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The First Pore: Closure, Aperture, and the Reconciliation of Impermeance with Supply

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Declared conflict

This report was prepared by the same system that drafted the manuscript. Nothing below is independent confirmation. Every substantive point is framed as arithmetic, as a comparison of stated conventions, or as a comparison against a cited article, so that a reader may check it without trusting the reporter. There is no author-reply section.

Scope of Review

The manuscript asks whether the architecture can conduct and answers in two movements. First, that it had better not. With fixed anionic charge in the leaflets, a membrane permeable to the osmotically active species draws water until the vessel is spherical. The reduced volume is pinned at unity and the cycle paper's division threshold is unreachable. Excess area exists

only because the particle count is impermeant, so a pore conducting that count removes the condition it was wanted to supply. Second, that a selective passage is nonetheless available from the inventory. Columns are joined end to end along 6–12 by phosphodiester formation and closed into rings along 3–9 by the same chemistry. A torsion scan finds that closure is free at every ring size, that the phosphorus lies outside the chord in every closing conformer, and that the closure constraints pin the bridge angle at a ring of three alone. The trimeric aperture is reported as 0.254 nm, determined to 0.008, admitting a dehydrated cation and excluding the residue. The influx is then a trap rather than a leak because the arriving ion is consumed on arrival, which lets conditions C1 and C1′ hold together.

Compiled disposition

Major revision. Two of the manuscript's results, that the lateral bridge closes a ring at every size, and that the phosphorus is exiled from the lumen by the same geometry that closes it, are finite, clean, and the best things the corpus has produced since the polarity column. They are not in question below. The paper's advertised result is not those two. It is that the trimeric aperture excludes the residue by 0.016 nm, and that comparison is made between two quantities measured in different conventions, with a margin smaller than the difference between the conventions. A second result, that the trimer's aperture is determined, is computed for a symmetric ring whose symmetry is assumed and not derived. The necessity argument of Section 4 is overstated at small radii by its own block. And the premise that reversed this paper's conclusion once is now carried as a convention rather than a hypothesis, which empties the register in the paper's favour. None of these touches the two results named above, which is why the recommendation is revision.

Required before print

Blocking before acceptance. Recompute the exclusion with both quantities in one convention. Either close the ring explicitly over independent conformers for the three bridges, or register the three-fold symmetry as a premise. Restate the pinning theorem for the sub-lytic regime. Register the cross-section as a hypothesis. The reporter would re-review points 1 and 2.

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1 What the manuscript does well

Necessity argument, exile theorem, Appendix D, non-implications

The necessity argument is the right way round. Putting Section 4 before the construction, so that the reader learns the obvious pore is fatal before being shown another, is correct exposition and is also honest. It declares the hazard before claiming the escape. The exile theorem is the paper's best result and is underclaimed. That the phosphorus must lie outside the chord because it is the apex of the bend is a structural necessity with a one-line proof, and it kills the most natural reading of the construction, arms projecting inward to narrow the channel to taste. The manuscript states it and moves on. It deserves more weight than it is given. Appendix D is exemplary and its closing observation is the most useful sentence in the paper. That three of the four withdrawn items are conclusions drawn from the shape of an argument rather than from a computation is a diagnosis, not an apology, and it is correct. The non-implications are unusually disciplined. Separating a hole of ion-channel size conducts from a selective hole gates, and explaining that the second fails worse because the architecture has no state variable to act on an aperture, is precise.

2 Major points

1 — The exclusion compares a hydrodynamic radius against a hard-wall clearance

Corollary on selectivity sets the aperture inradius of 0.254 nm against a residue radius of 0.270 nm and reports a margin of 0.016 nm. The 0.254 nm is a geometric clearance, a distance from the void's centre to the van der Waals surface of an aromatic face, the half-thickness being taken as 1.7 Å from the 3.4 Å interplanar contact. That is a hard-wall quantity and the manuscript computes it correctly. The 0.270 nm is a Stokes radius. A Stokes radius is a hydrodynamic quantity, the radius of the sphere with the same translational friction, and it is systematically larger than the clearance a molecule needs to pass a rigid aperture, for small solutes by one to two tenths of an angstrom and often more. The two conventions differ by more than the margin being claimed. The comparison as made does not establish exclusion, and would not establish passage either if it came out the other way.

