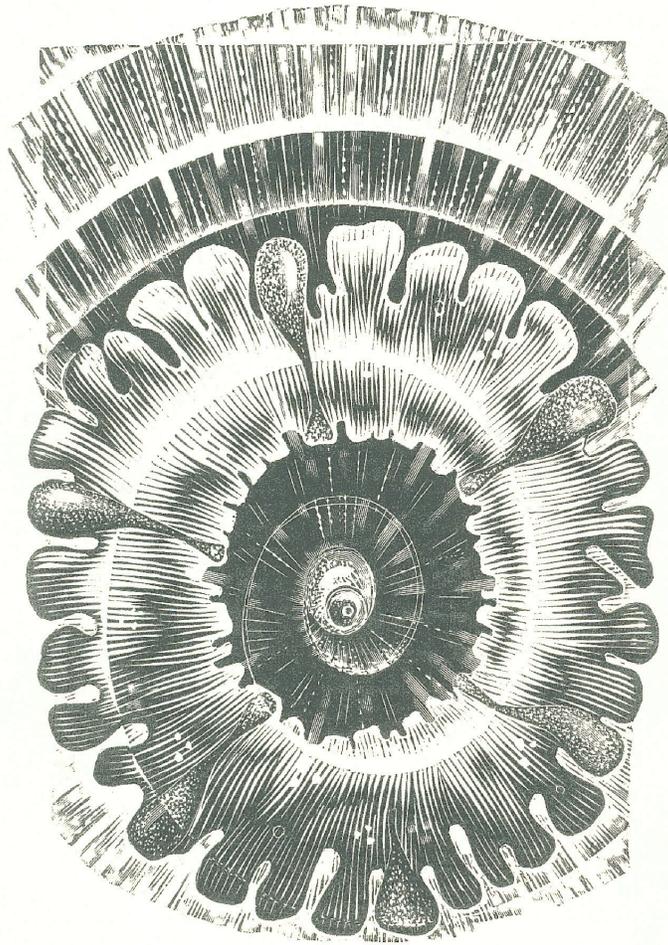


# Corona Radiata



Alice Major

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*For my mother*  
*Mary McMillan Matheson*

***Ex Ova Omnia***

— *frontispiece to William Harvey's book on embryology, 1651*

The development of a child in the womb is a series of journeys —  
of journeys within journeys.

Voyages to chart a new world. Travels in time. Searches in the maze.

The pilgrim's chosen route to a known destination.  
The nomad path of random branchings.

The great migrations of the species  
repeated by the individual.

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## 1. *Corona radiata*

### *Ships*

Ova mundi, world of an egg, radiant  
pearl launched on the engulfing stream

towards the womb. She is skirted  
in embroidered net, virgin queen for whom

her courtiers lay down their cloaks.  
She is a globe of filigree, a wonder.

The mouth of the river swells to the sea.  
The attendant jostle of small boats

gives way before the barque. Signals ripple out  
a silent semaphore. Cells begin

their courtly, kaleidoscope pavane —  
divide like sails unfolding in the wind.

## *Maps*

That first disk of cells, held in place  
like a map clamped to a table.  
Fate maps, coded cartography of coasts,  
unroll their silent directions.

*This to become bone.*

*This to become brain.*

And the disk curls into a little boat,  
into a tube – like the topography of origami  
pleating from two dimensions into three.

Maps have a history, an evolution.  
What was peninsula on ancient charts  
becomes island. Small continents swell,  
large extrusions dwindle. Until it emerges —  
the familiar shape of a world.

And so a fetus changes. Pharyngeal arches shrink  
to the delicate bones of the face. Limb buds lengthen  
from rounded paddles to extensive isthmuses.

As though a child's unfolding  
is less a tale of growth  
than of discovery.

## *Monsters*

The shiny pages of the textbook  
on medical embryology, atlas of teratology —  
a tale of wonders.

