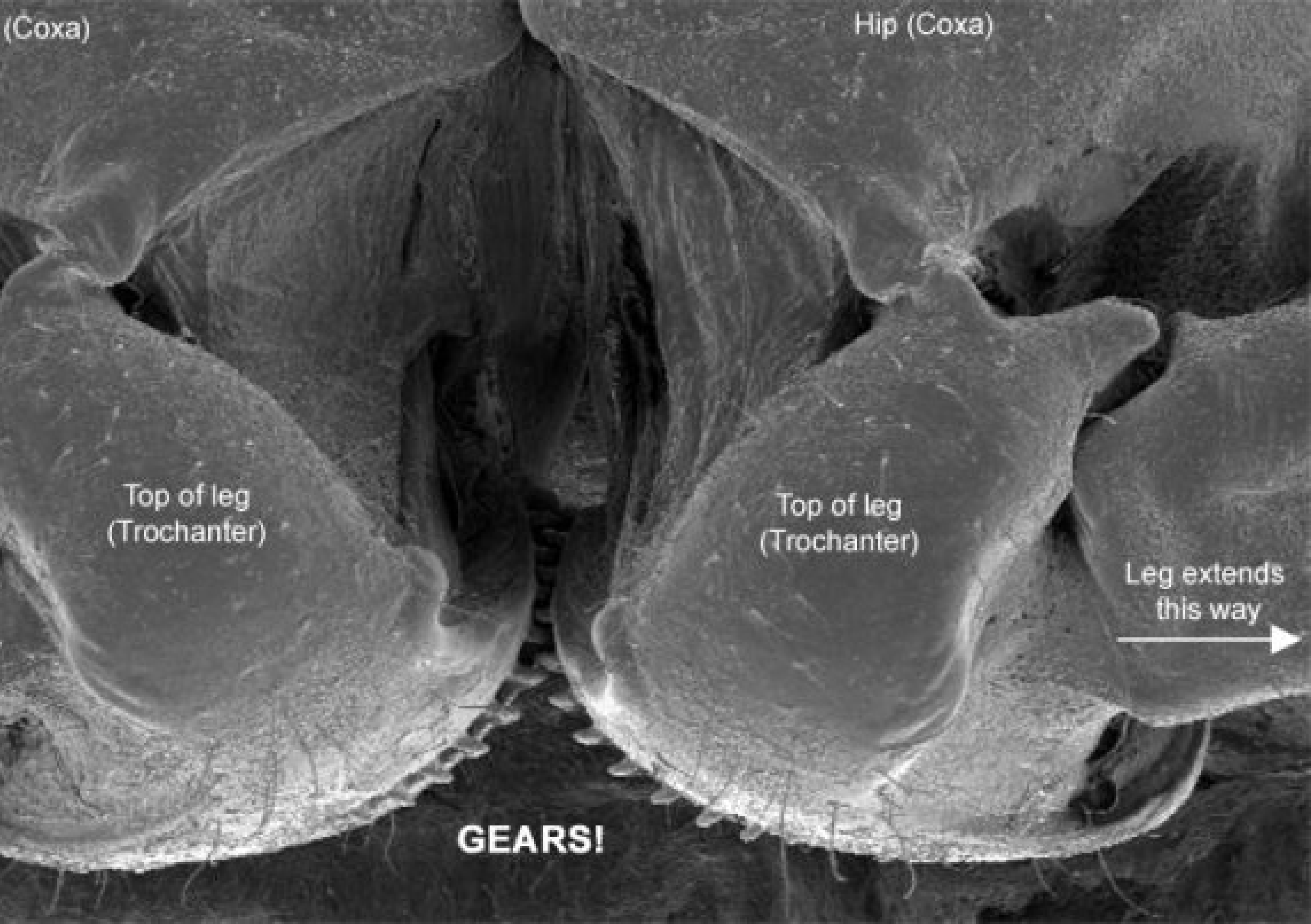


## 2. Screening the Surface

Though a strict taxonomy might suggest that the screen is a mere instantiation of
ce, let us consider the surface as screen. In
, it will become clear that the constella
ities, which occurs at the site of the
recisely rehearsal of the reality proble
art of t surface. Of course many of th
rations screen that I have in mind d
ne scre plain sense of a screen for




but it is a way of thinking in its own right.


(Coxa)
Hip (Coxa)
Top of leg
(Trochanter)
Top of leg
(Trochanter)
Leg extends
this way
GEARS!