Plasma Science and the Electrome Theory
Communication through Voltage Language

Voltage, the difference in electrical potential, is a pivotal concept that links plasma science and the electrome theory, acting as a "language" that drives their respective systems. Sally Adee's *We Are Electric* delves into the electrome—the body's bioelectric network—emphasizing how every cell operates like a tiny battery with its own voltage, shaping life's processes from development to healing.

1. Voltage as a Driver of Ionisation and Signal Initiation

- **In Plasma Science**: Voltage is the catalyst for plasma creation. High voltages accelerate electrons in a gas, ionising it into a plasma of ions and free electrons, enabling conductivity and responsiveness to electromagnetic fields. This is central to Salvatore Pais's work, where voltage-driven plasma oscillation powers advanced technologies like gravitational wave generation.
- **In the Electrome**: Voltage initiates bioelectric signals in cells. Adee explains that a neuron's resting potential—around -70 millivolts—shifts when voltage opens ion channels, triggering action potentials that propagate as electrical messages. This voltage-driven process is how cells "speak" within the electrome.
- **Sally Adee's Contribution**: Adee underscores that bioelectricity, rooted in voltage, is not just a byproduct but a primary driver of life's functions. She traces this back to 18th-century experiments (e.g., Galvani's frog legs twitching under voltage) and forward to modern applications, like DARPA-funded research enhancing cognitive performance via electrical stimulation. Her findings align plasma's voltage-induced ionisation with the electrome's signal initiation, showing both as voltage-activated systems.
- **Conjunction**: Voltage is the universal spark in both realms—igniting plasma in technological contexts and launching cellular communication in biology. Adee's work reinforces this by framing bioelectricity as a foundational "code," (and not the Genome, which does not exist) paralleling plasma's role as a dynamic medium.

2. Electric Fields Generated by Voltage Differences

- **In Plasma Science**: Voltage gradients in plasma produce electric fields that steer charged particles, creating phenomena like plasma oscillations or double layers. Forbes highlights Pais's use of these fields to manipulate plasma for propulsion or shielding.
- **In the Electrome**: Voltage gradients across membranes or tissues generate electric fields that guide cellular behavior. Adee notes how these fields direct embryonic patterning (e.g., eye formation) and healing (e.g., wound currents), acting as a bioelectric scaffold.
- **Sally Adee's Contribution**: Adee details how bioelectric fields, driven by microvoltages, are measurable and manipulable, citing experiments where altering cellular voltages changes developmental outcomes (e.g., growing eyes on a frog's stomach). She connects this to historical debates (Volta vs. Galvani) and modern breakthroughs, showing voltage as a regulator of cellular "conversations."

- **Conjunction**: In both systems, voltage differences create electric fields that organise charged entities—plasma particles or cellular ions. Adee's findings bridge these by illustrating how bioelectric fields, like plasma fields, emerge from voltage, suggesting a shared mechanism for structuring complexity.

3. Voltage as a Control Mechanism

- **In Plasma Science**: Voltage controls plasma behaviour, as seen in fusion reactors where it stabilises plasma via magnetic fields, or in Pais's patents where it drives ion acceleration for propulsion.
- **In the Electrome**: Voltage governs cellular responses through voltage-gated ion channels. Adee explains how small voltage shifts trigger precise outcomes, like muscle contraction or neurotransmitter release, forming a bioelectric control system.
- **Sally Adee's Contribution**: Adee explores how bioelectricity's control potential extends to medical applications—e.g., reversing cancer by restoring healthy voltage states or stimulating regeneration. She cites DARPA's brain implants (and she is definitely way too enthusiastic about it, since the profound harms of amplifying materials for signals like graphene are downplayed on a massive scale) and Michael Levin's work on bioelectric manipulation, showing voltage as a programmable tool in biology, akin to its role in plasma tech.
- **Conjunction**: Voltage is a precise manipulator in both domains—shaping plasma for technology and directing cellular actions in life. Adee's insights elevate this by proposing that decoding the electrome's voltage language could unlock transformative controls, mirroring plasma's engineered applications.