*In this place, dwell monsters.*

The horrible and fascinating  
glimpsed through fingers.

Lower limbs entwined in mermaid tails.  
A one-eyed cyclops.  
A mummified twin dangling like a puppet  
from a larger fetus. Faces cloven  
with harelip, harlequined with keratin.  
*Anthropophagi and men whose heads  
do grow beneath their shoulders.*

These are the creatures drawn in margins,  
inhabitants of lands that lie beyond  
Saint Brendan's Isle – the whale that floats  
so long upon the surface of the sea  
trees and bushes grow upon its back.

A wonder  
that, from this voyage of discovery,  
we bring back a human child at all.

## ***Fish***

Little boat, little curved fish —  
minnow, penis-slippery,  
one among the teeming myriad,  
a net shimmering with promise.

To dream of fish — a sign  
that bairns will be born to the family.  
Charm against barrenness — eat  
a fish found within a fish.

Sephardic marriage custom – the bridegroom buys  
a large carp in the market, puts it in a copper tub  
before his bride. Over it she jumps, three times three,  
her light feet applauded by the women.  
*May you be blessed by as many children  
as the fish of the sea.*

When the bride began this voyage,  
travelling to her own mother's womb,  
her children already travelled with her — a cargo  
of small fish caught in a silk mesh.

### *Fates*

And tucked in the egg, not birth alone,  
but death: the fates, the three weird sisters —  
tiny and measured, with their scissors.

In every chromosome, the spiral end  
secured – a minute twist tie  
holds the helix in place. Its length  
spun in that first cell and snipped  
a little shorter with each division down  
the years to come. Until there is nothing  
left to cut and all unravels and the cells  
dissolve.

The fates make this promise to the earth,  
which lies below all seas:

*this child will come to join the spiralled cord  
her people buried at her birth —  
their pledge she will return to you, their plea  
you will not claim her sooner than you must.*

The fates inscribe a covenant and map  
to bring the ship back home.

## 2. Gender

### *Letter*

Criss-crossing chromosomes shape  
letters — knotted X  
tiny, intent Y.

Unknowns in an equation.

Let  $x$  be ... breasts, pudenda, ovary.

Let  $y$  be ... beard, penis, sperm.

A word hoard, vocabulary of divergence,

of cleavage.

*The bittie the axe fell on*

say Scots peasants of the girl-child's genitals.

To conceive a daughter, sleep

with an axe under the bed.

To conceive a son, lie below a greenwood tree.

*It couldn'a be but a boy.*

*It was got amang the green grass*

*by a man wi' his boots on.*

To breed a daughter, sleep

on the left side. To conceive a son

sleep on the right.

The sperm cell struggles through

its arithmetical dark

towards solution.

*Line*

Primal plate of cells. Blank plane,  
a world in waiting.

A streak forms, a line. In this axis of reflection,  
the embryo's two halves will contemplate  
each other, mirror images.  
A prime meridian defining hemispheres.

Journey to the east — to the sloe-eyed deserts,  
silk roads, curved dunes, undulation of caravans.  
Journey to the west — deep-voiced wind  
in the sea's sails, prow-thrust, surge of the whale's road.

Follow the world's great circles  
until east becomes west becomes east again  
on a seamless globe. At the back of beyond  
paths meet, cross, braid their way back home.

### *Cord*

The first task is to lay down anchor lines,  
knit the placenta's web of nourishment,  
spin the cord. Like a spider  
pulling a path out of itself.

This motherly link is the male's task,  
its code written in the firm, short strokes of the letter y.  
Without it, the umbilicus would wither,  
snapped gossamer, a spell  
gone awry.

The cord thickens, lengthens, twists  
around itself, a braid of veins, barrier  
and bond. This mesh of masculinity  
that nourishes but will sometimes  
turn against itself, amputate a limb,  
grasp a throat.

***Knot***

*X* and *Y* write one simple edict:  
a testis will develop  
or not.

