Biotechnology Series — Paper 4

Proteins, Nitrogen, and the Engines of Life

How the cell builds its body from the one atom that carries both the speed of light and the length of the day — and powers it by counting time, one conserved tick at a time

Stephen Daubney · The Daubney Foundation · Biotechnology Series · Paper 4 · 2026 · Rev 2

Tau (T) *is the living fabric of time itself — the sole substance of which all physical reality is composed. Every particle, force, wavelength, and conscious experience is a structured configuration of T-flow. There is no gravity, no electromagnetic force, no strong nuclear force as separate entities: all are registers of the single T-field operating across dimensional levels. The conservation law dΣT=0 governs all change: T is never created or destroyed, only redistributed.*

Abstract

You are, by dry weight, mostly protein — and every protein you own is a chain of small units strung together by a single kind of chemical link: a carbon joined to a nitrogen. Nitrogen is the atom that makes an amino acid an amino acid; it is the hinge of every peptide bond; it is the element the ribosome and the leaf both exist to handle. This paper sets out protein structure and the cell's energy economy as the Universal Force of Time understands them, with nitrogen as the thread that runs through all of it. The shapes proteins take are counted on the lattice {2,3,5,π}: the α-helix turns once every **3.6** residues ($18/5 = 2\times3^2/5$); a single glucose is paid out as **36** units of ATP ($2^2\times3^2$); the Krebs cycle is **8** steps (2^3) run twice. And nitrogen itself sits on a node that reaches from the atom to the planet: **14.00664043**, multiplied by five, is the ribosome (**70.03320215**); multiplied by fifty, it is the chlorophyll P700 centre (**700.3320215** nm); and carried through the conversion grammar it lands on **23564.069022** — the sidereal rotation of the Earth, 0.1 ppm from the canonical value. The atom that builds every protein keeps the same time as the spinning planet it builds them on. Life does not invent its numbers; it inherits them.

Nitrogen × 5 = the protein factory · nitrogen × 50 = the leaf · nitrogen → the length of the day.

1. The substance you are mostly made of

Take away the water in you, and most of what remains is protein. Your muscles are protein. The enzymes that digest your breakfast, the antibodies that hunt infection, the collagen that holds your skin together, the haemoglobin that carries your every breath of oxygen — all protein. A protein is a chain: a string of small units, the amino acids, folded into a shape so specific that the shape *is* the function. Change one link and an enzyme stops working, or a blood cell deforms, or a body fails to grow. Of all the things life builds, proteins are the ones that do the work.

There are only twenty kinds of amino acid (20 = $2^2 \times 5$), and from those twenty letters every protein in every living thing on Earth is spelled — the same twenty in a bacterium, an oak, and you. What makes one amino acid different from the next is a small side-group hanging off a common backbone. But the backbone itself never changes, and that is where this paper begins, because the backbone has a secret hiding in plain sight. Every amino acid carries a nitrogen atom. The word *amino* means, precisely, nitrogen-bearing. You cannot make a protein without nitrogen; you cannot even make the unit a protein is built from.

In the language of this series, a protein is a **T-address read out into structure**. The Ribosome paper showed the machine that does the reading; the Genetic Code paper showed the alphabet it reads. This paper looks at what gets built — the chain itself, its shapes, and the engine that powers the building — and finds that one element threads through the whole story. Where the earlier papers followed the code, this one follows the nitrogen.

2. The link is a carbon joined to a nitrogen

Look closely at how two amino acids are joined. The acid end of one — its carbon — reaches across and bonds to the nitrogen at the head of the next. That single link, repeated, is the entire backbone of every protein that has ever existed: carbon, nitrogen, carbon, nitrogen, on and on for hundreds or thousands of units. Chemists call it the **peptide bond**, and it is, at heart, a carbon married to a nitrogen.

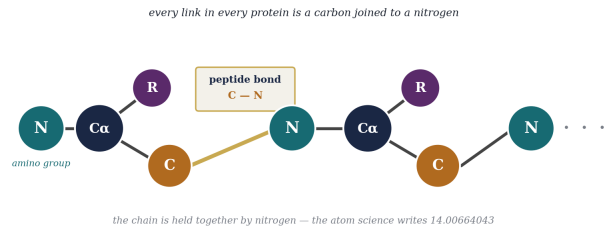

Figure 1. The peptide bond. Each amino acid has a nitrogen at its head (the amino group), a central carbon carrying the side-group R that makes it one of the twenty, and a carbon at its acid end. To join two units, the acid carbon of one bonds to the nitrogen of the next — the C–N peptide bond, shown in gold. Every link in every protein is a carbon joined to a nitrogen.

