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Structural Adequacy for Signalling: The Chrysene–Nucleic Acid Complex as a Hybrid Channel, Scaffold Succession, and the Continuity of Directed Pathways

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Declared conflict

This report was prepared by the same system that drafted the manuscript. That is a conflict of the first order and no statement below is independent confirmation. Every point is framed so that a reader may check it against the manuscript and against a standard reference rather than against the reporter. Where the report defends the manuscript, discount accordingly. There is no author-reply section.

Scope of Review

The manuscript takes the enclosure paper's injection from sequence to membrane configuration, notes that no decoder was exhibited there, and asks what a decoder would have to be. It defines a signalling architecture by five clauses, argues the complex satisfies all five without any component the integrated synthesis does not produce, and then bounds what any reader could achieve. The carrier is photoexcitation. The chromophore is the vessel skeleton, the bridge the phosphodiester tether, the acceptor the templated base. The two anchor types differ by three backbone atoms and therefore by a factor of some 45 to 142 in transfer rate, so the pair type is reported as an excited-state lifetime. A window reports the composition of a contiguous subword, overlapping windows share their differences, and the word is recovered to within a fibre of exactly $\binom{\ell}{S_1}$, an ambiguity bounded by the window and not by the strand. Two negatives follow: no feedback loop closes on the orientational state, and succession is a directed morphism under which chirality, two-sidedness and conformational freedoms are provably not inherited.

Compiled disposition

Major revision. The combinatorial content is correct and checkable, the negative results are real, and the paper names its own worst vulnerability, which is more than most do. But the photophysical figure on which the entire readout rests is taken from the wrong environment; the discrimination the paper attributes to geometry is confounded by a chemical effect its own appendix identifies and its body ignores; and the theorem that licenses the paper's method is asserted by inspection and deferred to a target. The first of these is recoverable and, recovered, would strengthen the paper considerably.

Required before print

Blocking before acceptance. Recompute block W2 across a range of core oxygen concentrations, state the air-saturated contrast in the body, and add the anoxic requirement as a numbered statement. Move the base-dependent confound from Appendix C into the body beside Theorem 10.x and estimate the base-dependent term. Supply the checkable list for the substrate-independence theorem, or mark the deferral of chemistry as provisional. The reporter would re-review points 1 and 3.

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1 What the manuscript does well

Reconstruction, triplet derivation, spacing, trapdoor, coordination

The reconstruction result is clean, exact and checked. The identity $S_{i+1} - S_i = w_{i+\ell} - w_i$ is elementary and the fibre $\binom{\ell}{S_1}$ follows in a line, but the consequence, that the kernel is bounded by the window rather than growing with the strand, is not obvious and is the difference between a usable channel and a useless one. That it is verified against exhaustive enumeration at nine sizes is good practice. The triplet requirement was derived and not chosen. The manuscript computes the readout on the singlet, finds a contrast between nought and thirty per cent, and adopts the triplet because the arithmetic leaves no alternative. Appendix D records that this was not a designed feature. Two independent routes to the anchor spacing give 3.57 nm separately. Neither was computed with the other in view. The trapdoor is self-named. Scholium 13.x states that a failure of the photophysical premise would leave every structural statement standing and remove the subject. The coordination finding is recorded against interest. That this paper and the enclosure paper want opposite branches of one hypothesis is stated in both, with what each would lose.

2 Major points

1 — The triplet lifetime is taken from the wrong environment

Block W2 uses a triplet lifetime of 1 ms. That is a rigid, deoxygenated figure. The manuscript places its chromophore in a fluid acyl core, into which molecular oxygen partitions at three to five times its aqueous concentration, and triplet quenching by oxygen is near diffusion-limited. At an air-saturated core the triplet is quenched to of order 0.5 μs, and the contrast between the two tethers, the quantity the entire readout rests on, falls from 79× in the anoxic row to 3.2× in the air-saturated row. The manuscript prints the last row. The unquenched reference ceases to be a useful baseline entirely.

The opportunity. The manuscript has a defence available and does not make it. An origins setting is anoxic. The triplet requirement is therefore not merely compatible with an early Earth. On these numbers it requires one, and would fail in an oxygenated environment. That is a substantive, falsifiable and rather striking claim. The architecture's readout works at the onset and stops working after the oxygenation of the atmosphere, which is the same event the manuscript elsewhere invokes to date the sterol transformation. The paper currently has an unexamined parameter where it could have a constraint on the era. Requested: recompute block W2 across a range of core oxygen concentrations. State the air-saturated contrast in the body. Add the anoxic requirement as a numbered statement rather than leaving it implicit. Remark 10.x on deep time should be revised to note that the same oxygenation that enables the sterol transformation disables the photonic readout.

2 — The discrimination is confounded by a chemical effect

Theorem 10.x attributes the difference in transfer rate to the three-atom difference in bridge length, and Remark 6.x makes a rhetorical point of it. A structure designed to be read could hardly have done better than to put such a difference in a bridge whose attenuation is exponential. Appendix C then records that purines quench more readily than pyrimidines. The two anchor types are an adenine anchor on the short tether and a cytosine anchor on the long one. The chemical effect and the geometric effect therefore run in the same direction, and the manuscript cannot say which produces the observed ratio.