Then hormones instruct tissue  
to form tunnels, cavities,  
to fold into scrotum or labia — shy protrusions  
that define the great division, the first question  
gaspd in the birthroom.

Then the blanket will be drawn down tight,  
secured with a bow. Inescapable pink or blue.

### *Garden*

But shift a gene here, inform an organ there  
with androgens — and female shades into male.  
The translations are intricate,  
hermaphroditic. The divide simply

a line on the page, a border of hyssop  
in a knot garden. Gender a geometric pattern  
penned in low hedges of perfumed sage  
or myrtle. Its lines in-fold, enclose  
beds tinted by familiar, old-world flowers —  
demure primrose, rainbow iris.

But also painted in the bold blossoms of exotica —  
spiderwort, sunflower, marvel-of-Peru —  
outlandish flowers brought home from across oceans.  
White roots shipped in dark holds  
to grow in gardens where patterns  
bend into one another, explore themselves.

### 3. Heart

#### *Mammal*

The heart makes a journey through time.

Begins when the old amoebae drift  
of nutrients from cell to cell  
will suffice no longer.

First  
a fish's heart — a tube of knuckled coral,  
ancient, Paleozoic invention.

Bends  
into a horseshoe, becomes  
amphibian, Devonian, double-chambered  
like the frog's croak.

Contorts,  
squeezes, divides again  
into a snake's heart. Three rooms —  
two atria to collect, one large cavity  
to force out.

One last division  
— another phylum forms,  
four chambers now. Symmetric.  
A pump for warm blood.

The little mammal curls in her nest,  
blind shrew with clever paws.  
She has travelled through  
five hundred million years.

### *Territory*

First, the staking of territory,  
the placenta's disk mapped  
on the fertile, irrigated plain.

The hunter tribe of wandering cells  
puts down roots into the womb,  
breaks down its blood vessels.  
Capillaries dip slim fingers  
into small, subterranean pools,  
suck nourishment up into the thick stalk  
of the umbilicus.

Never so close to the mother again  
— separated by the sheerest membrane  
from maternal earth. Cultivation  
of this particular plot of land  
is the new heart's sovereign task.  
It enacts ceremonies of fertility,  
the ritual exchange of blood for harvest,  
to make seed fruit.

## *City*

The heart has many entrances and exits.

Gates in a walled city. Under its arches  
thoroughfares bustle with the mingled  
breath of travellers and freight from distant ports.  
The great, fluid flux of constant motion.

The *vena cava*, veins of the heart, draining in.  
Aorta, open portal pumping out.

And, like a side door,  
the coronary artery branches off and bends  
back into a maze of alleys that hug the city walls,  
where a thousand unobtrusive doorways infiltrate,  
allow secret entry.

Cities the most public,  
the most private spaces.

## *Space*

The heart prepares to leap forward,  
to tear itself away.

In the gaping moment after birth  
all its pathways will be wrenched, re-routed.  
Umbilical circuits will clamp shut.  
Lungs will heave and all their vessels  
clamour for blood. Under their pressure  
the septa's flap will squeeze shut,  
final separation of the chambers.

And the child is launched into isolation,  
to become a self sustaining body —  
a blue planet assuming its orbit  
in a black sky.

But the heart does not know where it will find itself.

Its repeated beat, its insistent rhythms  
are chaotic, evolve like weather systems  
or the drift of galaxies or a spinning moon  
to incalculable ends.

#### 4. Hand

##### *Shell*

A ridge thickens, pushes purposefully.  
The loose mass of cells behind the edge  
organizes itself into cartilage.  
The hand emerges, translucent —

a grooved fan, diminutive scallop shell,  
emblem of the pilgrim who makes her way  
from foreign parts towards a destination  
known and yet mysterious.

Four stitched lines where fingers  
will separate. A web between them  
stretches and dissolves, sculpted  
by cells' self-sacrifice

until each hinged digit becomes individual,  
patterned with the unique hieroglyph of fingerprint,  
yet joined in the common foundation  
of palm.