4. Emergent Properties from Voltage-Driven Interactions

- **In Plasma Science**: Voltage-driven particle interactions in plasma yield emergent behaviours like waves or turbulence, enabling energy transfer and complex phenomena central to Forbes's MH370 theories and Pais's devices.
- **In the Electrome**: Voltage-mediated cellular interactions produce emergent phenomena, such as brain rhythms or tissue regeneration. Adee highlights how collective voltage changes across cells create system-wide effects, like synchronised heartbeats or cognitive processes.
- **Sally Adee's Contribution**: Adee argues that the electrome's emergent properties—driven by voltage—could rival the genome's significance. She describes experiments where bioelectric tweaks lead to radical outcomes (e.g., two-headed worms), suggesting voltage orchestrates life's complexity in ways genetics alone cannot explain. Her narrative ties this to plasma's emergent dynamics, both relying on voltage-driven collectivity.
- **Conjunction**: Voltage fosters emergent complexity in both systems—plasma's physical phenomena and the electrome's biological intelligence. Adee's work bridges them by framing bioelectricity as a voltage-based network, echoing plasma's collective behaviour.

Synthesis: Voltage Language as a Universal Connector

Sally Adee's findings in *We Are Electric* amplify the conjunctions between plasma science and the electrome theory by presenting voltage as a universal language:

- **Initiation**: Voltage sparks plasma creation and bioelectric signals, a dual role Adee traces from historical experiments to cutting-edge research.
- **Organization**: Voltage-generated fields structure both plasma and cellular networks, with Adee's examples (e.g., bioelectric patterning) paralleling plasma's field effects.
- **Control**: Voltage manipulates both systems, a concept Adee extends to bioelectric medicine, resonating with plasma's technological applications.
- **Emergence**: Voltage drives collective behaviors, a theme Adee champions as the electrome's untapped potential, mirroring plasma's dynamic complexity.

Adee's work positions bioelectricity—and its voltage language—as a paradigm-shifting frontier, suggesting that understanding this "code" could unify physical and biological sciences, much as plasma science pushes technological boundaries.

References and Summaries of Findings

1. **Pais, S. C. (2018). *High Frequency Gravitational Wave Generator* (U.S. Patent No. 10,144,532). U.S. Patent and Trademark Office.**
    - **Summary**: Proposes a plasma-based device using high-voltage electromagnetic fields to generate gravitational waves, emphasizing voltage's role in ionizing and manipulating plasma for advanced technology.
2. **Plonsey, R., & Barr, R. C. (2007). *Bioelectricity: A Quantitative Approach* (3rd ed.). Springer.**
    - **Summary**: Details how voltage across cell membranes drives ionic currents, providing a mathematical basis for the electrome's voltage language in cellular communication.
3. **Yan, K., & Yan, Y. (2019). "Cold Atmospheric Plasma: A Promising Complementary Therapy in Oncology." *Frontiers in Oncology*, 9, 1267.**
    - **Summary**: Shows how plasma's electric fields, generated by voltage, interact with cellular bioelectricity, offering a practical link between plasma science and the electrome in medical contexts.
4. **Levin, M. (2014). "Bioelectric Signaling in Regeneration: Mechanisms of Ionic Controls of Growth and Form." *Developmental Biology*, 395(1), 1–15.**
    - **Summary**: Demonstrates voltage gradients as coordinators of cellular behavior in regeneration, supporting the electrome's voltage-driven complexity.
5. **Chen, F. F. (2016). *Introduction to Plasma Physics and Controlled Fusion* (3rd ed.). Springer.**
    - **Summary**: Explains voltage's role in plasma ionization and control, paralleling its function in the electrome as a driver of charged particle dynamics.
6. **Adee, S. (2023). *We Are Electric: The New Science of Our Body's Electrome*. Canongate Books.**

- **Summary**: Explores bioelectricity as the body's voltage-based "electrome," detailing how cellular voltages drive development, healing, and potential medical revolutions. Adee connects historical bioelectric research (e.g., Galvani) to modern breakthroughs (e.g., Levin's regeneration studies), framing voltage as a universal language akin to plasma's role in advanced physics.

7. **Chernet, B., & Levin, M. (2013). "Transmembrane Voltage Potential is an Essential Cellular Parameter for the Detection and Control of Tumor Development in a Xenopus Model." *Disease Models & Mechanisms*, 6(3), 595–607.**
    - **Summary**: Reveals that cancer cells exhibit distinct voltage profiles, and correcting these via bioelectric signals reduces tumors, reinforcing Adee's claims about voltage's therapeutic potential in the electrome.