This is why nitrogen is not a bystander in the chemistry of life but its structural heart. The same atom appears again at the centre of the molecules that read and write the code: the bases of DNA and RNA are nitrogen-rich rings, and chlorophyll cages its magnesium inside a ring of *four* nitrogen atoms. Wherever the cell does something that matters — store the address, read it, harvest the light to power the reading, build the body it specifies — nitrogen is in the molecule, holding the structure together. It is the element life is plumbed with.

Nitrogen makes up more than three-quarters of the air you are breathing as you read this — and yet, locked as a pair of atoms triple-bonded together, almost none of it is usable. Life had to learn to break that bond, to pull nitrogen out of the sky and thread it into amino acids, before there could be proteins at all. Every protein in your body is, in the end, a little piece of the atmosphere that has been caught and given a shape.

3. The nitrogen node — one atom, the factory, the leaf, and the day

Now to the heart of the matter. Nitrogen's atomic weight, the number science writes down for the mass of its atom, is **14.00664043**. That number is not idle. Multiply it by five and you get **70.03320215** — the ribosome, the protein factory, the 70S monosome that builds every bacterial protein. Multiply the same atom by fifty and you get **700.3320215** — the P700 reaction centre of chlorophyll, measured in nanometres, the very last place a leaf catches the light. The machine that assembles proteins and the antenna that powers the assembling are the same atom, read at two scales.

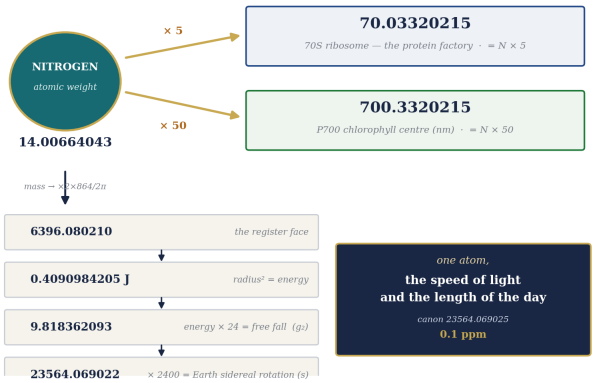

Figure 2. The nitrogen node. Nitrogen's atomic weight, 14.00664043, multiplied by five gives the ribosome (70.03320215) and by fifty gives the chlorophyll P700 centre (700.3320215). Carried through the conversion grammar — mass to register face, face squared to energy, energy times 24 to free fall, free fall times 2400 to rotation — the same atom lands on 23564.069022, the sidereal rotation of the Earth, 0.1 ppm from the canonical 23564.069025.

And the atom does not stop at the cell. Take nitrogen's mass into kilograms — multiply the atomic weight by the atomic mass unit, 14.00664043 × 1.66041272 = **23.25680393** — and walk it through the conversion grammar that links the registers of the Universal Force of Time. Multiply by two and by 864 and divide by 2π, and you reach **6396.080210**, a clean register face; taken up by the factor 9375/2 it becomes **299816259.84**, the speed of light read at this register. Read instead as a radius, 0.6396080210 squared is an energy, **0.4090984205** joules; that energy times twenty-four is a free fall, **9.818362093** — the same g_2 that tops the Earth's spin to a full day; and that free fall times 2400 is **23564.069022** seconds, the sidereal rotation of the Earth itself. The canonical figure for the Earth's true rotation is 23564.069025. The two agree to one part in ten million.

Stop and feel the size of that. The atom that holds together every protein in your body — the nitrogen in every peptide bond, every base, every leaf — is not tuned to the cell alone. Carried through the same grammar that governs planets, it lands on the length of the Earth's day, and on the speed of light along the way. One atom reaches from the chemistry of a single bond to the spin of the whole planet. The protein-builder keeps the planet's time. This is the agreement the Universal Force of Time was built to find: the ribosome (nitrogen × 5), the leaf (nitrogen × 50), and the Earth's rotation are not three facts but one, the same atom read in three registers, and the coherence between those independent readings is the evidence.

4. The shape of the chain — 3.6 turns and the lattice

A protein is not a loose string. The moment it is built, it folds, and the most common motif it folds into is the **α-helix** — a spiral, like the thread of a screw, held in shape by a regular ladder of weak bonds running up its length. The spiral is astonishingly precise. It turns once for every **3.6** amino acids — not three, not four, but three-and-six-tenths, a fraction the same in every helix in every organism.