Canterbury, Mecca, Lac Ste. Anne.  
Places of arrival. Places to be grasped.

The pilgrim in her sanctum twists,  
flexes fingers, busies herself  
with the cord that is both staff and scrip.  
In this swelling world  
of bread and holy water, she makes devotions.

## *Tool*

It becomes a contrivance of levers and pulleys.

The hand's twenty-seven bones – carpals,  
phalanges – all precisely curved and fitted  
as a tool-and-die cutter's work.

The wrist's eight bones fit  
into the forearm's shallow socket.  
Muscles that move fingers are fixed  
at a distance. Remote control.  
Flexors to bend. Extensors to straighten.

Limited range of motion — mechanistic  
device, obedient  
to the decrees of cause and effect,  
the pre-determined order of the world.

*Homo habilis*, tool-maker  
made through her tools. Hand and brain  
evolved together, a tight loop  
opening out

so that this first tool will grapple constantly  
with freedom. It will select. Hold  
brush, pen, chisel. Determine  
to construct a singular thing  
from the infinite range of possibility

as the palmer chooses.

*Anchor*

The new hand trails through fluid,  
senses the amnion's smooth swathe,  
the placenta's sponge, the tough turn  
of umbilicus. Touches  
the thin new skin of eyelid, lip.

Touch knitted into the first threads of thought.  
The first sense and the last,  
the mind's deep anchor,  
a faith in the tangible world.

## 5. Ear

### *Labyrinth*

The head of the monster  
is tiny, horrifying, not yet human. Buckled  
and cleft, eyeless, ruptured  
by the slash of mouth and nostrils.

In this landscape, two pits dig themselves,  
build walls according to an ancient, arcane plan  
of quest and initiation. Cochlea burrows into bone  
two turns and a half — spiral labyrinth of dance and balance.

Hair cells form along its curling avenue,  
wait for the click of ossicles, hammer on anvil, stirrup  
knocking. Bones brought from the jaws  
of lizard ancestors.

The cells wait like priests at a door  
where a small window peers on the outer world.  
They usher sound silently to the nerves' spun thread,  
the seeker's path to the centre.

The child turns in the maze of first sounds —  
rushing wind, low booms like the bellowing  
of a distant, lonely beast.

***Drum***

Fetus swings in the stretched hammock  
to the steady beat of her mother,  
the heart's double rhythm.  
*Push - lock. Push - lock.*

Insistent,  
a drum calling spirits  
into the womb.  
A drum calling gods  
into the pitched tent.  
*Come — stay.*  
*Come — stay.*

The new ear – delicate web  
over hollow cell – waits to be filled.  
It moves with the breath of ghosts,  
catches motions slighter  
than the shiver of an atom.

## *Music*

Sleek creature living between two worlds,  
air and water. Tiny dolphin, turning  
at the surface, the dividing plane.

Water music, whale song, sea of sound,  
pitch slips continuously, fluid  
as currents in an ocean.

While earth music is chopped  
into notes, divided, tempered, quantized.  
The earth ear loses its acuity —  
lumps sounds together.

But what lies between the steps on a scale?  
What notes become inaudible,  
indiscriminate, when the sea creature  
is brought to land?

Place a shell to the ear,  
and hear – not sea – but the surges  
of the body itself, its hidden notes  
and sighings, the lost chords.

## *Organ*

The ear is the organ of time, sorting sounds  
into the measure of word — sounds that trip so quickly  
we should not have the power  
to give word meaning. The ear discriminates  
notes bound together in a chord,  
hears both the whole and parts.

Old Pythagoras, with his numbers and scaled notes,  
his arithmetic of parts and wholes,  
believed in *musica humana* —  
continuous, unheard, arising from the resonance  
of soul and body.

But where in this squirming larva  
can a soul enter? In what vanishingly  
small gaps can spirit breathe?

