

What is the "legalome"?

The "legalome": microbiome and omics science applied to law and justice

The term "legalome" is new and refers to bringing microbiome and broader "omics" science (genomics, metabolomics, etc.) into criminal law, neurolaw, and forensic psychiatry/psychology. It focuses on how biological processes, especially gut microbes, can affect cognition, impulse control, and behaviour in ways that matter for legal responsibility and sentencing.

Core Definition and Scope

- The legalome is defined as **microbiome and omics science applied in forensic psychiatry, legal psychology, and criminal law** (Logan et al., 2025; Mishra et al., 2025; Prescott & Logan, 2024; Logan et al., 2025; Logan et al., 2024).
- It emphasizes the **explanatory role of gut microbes and microbe-derived metabolites** in aggression, irritability, antisocial behaviour, involuntary intoxication, and other justice-relevant behaviours (Logan et al., 2025; Prescott & Logan, 2024; Logan et al., 2025; Logan et al., 2024).
- It also considers how the microbiome acts as a "**biological transducer**" of **environmental inputs** (diet, stress, socioeconomic adversity) that shape behaviour and even the decision-making of justice professionals (Mishra et al., 2025; Logan et al., 2025).

Main Elements of the Legalome

Element	Description	Citations
Microbiome & omics data	Gut microbes + genomics, metabolomics, etc. linked to behaviour	(Logan et al., 2025; Mishra et al., 2025; Prescott & Logan, 2024; Logan et al., 2025; Logan et al., 2024; Prescott et al., 2024)
Forensic/clinical use	Assessing diminished capacity, mens rea, mitigation	(Logan et al., 2025; Prescott & Logan, 2024; Logan et al., 2025; Logan et al., 2024)
Courtroom examples	Auto-brewery syndrome DWI acquittals (internal ethanol)	(Logan et al., 2025; Prescott & Logan, 2024; Logan et al., 2025; Logan et al., 2024)
Policy/justice aims	More precise, fair, rehabilitative responses	(Logan et al., 2025; Mishra et al., 2025; Logan et al., 2025; Logan et al., 2024; Prescott et al., 2024; Logan & Mishra, 2025)

FIGURE 1 Key components and uses of the legalome

Legal and Ethical Implications

- Legalome arguments challenge **traditional ideas of free will, mens rea, and retributive punishment**, suggesting some behaviour is partially microbially or metabolically driven (Logan et al., 2025; Mishra et al., 2025; Prescott & Logan, 2024; Logan et al., 2025; Logan et al., 2024; Logan et al., 2025; Logan & Mishra, 2025).
- Authors propose **structured protocols** for evaluating microbiome evidence, aiming to avoid crude biological determinism while still recognizing genuine biological constraints on behaviour (Mishra et al., 2025).
- The framework is linked to **nutritional criminology**, metabolic factors, and biomarkers (e.g., uric acid) as potential tools for more humane, evidence-based prevention, mitigation, and rehabilitation (Prescott & Logan, 2024; Logan et al., 2025; Logan et al., 2024; Prescott et al., 2024; Treadway & Buckholtz, 2011; Logan & Mishra, 2025).

Conclusion

The legalome is an emerging framework that integrates microbiome and omics findings into forensic psychiatry, neurolaw, and criminal justice. It seeks to refine how courts understand intent and responsibility and to support more scientifically grounded, preventive, and rehabilitative approaches to crime.

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