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Division Without a Device: The Dusk Shape, the Tethered Domains, and the Window of the Gain

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Declared conflict

The initial author-side check was prepared by the same system that drafted the manuscript and wrote its blocks. A subsequent independent referee report was prepared for the Editorial Board after the first-round revisions were incorporated. There is no author-reply section.

Scope of Review

The manuscript revisits Article 73's finding that line tension cannot divide the closure vesicle. It observes that Article 72's orbit delivers the vessel to dusk at reduced volume $2^{-1/2}$, which is the limit shape of two touching spheres, and concludes that the bending energies of parent

and daughters agree, so that fission costs only the Gauss–Bonnet term $4\pi\kappa_G < 0$. The initial review found that the second main result, the window on the gain, does not follow from its argument: it infers preference from accessibility, and the energy of n equal spheres rises monotonically with n, so a vessel never prefers three daughters to two. The lower bound on g and the two-sided ceiling on uptake rest on that inference and must be withdrawn or re-argued. The first result also needs narrowing: at the limit shape the parent already is two spheres joined at a point, so the theorem says that cutting at a singular point costs only the topological term, and the entire remaining cost sits in the neck the paper does not price. What survives is real: the dusk shape is the fission shape, the bending deficit Article 73 reported is not a barrier, the orbit does not drift toward division without an area bias, and the tethers segregate the strands and set the axis.

Compiled disposition

Accept with minor revisions. The first-round required corrections (R1–R5) were incorporated, including the withdrawal of the counting lower bound on g and the narrowing of Theorem 4.3. The independent referee confirms the principal results and notes residual two-sided window figures left over from the revisions, an inconsistent description of Article 72's Target 11.7, and garbled displayed equations. No further computation is required. The window is now correctly stated as one-sided.

Required before print

Production and synchronization items only. Remove the residual two-sided window figures from the Abstract, Section 10.1, the heading of Proposition 9.1 and Target 10.8; correct the description of Article 72's Target 11.7 in Appendix C.1; and restore the garbled displayed equations in Theorem 6.2 and Proposition 8.1.

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1 Initial author-side check: the window does not follow

R1 – Theorem 5.1 infers preference from accessibility

Hypothesis H3 makes the configuration of n equal spheres available when $v \le n^{-1/2}$, and the theorem concludes that at $v \le 3^{-1/2}$ the vessel makes three daughters and binary fission is lost. Availability is not preference. By the paper's own energy accounting, $E(n+1) - E(n) = 8\pi\kappa + 4\pi\kappa_G > 0$ over the whole range of κ_G: more daughters is always higher in energy, and three spheres are never preferred to two. Article 72's own reset divides a vessel with $v < 2^{-1/2}$ symmetrically into two flaccid daughters. Required: withdraw Theorem 5.1 as argued, and with it Corollary 5.2, Remark 5.3's claim that the margin is narrow, the lower edge in Proposition 6.3, and the lower edge of Proposition 9.1. The upper bound $g \le 1$ is untouched and should be kept. Two routes to a genuine window are open: an energy comparison that supplies the reduced bending energy of a flaccid vesicle, or the structural argument that the two tethered domains of Section 7 are two nucleation centres.

R2 – Theorem 4.3 is narrower than it reads

At $v = 2^{-1/2}$ the parent's limit shape is two spheres joined at a point. The theorem therefore compares that configuration with two separated spheres, and the $4\pi\kappa_G$ it reports is the cost of the topological cut at the singular point. Everything that makes fission a process rather than a relabelling is in the neck, which the paper does not price. Required: say so in the theorem and in the abstract. The sentence that at the dusk shape fission lowers the energy and no curvature device is needed should become: the bending energies of parent and daughters agree, so the deficit Article 73 reported is not a barrier, and whatever opposes fission is confined to the neck.

Further required items from the initial check: R3 (Hypothesis H3 carries an unsourced claim about the minimal shape; cite the standard result); R4 (Ruling 73.2 overreaches: domain budding and vessel fission are different processes); R5 (Propositions 6.3 and 9.1 become one-sided after R1).