Another puzzle for the monkish theologians:  
how can angels sing in heaven? If God resides  
in transcendental timelessness, there is no room  
for music, whose essence is the passing  
and beating of time.

Where else to tuck a soul but in the centre  
of this labyrinth, on the shore  
of the remnant sea that fills the inner ear,  
where time resonates in the silent passage  
of eternity.

## 6. Spine

### *Boot*

It begins as a buttoned boot.  
Parallel rows of diminutive bones-to-be  
fasten the closure of a bent tube.  
Nerves will lace it, circuits crossing and recrossing.

The fetus floats weightless  
but her spine is shaping itself for gravity  
Its line will elaborate — bent bow, then  
double curve. Resilience for a world where weight  
snaps straighter columns too easily.

Adaptations for the animal who walks upright,  
places one foot deliberately before the other,  
walks out of the wilderness.

## *Highway*

The vertebrae lock in place like paving stones,  
engineer a smooth, broad road for communication.

This is the high road of empire, restlessly crowded with messengers  
bearing directives, gatherers of information,  
legionaries and spies.

Tributaries flow in from distant provinces,  
hand, foot, gut. From skin's layered plains,  
from deep jungles and outposts.

The minutiae of governance —  
territories charted. Governors appointed.  
Milestones to measure distance. Aqueducts  
to span valleys on their elegant arches.

The roadmakers cast their imperial line  
across the map. A spine whose stone remnants will be traced  
long after government has crumbled.

## *Capital*

The spinal column opens into ventricles, canals,  
public spaces. Here there is great activity,  
walls rising, carpentry enclosing  
palaces, scriptoria, markets

where merchants will unload their beasts,  
hand over their sealed envelopes,  
and rest a brief time before returning,  
refreshed by figs and almonds.

Or hurry in panting, crying *Danger*  
as wax melts from hasty scrolls.

Encrypted messages are passed to officials  
trained in puzzling out significance.  
They peruse the signals, consider  
their import for empire, file them  
in elaborate, shifting patterns.

Somewhere in this capital the head of states  
will take up residence.

## ***Dominion***

Under the walls of the capital  
lies a garden enclosed. Here grows the tree of knowledge,  
from which the child will learn and remember  
good and evil. Love and fear.

*I had a little nut tree,  
nothing would it bear  
but a silver nutmeg  
and a golden pear ...*

Amygdala. The brain's almond  
grows like a nut on a branch, bearing the hard kernel  
of pain and the pleasant fruit of peace  
bounded in its shell.

A gift from fairy tale —  
the object with the power to tell the princess  
who is false and who is true, to help her rule  
her intricate dominion.

## 7. Lungs

### *Tent*

The lung begins as a tent pitched,  
a small fold of canvas pinched from the gut,  
its seams stitched down.

It will be lashed in place with cord.  
Its walls will shake with the wind,  
a dwelling for the transitory  
breath.

### ***Branches***

Two buds on a stalk. The lungs grow  
as a tree grows into air, its leaves arranged  
to capture sunlight.

Tiniest of saplings. The buds branch  
again — two lobes on the right side,  
three lobes on the left. The lungs  
will hang in lop-sided balance  
like a wind chime suspended  
between earth and air.

Divide again, again . . . doubling, doubling  
*trunk to branch to twig*  
*bronchus, bronchiole, alveoli . . .*  
Fractal symmetries repeat  
from one scale to the next, fitting infinity  
into a finite body. In apparent randomness,  
a secret structure.

Capillaries grow into the lungs' leaf-thin lining,  
an interface of blood and air.  
Sky and branches wandering  
into one another.

### *Forest*

The lungs grow dense and three-dimensional,  
a sponge to mop up oxygen, a market  
for the chance exchange of molecules —  
economy of minute transactions, trade routes  
where roving merchants barter raw material  
for compound ores.

Laden caravans labour along veins  
so narrow that blood cells must pass singly,  
pannied donkeys picking their way  
along secret tracks that branch and fork  
like lines on a gypsy palm  
crossed with silver.