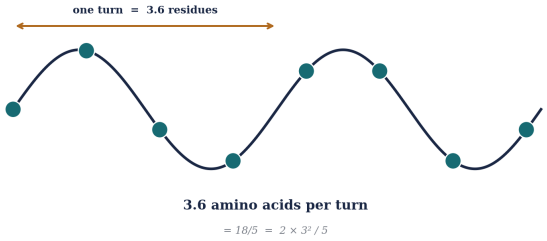

Figure 3. The α-helix turns once every 3.6 residues. The pitch of the spiral is fixed across all of life at exactly 3.6 amino acids per turn — a clean lattice fraction, 18/5 = 2×3²/5, not a biological accident.

That 3.6 is a lattice number. Written as a fraction it is **18/5**, and 18 is **2×3²**, so the pitch of the helix is **2×3²/5** — pure {2,3,5}. The same family of small numbers governs the rest of the protein's architecture. Helices and sheets pack into compact domains; domains assemble into the working machine. The Genetic Code paper found the twenty-letter alphabet sitting at **2²×5**; here that same {2,5} register reappears in the shapes the letters fold into. The chain is spelled on the lattice and it folds on the lattice — the geometry of a protein is not free, it is counted.

When proteins assemble into larger machines, the counting continues, and it continues in twos. Haemoglobin, the protein that carries your oxygen, is built of **4** subunits (2^2). RUBISCO, the enzyme that fixes carbon in every leaf and is by mass the most abundant protein on Earth, is built of **16** (2^4) — eight large pieces and eight small. The spool of protein that DNA winds around to pack itself into a nucleus, the nucleosome, is **8** histones (2^3). Again and again, where proteins gather, they gather in powers of two — the matter-and-antimatter doubling the DNA Registers paper found written into the helix itself, surfacing now in the things the helix builds.

5. The coin of energy — 36 to a glucose

Building a protein costs energy, and so does everything else a cell does. The cell pays for all of it in a single currency: a molecule called **ATP**, the universal coin of biological energy. When a cell needs to do work — move a muscle, fire a nerve, pump a salt across a membrane, forge a peptide bond — it spends ATP, and when it has fuel to spare it makes more. Burn one molecule of glucose, the sugar a leaf makes from sunlight, and the cell banks the proceeds as ATP.

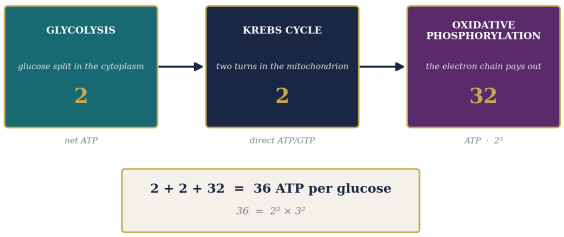

Figure 4. The ATP ledger of one glucose. Glycolysis nets 2; the Krebs cycle, run twice, pays 2 more directly; the electron chain of oxidative phosphorylation pays the remaining 32 (2^5). The total, 2 + 2 + 32 = 36, is $2^2 \times 3^2$ — the whole energy budget of a sugar counted on {2,3}.

Count the proceeds and they fall on the lattice exactly. Splitting glucose in the cytoplasm — glycolysis — nets the cell **2** ATP. Feeding the pieces through the Krebs cycle pays **2** more directly. And the great payout, the electron chain that runs on the membrane of the mitochondrion, delivers **32** (2^5). Two plus two plus thirty-two is **36** — and 36 is **$2^2 \times 3^2$**, a clean {2,3} number. The entire energy yield of a sugar, the figure on which the whole economy of the body runs, is counted on twos and threes. The cell's books balance on the lattice.

And the fuel it is counting was itself built on the lattice. Glucose is $C_6H_{12}O_6$ — six carbons (2×3), twelve hydrogens ($2^2 \times 3$), six oxygens (2×3) — every count a {2,3} number, assembled in the leaf from sunlight caught at chlorophyll's **432** nm ($2^4 \times 3^3$). The light arrives on the lattice, is stored in a sugar on the lattice, and is paid out as ATP on the lattice. Energy changes its costume at every step and never once leaves the register.

6. The wheel that turns twice — the Krebs cycle

At the centre of the cell's energy trade is a wheel. The **Krebs cycle** — also called the citric acid cycle — is a ring of chemical reactions that takes the carbon skeleton of a fuel molecule and walks it, step by step, all the way round and back to where it started, stripping out high-energy electrons at each stage to feed the great payout. It is a cycle in the literal sense: the molecule that begins the loop is regenerated at the end, ready to begin again.