2 Independent referee report on the revised manuscript

Independent assessment — Accept with minor revisions

A subsequent independent referee report was prepared for the Editorial Board after the first-round revisions (R1–R5) were incorporated. It recommends Accept with Minor Revisions. The report confirms five core results: energetic repricing of fission at the dusk limit shape; monotonicity of multi-sphere energies and absence of a counting lower bound on g; area-biased incorporation and restoration of the 200-unit genome; structural selection of binary fission by tethered footprints; and comparative assessment of three neck devices and stimulated uptake. It notes that the separation of offices between the dusk shape (paying the mean-curvature cost) and the tethered domains (selecting $n = 2$ and the cleavage axis) brings real clarity to the series.

M1 — Residual two-sided window figures

Four places still retain the old two-sided numbers or phrasing left over from Revisions R1 and R5. The Abstract still says an environmental flux of 0.53 to 0.75 λ per period; it should read at least 0.53 λ. Section 10.1 entry 4 still says a flux of 0.525–0.745 λ suffices; it should read at least 0.525 λ. The heading of Proposition 9.1 still reads "The two-sided ceiling"; it should be changed to "The one-sided threshold" or "The uptake floor". Target 10.8 still says the geometry admits only a tenth of a doubling per period; it should say the geometry supplies only a floor and no upper bound below $r = 1$.

M2 — Inconsistent description of Article 72's Target 11.7

In Scholium 5.5, Scholium 9.2, Section 10.1, Ruling 10.1, Target 10.4 and Appendix D the paper states that Article 72's Target 11.7 remains open. In Appendix C.1 the summary of Article 72 still reads that the flaccid-limit target is closed here. Change "closed here" to "left open here" or "examined here".

M3 — Garbled displayed equations

In Theorem 6.2 the second half of the displayed equation defining the unperturbed gain g_0 is misprinted across two lines. Restore $g_0 = J/N_\lambda$. In Proposition 8.1 the formula is printed as $x = \delta\alpha\,\Delta A$; it should be $x = \delta a/\Delta a$.

Minor and typographical items from the independent report

1. Notation 2.2 prints ρ_{eff} instead of g_{eff}. Hypothesis 2.6 prints "1 in 1 to 5" instead of "t in 1 to 5". The table of Proposition 9.1 has a column header printed as "8eff" instead of g_{eff}. Ruling 10.1 prints $\gamma^{-1/2}$ instead of $2^{-1/2}$. Appendix B is missing closing brackets in three block headers. Appendix E is missing π in $4\pi\kappa_G$.
2. Several Greek symbols (ϕ, κ, t, λ, δ) and status labels fail to render or collide.
3. The heading of Appendix A appears orphaned because Table 1 floats. Add a one-line pointer.
4. Update the references to Articles 71, 72 and 73 to their published titles and harmonize the volume, issue and page numbers.

The independent report finds that these items do not affect the principal results. The dusk-shape repricing, the monotonicity of multi-sphere energies, the one-sided window, and the structural selection by tethered domains remain intact.

Recommendation

Accept with minor revisions. The first-round required corrections were incorporated. Remove the residual two-sided window figures, correct the description of Article 72's Target 11.7, and restore the

garbled displayed equations. No further computation is required. The window is correctly stated as one-sided. The dusk shape is the fission shape, the bending deficit Article 73 reported is not a barrier, and the tethers segregate the strands and set the axis.

References

[Art73] C. D. Schaper. Fission at the closure scale. *Annals of the Chrysene Formalism* 1(3):1484–1492, 2026. Article 73.

Revision history

Version	Date	Notes
v1.0	2026-10-21	Review record published with Article 74.

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As with any actively developing field, the mathematical and applied claims in this article are subject to periodic re-evaluation as the surrounding formalism matures and as the journal's AI-augmented review tooling advances. Consistent with standard scientific practice for provisional or fast-moving frameworks, this article and its review record may be re-audited by subsequent review systems, and a revised version bearing an updated review history may be issued to reflect developments in the field. Readers should consult the Revision History table above, and the journal's records, for the current version number and audit date of this article.

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