The child sets out along the forest paths  
to make her fortune.

***Ransom***

Lungs must be sturdy, self sufficient,  
able to sustain themselves against the forces  
that would imprison them.

The fetus prepares. Practices  
all the motions of breath. Systematic.  
Chest muscles. Diaphragm. In. Out.

Breathes water. Fluid slips easily  
through passages preparing for the  
harder world of air.

Her lungs will retain a remnant of their mermaid past  
after the child is fished, gasping, from the water.  
A lining of sea will remain, a seal of fluid  
to keep the sacs buoyant.

She will linger on shore like the seal-maiden  
whose skin is kept hidden from her —  
able to breathe on land but longing for her own sleek people  
who roam their sea ways and call her home.

## ***Road***

The child waits for diaspora —  
the day when she will be pushed out  
from behind and drawn on by rumours  
of a kinder land. Her breath will rush out  
in front of her.

*A child who eats the bread of gypsies  
learns sooner to speak.*

Of course. For the mouth gives no fixed address.  
Shapeshifter, it makes sounds from exhalation.  
*The wind blows where it listeth*  
over the strings of plaintive violins in open air.

Breath will blow her into the world. The gypsies say  
*The road that brings you is  
the road that takes you away.*

## 8. Eye

### *Cave*

It is dark. A cup forms, flaring  
at the end of a long stalk.  
In its round grasp, a globe,  
a scrying glass, a speculum  
in which visions will emerge.

The four-month fetus squirms away  
from strong light on its mother's stomach.  
Lids close down, sealing  
the primordial eye.

Iris: pigmented to deepen darkness.  
Muscle to hold the ball in place, an instrument  
of navigation revolving in its stand.  
Retina: tunic of cobwebs, projection screen  
turned inside out, receptor cells  
buried below a web of blood vessels.

Optic nerve a tunnel to the darker caves  
beyond, where ways cross, diverge,  
map themselves on striated surfaces —  
ancient layers of the brain canted at angles  
like mirrors in a well, placed to catch light.

## *Fire*

In the seventh month, eyelids open  
on a red glow, firelight warming a cave.

On the walls, shadows —  
like ancient paintings of beasts  
outlined in black and rust.  
Patterns laid down even before learning.  
Foreshadowings, as the shape of 'hawk'  
is mapped in a duckling's brain before  
any real hawk darkens its sky.

The vital task of recognizing symmetry —  
an enemy advancing, a mate's desirability.  
These borders of love or fear drawn long before  
experience fills in the details.

*Aphrodite shaped the human eye and kindled it  
at the hearth fire of the universe.  
The eye a lantern, sending its gleam onto the world,  
to make sight possible.*

The child will construct vision  
from shapes her brain already knows,  
from the shadows it casts on light.

### *Invention*

Light bathes the world, a seamless, colourless,  
nonsensical array of wavelengths, until  
colour is made in the mind — receptors tuning in  
to frequencies.

The fetus starts  
at one end of the spectrum, peers  
through the web of blood vessels, cloudy with smoke, invents  
red. Tiny Prometheus, stealing the colour of fire.  
She travels further on the rainbow, picks out  
green. Leaps to violet. From the interplay  
of these three elements, she will make up

lime and turquoise. Azure, coal and sapphire.  
Amber and vermilion. The million hues that she  
does not yet know she'll need. Like Newton,  
inventing 'indigo' to fill his mystic spectrum,  
she will create her colours, making them out  
of light — a new Eve naming  
the beautiful beasts of Paradise.

*Prism*

Sight is a glimpse through a narrow window  
in the wide band of wavelengths. A white beam  
passes through a slit, opens into colour like a fan.

The child waits in her cloudy sac,  
in a cave shrinking. The future is a blur,  
something she cannot get far enough away from  
to see.

She is a still a simple, single beam. Soon she will pass  
through a slender channel and refract  
in dazzling variety.