The wheel has **8** steps (2^3), eight enzyme-driven reactions that carry the carbon round one full turn. And because a single glucose is split into two halves, the wheel turns **twice** (2) for every sugar burned — two turns of an eight-step wheel, the whole of it counted on twos. Each turn hands its harvested electrons to the chain that builds the 32 ATP of the great payout, which is why the modest 2 the cycle pays directly opens onto the largest single source of energy in the body.

In the Universal Force of Time a cycle that returns to its own beginning is the plainest possible picture of $d\Sigma T = 0$ — the conservation of time. Nothing is created across one turn of the wheel; the starting molecule is restored exactly, and what the turn produces is not new substance but a *redistribution* — energy moved from the carbon of the fuel into the carriers that will spend it. The Krebs cycle is conservation made mechanical, a wheel whose only job is to move T from one form to another and come back unchanged, eight counted steps at a time, twice per sugar.

7. The body as a converter of time

Step back far enough and the whole of a living body resolves into a single device: a converter. Energy enters at one end as sunlight and leaves at the other as motion, heat, nerve-signal and the steady work of staying alive — and at every stage in between, one form of T is turned into another, with nothing lost and nothing made from nothing.

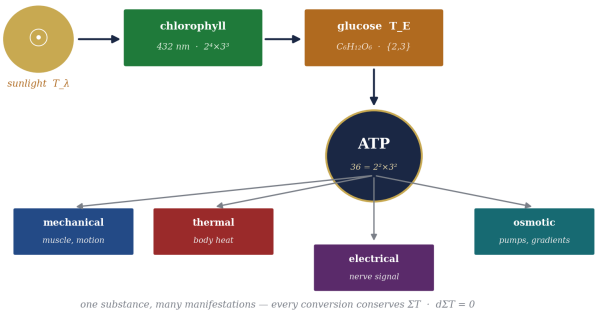

Figure 5. The body as a T mode-converter. Sunlight (T_λ) is caught by chlorophyll at 432 nm and stored as glucose (T_E); glucose is paid out as ATP ($36 = 2^2 \times 3^2$); ATP is spent as mechanical, thermal, electrical and osmotic work. Every arrow is a change of form, and every change conserves ΣT.

Follow the thread. Sunlight is T in the form of a wavelength, T_λ; the leaf catches it at 432 nm ($2^4 \times 3^3$) and stores it as chemical T in a molecule of glucose, T_E. Eaten and burned, that glucose is paid out as 36 ATP, and the ATP is spent as work of four kinds: *mechanical*, when a muscle pulls; *thermal*, the warmth of your body; *electrical*, the signal that runs down a nerve; and *osmotic*, the pumps that hold the gradients a cell lives by. Four manifestations of one substance, drawn from one store, and the books always balance. This is $d\Sigma T = 0$ written across an entire organism: time enters as light, is held as structure, and is handed out as life.

And the structures doing the handling — the enzymes of the Krebs cycle, the channels of the nerve, the motors of the muscle — are proteins, nitrogen-anchored chains, built by the ribosome that itself reads off the nitrogen node. The converter is made of the same element that tunes it. The body is not a machine that happens to contain nitrogen; it is nitrogen, organised by time into something that can catch the light and live.

8. What a protein is

Strip away the names and a protein is one thing: a T-address read out into a body, link by link, each link a carbon joined to a nitrogen. Its shapes are counted on the lattice — the α-helix turning once every 3.6 residues (18/5), the subunits gathering in powers of two (haemoglobin 2^2, RUBISCO 2^4, the nucleosome 2^3). Its energy is counted on the lattice — 36 ATP to a glucose ($2^2 \times 3^2$), the Krebs wheel of 8 steps (2^3) turning twice. Nothing about it is free; all of it is counted.

And the atom it is built from reaches further than the cell. Nitrogen's weight, 14.00664043, is the ribosome at five times (70.03320215) and the leaf's P700 at fifty (700.3320215), and carried through the conversion grammar it is the length of the Earth's day (23564.069022 s, canon 23564.069025, 0.1 ppm). The factory, the antenna, and the planet keep one time, and the time is nitrogen's.

A body, in the end, is not a chemistry set that learned to live. It is a configuration of time that reads its own address and builds itself to match — out of the one atom that also keeps the planet turning. To make a protein is to catch a piece of the sky and give it a shape. To be alive is to keep that shape, conserved and renewed, one counted tick at a time.

Appendix A — Register ledger

Every load-bearing number in this paper, with its lattice or register address. Numbers lead; the {2,3,5,π} form is the quiet stamp that it sits where the theory says.