The manuscript is half aware of this. Its remark on constrictions records that a polygonal aperture discriminates on a solute's smallest cross-section rather than its Stokes radius, and calls the corollary optimistic in that respect. That is the same objection reached by a different route and then left as a caveat beside a numbered corollary that does not carry it. Requested: recompute the exclusion with both quantities in one convention. The natural choice is hard-sphere. Give the residue's minimum van der Waals cross-section from its molecular geometry, and compare it to the same clearance already computed. If the margin survives, the corollary stands and is stronger than it now is. If it does not, say so. The construction survives the loss.

2 — The determined aperture is computed for a symmetric ring, and the symmetry is assumed

The aperture theorem reports a spread of 0.008 nm over 96 closing conformers and concludes that the trimer alone has a determined aperture. The scan behind it treats one bridge and asks whether it can supply a 120° turn. A trimer has three bridges. Each adopts a conformer independently, each contributes its own L_b and its own bridge angle, and the ring closes only if the three are jointly consistent. The manuscript computes the equilateral case, in which all three take the same values, and reports its spread. It does not show that the three must agree, and if they need not, the ring is scalene and its inradius is set by the narrowest approach rather than by the symmetric value, which is smaller, not larger, so the direction of the error is toward over-reporting the aperture.

This matters more than it would elsewhere because the claim at issue is precisely that the aperture is determined. A spread of 0.008 nm across the symmetric family is not a bound on the aperture of a trimer. It is a bound on the aperture of a symmetric trimer. Requested: either close the ring explicitly over independent conformers for the three bridges and report the spread of the resulting inradius, or state the three-fold symmetry as a premise and register it. The first is the same scan run over triples and is a small computation.

3 — The pinning theorem is contradicted at small radii by its own block

The theorem states that the reduced volume is pinned at unity. Its block reports the membrane tension that accompanies the pinning: $1.8\,\mathrm{mN\,m^{-1}}$ at $R = 100$ nm, rising to 5.9 at $R = 25$. The manuscript's own scholium observes that the last figure is in the lysis range of a fluid bilayer. A vessel that lyses is not pinned at $v = 1$. It is not there at all. The theorem is therefore false as stated at the small end of its own table, and what is true is weaker and should be said. The vessel is pinned where the tension is sub-lytic and fails where it is not. The corollary is unaffected. Division is unavailable either way. But the theorem is advertised in the abstract in the stronger form.

Requested: state the theorem as a conducting membrane admits no division, being pinned at $v = 1$ where the Donnan tension is sub-lytic and lysing where it is not. Give the area-expansion modulus used to place the boundary, or say that it is not supplied and the boundary is therefore indicative.

4 — The cross-section is a hypothesis and is carried as a convention

Appendix A holds three entries and the register's closing remark observes that the paper's principal result rests on none of them, being a scan over internal coordinates and a convention about a cross-section. A convention about a cross-section is a premise. It is also, by the manuscript's own Appendix D, the premise that reversed this paper's conclusion once. The disk reading gave a leaky pore and the plank reading gives a selective one, with every input unchanged. A premise with that history is the last one that should be classified out of the register. The manuscript may be right that the plank reading is correct. The objection is to the bookkeeping, which presents an empty register as a feature of the paper while the load-bearing assumption sits in Section 2 under a heading that does not attract scrutiny.

Requested: register the cross-section as H4, with Appendix D's reversal as the entry under what survives its failure, and amend the closing remark of Appendix A. The remark's contrast with the material ledger's posture is fair and may stand once the register is honest.

3 Further points

> **5 — The passage is argued on size and conceded on energetics**
>
> Appendix C records that a cation crossing a constriction narrower than its hydration shell must shed part of it, that the cost is repaid by coordination to the lining, and that neither term is computed. For an aperture of 0.25 nm the dehydration penalty, not the clearance, is what governs whether anything crosses. The manuscript's radius of 0.150 nm assumes partial dehydration rather than deriving it, in its own words, and that assumption is doing work in a numbered corollary. Requested: either carry the dehydration term into the selectivity statement, or restate the corollary as a necessary condition on size with the energetic condition explicitly outstanding, and add it to the targets.