Her face will turn to the sun rising.  
Lashes will make a rim of rainbow  
for a small, brave, privileged animal  
peering from its den through iridescent underbrush,  
reflecting on newborn light.

## 9. Head

### *Plates*

The plates of the skull rise, coalesce  
out of substrata, move into place  
like continents crusting a globe.

Fontanelles and sutures draw a map —  
rift valleys defining ancient land masses.  
Continents formed and reformed through eons,  
where species move in vast patterns,  
and a single animal travels the great circles  
laid down by her kind.

Caribou herds shaking tundra with their hooves.  
Whales singing. Salmon rounding an ocean  
with their lives.

## *Plains*

Neurons pull themselves into place  
with the dumb compulsion  
of vines twining on a lattice,  
snakes streaming to breeding grounds.  
Vegetable, animal life moving  
in mute organization.

Long axons with probing tips curl, test,  
cast themselves across rope bridges spun by glial cells,  
find their way to the outer layers of the cortex —  
the new country.

Here they spread,  
find each their individual place, become  
herds of grazing ungulates, placid but united  
in a mesh of immediacy. Glance, scent, signal —  
and the herd fires, wheeling as a single mind.

### *Land bridge*

The fetus builds with the endlessly old.  
Every continent constructed  
from the same simple rocks. Limestone, basalt, granite.  
No cell in a human brain differs in kind  
from a mouse.

The mind moves into place, tectonic,  
determined. Pulls together the thick slab,  
*corpus callosum* — a land bridge  
spanning continents whose roots go deep  
below the sea. Opens  
a route across hemispheres, an isthmus for exploration  
and the interchange of species.

In one direction migrate  
howler monkey, clacking parrot.  
In the other, quick-eyed fox, quiet deer.

The twinned continents share  
old creatures and new — speechlessness  
and language, instinct and learning,  
life in an eternal present and the fresh new consciousness  
of time.

## *Island*

The fetus dreams —  
spike and surge of waves, ripple of eyelids.

Already the brain's drive  
to explain, to make sense of sensation, is rising in her, unstoppable  
as the pulse of magma up through crust.

She dreams a world into being —  
steam sizzling from the ocean, then molten rock and smoke  
in a boiling rim of water. Until an island rises,  
self-conscious above the waves.

Even before the ferment cools and dreams subside  
into waking, seeds are blowing here, launched  
on air from nearby coasts. They put down roots,  
first settlers. Sea birds come, and seals.

The child's dreams are a foam of seawrack,  
a spiral of steam simmering at the island's shore.

*Like the dreams of mice whose whiskers twitch in their sleep.*

*The dreams of dogs with scrabbling paws.*

*The dreams of apes who whimper and stir  
like infants.*

## *Homing*

The child knows the way.  
She is flying with the stars, a bird tracking  
her destination by the dipper's swing around the pole.  
The sun is her compass rose, golden dial rising.  
Wind on her cheek, scribble of coastline far below.  
Magnetic lines of force draw her on, earth's slow rhythms  
labouring in her veins.

She signals to her mother,  
sends whispers across the caul  
like the scent of water in a salmon's gills —  
*it is time it is time it is*  
*now*

She battles upstream, the fling of self  
against the urgent flow of time,  
through the constricted tunnel of the present  
towards the act of birth.

One last long heave of muscle. At last  
the downy head appears, the crowning skull.

*The bairn's near hame*  
the midwife says rejoicing, reaching through pain  
to catch the slippery creature in the world's meshed hands.

*There, there,* she says again.  
*The bairn's come hame.*

**Notes:**

Page 3: The corona radiata is a web of cells that arrange themselves around the egg cell after it is released from the ovary. Sperm cells must shed their outer coats to penetrate it.