This does not threaten the discrimination. Reinforcing effects discriminate better. It threatens the attribution, and the attribution is what carries the paper's continuity argument. The readout is claimed to be a by-product of the templating geometry, and if the rate difference is largely a difference between a purine and a pyrimidine then it is a by-product of base identity, which is a different and much weaker statement about what the architecture supplies. Requested: move the confound from Appendix C into the body beside Theorem 10.x. Estimate the base-dependent term. If it is comparable to the geometric term, weaken Remark 6.x accordingly. If it dominates, the geometric claim should be withdrawn and the readout re-described as base-sensitive.

3 — The keystone is asserted, and it is also what creates the trapdoor

Theorem 8.x (substrate-independence) is the licence for the paper's entire deferral of chemistry. Its proof reads by inspection of the statements named, and the manuscript defers the actual inspection to a target, asking that it eventually be given as a checkable list. A theorem doing this much work should not be the one whose proof is postponed. Worse, the two major weaknesses compound. Scholium 13.x observes that if the photophysics fails, every structural statement stands and only the subject disappears. The reason that is possible is precisely substrate-independence. The mathematics was built not to depend on whether the physics discriminates anything. So the paper's methodological strength and its structural vulnerability are the same property, and the property is unproved.

Requested: supply the list. It is a page of work and it converts the paper's central methodological claim from an assertion into something a reader can check. Until it exists, Convention 2.x should say that the deferral of chemistry is provisional.

3 Further points

4 — Is Definition 5.x satisfied by anything that is not a signalling architecture?

The five clauses, a persistent state, a discriminating response, a path, a timescale separation, an external energy source, are abstract enough that a great many assemblies satisfy them. The manuscript concedes the definition is deliberately weak and defends the weakness well, but weak and vacuous are different and the paper does not distinguish them. Requested: exhibit one physical assembly that fails the definition, and say which clause it fails. A definition with no counterexamples has no content.

> **5 — The succession functor has no instance**
>
> Sections 11 and 12 define Inv, prove preservation, prove three non-inheritances and prove directedness, and never exhibit a single succession. Both realizations, catalytic and mechanical, are marked [E] with the existence of a successor a premise. Requested: work one example through, even a hypothetical one. An aggregate, a named successor, the invariant carried, and one invariant demonstrably lost. Without it the reader cannot tell whether the functor is doing work or is a formalism over an empty class.

Composition understates what the measurement requires. Theorem 7.x treats the window observable as a count. Physically it is the amplitude ratio of a multi-exponential decay, and recovering component amplitudes from such a decay is ill-conditioned. At a contrast of 79× this is feasible. At the air-saturated 3.2× of point 1 it may not be. Requested: state that the composition is an amplitude extraction and give the conditioning as a function of the contrast, so that points 1 and 6 can be read together.

Contiguity assumes an extended strand and does not say so. Theorem 7.x concludes that an illuminated region covers a contiguous subword. That holds if the strand is locally extended along the surface. A coiled or looped strand would give a spatially contiguous region covering a sequence-discontiguous set, and the reconstruction of Section 13 would fail. Requested: add the local extension as a named premise, or derive it from the persistence length against the window.

The kernel is quoted at a window length the optics do not deliver. Corollary 13.x illustrates the bound with $\ell = 10$ and eight bits lost. Block V2 gives $\ell = 30$ for a diffraction-limited stimulus and $\ell = 6$ for near-field. $\ell = 10$ is neither. At $\ell = 30$ the loss is 27 bits, which against a one-bit-per-anchor channel is a quarter of a hundred-anchor word. Requested: illustrate with the achievable values.

4 Minor and editorial

1. The bandwidth block concludes the channel is not rate-limited. Given point 1, at low contrast the limit becomes photon budget rather than triplet lifetime, and the block should say so.
2. Four bibliography entries remain unfilled, including the two that carry points 1 and 2.
3. Theorem 12.x owes a domain scale and line tension. The criterion is computed and the scale is not.
4. Appendix C notes that a phosphate in the tunnelling path may not behave as a generic saturated bridge and that the sign of the deviation is unclear. Since β enters exponentially, this is arguably a major point in a minor position.

On the corpus's practice

Two observations, offered as comment. The regime hypothesis is now load-bearing in two papers in opposite directions, and both record it. That is the right handling and it should be carried into the coordinating ledger rather than left in two precedence sections, because the next paper to assume a regime will otherwise assume one without knowing it is contested. Second: this manuscript is the third in the arc to find a result its predecessor had no occasion to look for. Here, that the

enclosure paper's covalent ordering also excludes lateral diffusion from a readout hierarchy, and that its two tether lengths are an exponential difference in a transfer rate. That is what printing one's geometry buys. It is also a reason to be careful. Results obtained by later papers from earlier numbers inherit every uncertainty in those numbers silently, and the hypothesis register of this paper correctly makes the imported record a named premise. Later papers should keep doing that.

Summary of requested changes

Points 1, 2 and 3 before acceptance. Points 4–8 at the author's discretion, with 5 and 7 recommended. The reporter would re-review points 1 and 3.

References

[Art62] C. D. Schaper. The enclosure via the encoded chrysene cluster. *Annals of the Chrysene Formalism* 1(3):1279–1320, 2026. Article 62. DOI: `https://doi.org/10.68366/24m3wx88`.

Revision history

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v1.0	2026-10-15	Review record published with Article 63.

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