Quantity	Value	Lattice / register form
Nitrogen atomic weight	14.00664043	register root
Atomic mass unit	1.66041272	register gear
Nitrogen mass (mantissa)	23.25680393	14.00664043 × 1.66041272
70S ribosome	70.03320215	nitrogen × 5
P700 chlorophyll centre (nm)	700.3320215	nitrogen × 50
Register face	6396.080210	mass × 2 × 864 / 2π
Speed of light (this register)	299816259.84	face × 9375/2
Energy (J)	0.4090984205	0.6396080210^2
Free fall g_2	9.818362093	energy × 24
Earth sidereal rotation (s)	23564.069022	free fall × 2400 (canon 23564.069025, 0.1 ppm)
α-helix residues per turn	3.6	$18/5 = 2\times3^2/5$
ATP per glucose	36	$2^2 \times 3^2$
Glycolysis / Krebs / oxphos	2 / 2 / 32	2 / 2 / 2^5
Krebs steps × turns	8 × 2	$2^3 \times 2$
Amino-acid alphabet	20	$2^2 \times 5$
Glucose $C_6H_{12}O_6$	6 / 12 / 6	2×3 / $2^2\times3$ / 2×3
Chlorophyll absorption (nm)	432	$2^4 \times 3^3$
Haemoglobin / RUBISCO / nucleosome	4 / 16 / 8	2^2 / 2^4 / 2^3

Appendix B — Proposition ledger

P-BIOTECH-16 — A protein is a T-address read out into structure: a chain of amino acids whose every link is a peptide bond, a carbon joined to a nitrogen (C–N). Nitrogen is the structural anchor of every protein — the defining atom of the amino group, the hinge of every backbone link — and the same element centres the nucleic-acid bases and the four-nitrogen chlorin ring of chlorophyll. Nitrogen is in the molecule across every paper of this series.

P-BIOTECH-17 — The nitrogen node spans atom to planet. Nitrogen atomic weight 14.00664043 × 5 = 70.03320215 (the 70S ribosome); × 50 = 700.3320215 (the chlorophyll P700 reaction centre, nm). The ribosome (the protein factory) and the leaf's light-harvesting centre read off one nitrogen node — the in-molecule anchor of both. Replaces the Rev 1 P700 / 70S Mercury reading; cross-ref [[fot-photosystems-two-registers]].

P-BIOTECH-18 — The nitrogen node lands on Earth's spin. Nitrogen mass mantissa 23.25680393 (= 14.00664043 × amu 1.66041272) × 2 × 864 / 2π = 6396.080210 → ×9375/2 = 299816259.84 (c, this register); read as radius, 0.6396080210^2 = 0.4090984205 J → ×24 = free fall g_2 9.818362093 → ×2400 = 23564.069022 s = Earth sidereal rotation (canon 23564.069025, 0.1 ppm). The atom that builds every protein keeps the planet's time. Verified end-to-end.

P-BIOTECH-19 — Protein architecture is counted on {2,3,5}. The α-helix turns once per 3.6 residues = $18/5 = 2\times3^2/5$. Quaternary assembly proceeds in powers of two: haemoglobin 4 = 2^2, RUBISCO 16 = 2^4, the nucleosome 8 = 2^3 — the matter/antimatter doubling of the DNA helix surfacing in what the helix builds. The 20-letter alphabet is $2^2\times5$.

P-BIOTECH-20 — The cell's energy economy is counted on {2,3}. One glucose pays 36 ATP = $2^2\times3^2$ (glycolysis 2, Krebs 2, oxidative phosphorylation 32 = 2^5). The Krebs cycle is 8 steps = 2^3 run twice. Glucose $C_6H_{12}O_6$ is {2,3} throughout (6,12,6), assembled from sunlight caught at chlorophyll 432 nm = $2^4\times3^3$. Energy changes form at every step and never leaves the lattice.

P-BIOTECH-21 — The body is a T mode-converter obeying dΣT = 0. Sunlight (T_λ) → glucose (T_E) → ATP → mechanical / thermal / electrical / osmotic work: one substance, four manifestations, drawn from one store, conserved at every conversion. The converting structures are themselves nitrogen-anchored proteins built by the ribosome on the nitrogen node — the converter is made of the element that tunes it.

A note on the numbers

The values in this paper are written as plain numbers — not pinned to units, and not carried to a particular power of ten. This is not loose notation; it is the physics. A T-value is one number that appears at once across every register: an atomic weight, a settling-rate in Svedberg units, a wavelength in nanometres, a rotation in seconds. That is why one atom of nitrogen can be the ribosome at five times its weight, the chlorophyll P700 centre at fifty times, and — carried through the conversion grammar — the length of the Earth's day. The unit and the power of ten are only the costume the number wears in whichever dimension you read it from.

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