Page 4: Developmental biologists construct “fate maps” to show how cells in the early stages migrate as the embryo develops. (*Langman’s Medical Embryology, 7<sup>th</sup> Edition.*)

Page 5: *Teratology* is the science of congenital abnormalities. The word derives from the Greek *teratos* (monster)

*Keratin* is a main component of the outer layer of skin. Massive thickening of the keratin layer leads to an abnormality known as a harlequin fetus.

Page 6: “Bairn” is a common Scottish word for a baby or child.  
The yolk sac that provides early nourishment for the embryo already contains primordial germ cells in its lining, which in turn will migrate to the ovaries of a female fetus and differentiate into egg cells that may wait another 40 years to become her own children.

Page 7: Telomeres are strings of protein at the end of each strand of DNA, which are shortened slightly every time a cell divides. They seem to be implicated in the eventual aging of cells.

The custom of burying the birthcord is widespread in many cultures. For example, the Palestinian Talmud states that the afterbirth is preserved “to give a pledge to the earth.” The commentator explains the word ‘pledge’ by adding “when he will die.” According to Raphael Patai (*On Jewish Folklore*), “this laconic statement expresses a very old and important folk idea: on the very day of his birth, a man must give a pledge to the earth to assure her that he will return to her when he dies ... So that the earth will wait for him patiently, and perhaps also so that she will not demand his return prematurely, the afterbirth is buried as a pledge.”

Page 10: In mammals, the ‘y’ (male) chromosomes are needed for the placenta to develop normally. If an egg cell is artificially inseminated with another female nucleus, the fetus will begin to develop normally, but the placenta will not.

Page 12: As many as four percent of children are born with some degree of ‘intersexuality.’ This includes true hermaphrodites (who have both male and female gonads), and individuals who can be classed as ‘male’ or ‘female’ because they have either testes or ovaries, but who also have genitalia or other features of the other sex. (*The Sciences*, March/April 1993)

Page 23: The issue of how soul and body are linked has been a theological debate for many centuries, and there have been numerous attempts to identify a specific organ where the soul interacts with the body to produce consciousness. Descartes, for instance, speculated in *Les Passions de l’ame (1649)* that the pineal gland was this site, partly on the basis that it is the only organ in the brain that is not one of a pair.

Page 27: The amygdala is a small lobe located below each half of the brain, so named for its almond shape. It houses the main circuits by which the brain colours experience with emotion. Neurologist Antonio Damasio (*Descartes’ Error*) believes that the ability to feel emotion offers humans a flexibility of response; that emotion itself is the

combination of a mental evaluative process with bodily responses to that process. (Etymologically, “emotion” derives from “movement out.”)

Page 33: The word retina derives from the Latin word for 'tunic' because of the webbed appearance caused by blood vessels.

The photoreceptors that detect light are actually placed at the back of the retina, so that light has to go through the web of blood vessels and nerve fibres before it reaches them. This seems to result from the embryological development of the retina from the surface of the brain.

One advantage to having the iris of the eye coloured is that it make the interior of the eye darker, thereby enhancing vision.

Page 34: Early philosophers thought light originated in the eye and reached out to explore the world. Empedocles, who formulated the idea that everything is composed of four elements (earth, air, fire and water), described Aphrodite's role in making sight possible: she kindled the fire of the eye at the hearth fire of the Universe, so that it would act like a lantern.

Page 35: If the brain had a different receptor to see every separable colour, it would need more than 200 different kinds. Instead, as Thomas Young first proposed in 1801, there are only three.

Sir Isaac Newton added an extra colour, indigo, to the six colours he identified in the spectrum, to suit the alchemical associations of the number seven.

Page 36: Glial cells are elongated cells that form a sheath around the axons of neurons.

Page 37: When the Panama isthmus rose from the sea bed, it joined North and South America, where species had evolved separately. This land bridge permitted one of the largest interchanges of species in earth's history.

The corpus callosum is the band of connective neurons joining the brain's left and right hemispheres

Page 41: Birth is triggered by hormones secreted by the fetus, rather than by the mother's body.