The ruling against the signalling paper claims a deferral lifted, and none is. The ruling's heading reads one deferral lifted and one not. Reading the section, the conductance is still not claimed and the aperture is a new object, a transmembrane ring of columns, not the in-plane aggregate of units that paper computed. Nothing of that paper's is lifted. Something of this paper's is supplied that was missing from both. Requested: rephrase the ruling to say that the deferral is not lifted, and that the earlier aperture is neither used nor contradicted. Appendix E already says the numbers are not comparable. The ruling should agree with it.

Splitting the feedstock makes the ledger's source set five, and the manuscript does not say so. The remark on splitting observes that the heteroatom species must be resolved into at least a nitrogen and a phosphorus half. The material ledger's source theorem states the source set as four species. Splitting one of them makes it five. The ledger's own falsification register anticipates exactly this, a fifth species consumed and unproduced, and calls it the likelier direction of error. This paper delivers it and does not claim it. Requested: state in the precedence ruling that the source set becomes five, and cite the ledger's falsification entry as having anticipated it. This is a finding, not an inconvenience.

Block V5(e) emits no numbers. It is a paragraph of argument about charge balance set inside the verification appendix. The house rule is that blocks recompute a claim from an explicit structure and emit their own numbers. V5(e) does neither, and the proposition it supports is labelled derived on its strength. Requested: either compute the balance, the per-period ammonium influx, the proton efflux and the resulting net charge, or move the paragraph to the body and relabel the proposition as an argument rather than a computed result.

The sinks proposition asserts membrane residence. The manuscript calls it the non-disruption on which the rest of the paper depends and then establishes it in one clause. Column and ring are sinks and both are membrane-resident. The second half is not shown. A ring carries phosphate monoesters at both faces and is a polyanionic covalent assembly. That it partitions to the bilayer rather than aggregating or shedding is plausible and is not demonstrated. Requested: either argue the residence from the amphiphilicity column of the ledger's property table, or mark the proposition derived and register it.

Block V3 is orphaned. The leak bound is transcribed into Appendix B and referred to once in a remark, and no numbered statement uses it. It was computed for a right cylinder, and the paper's aperture is a polygon, so it is not directly applicable either. Requested: either recompute it for the polygonal section and use it to bound the residue leak quantitatively, which would make the selectivity corollary a rate statement rather than a size statement, and would strengthen it, or drop the block and the remark that cites it.

The title promises more on supply than the paper delivers. The Reconciliation of Impermeance with Supply is apt for the reconciliation and generous about the supply, which occupies one short section resting on a proposition affected by point 8 and a remark observing that no conductance is needed. The reconciliation is the result. The supply is a corollary of it.

On what survives

A closing comment, since four major points may misrepresent the paper's standing. The closure theorem and the exile theorem are finite computations over explicit internal coordinates and are untouched by anything above. Together they say something the corpus did not have. That the architecture can build a transmembrane wall out of the chemistry it already uses for its encoding, along the axis the encoding leaves free. That closing a ring costs no strain. And that the same bend which closes it puts the phosphate outside the channel, so that the aperture is set by covalent geometry and cannot be tuned by the arms. The last of these forecloses a line of reasoning that would otherwise have absorbed several papers. The necessity argument survives point 3 in direction if not in magnitude. A conducting membrane does not divide, whether because it is pinned or because it bursts. And the distal-leaflet problem, what holds a unit on the far side of a bilayer when every anchor on record is tethered to a strand on the near side, is answered here for the first time, by a covalent linkage rather than by an assumption. What is at risk is the selectivity corollary, and with it the claim that the trimer is useful rather than merely well-defined. Points 1, 2 and 5 all bear on it and none of them is settled by a measurement. Two are settled by recomputation and the third by a term the manuscript already knows it owes. That is an unusually tractable position for a paper's central claim to be in, and it is worth saying that the corollary may simply be right.

Summary of requested changes

Points 1, 2, 3 and 4 before acceptance. Points 5–11 at the author's discretion, with 6, 7 and 8 recommended. The reporter would re-review points 1 and 2.

References

[Art65] C. D. Schaper. The chrysene-reachable material ledger. *Annals of the Chrysene Formalism* 1(3):1371–1383, 2026. Article 65. DOI: `https://doi.org/10.68366/dwqk8m15`.

Revision history

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