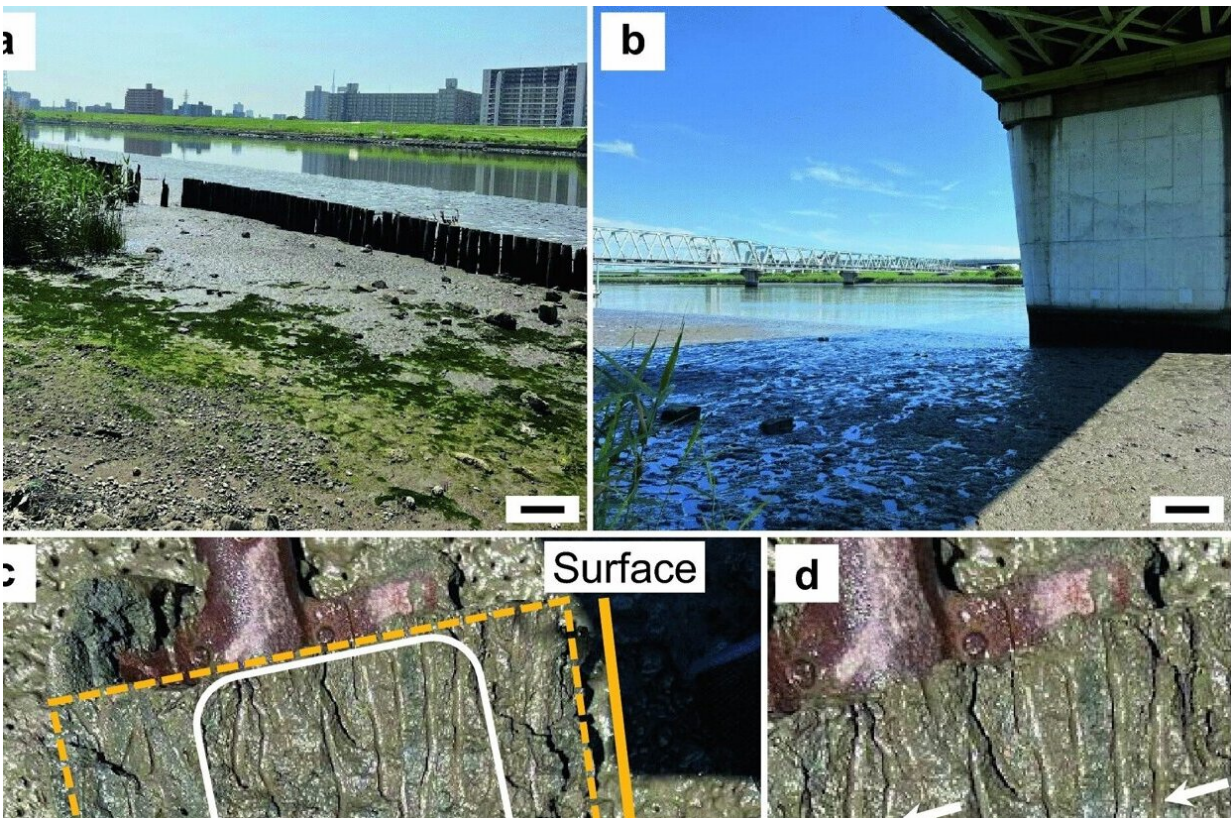


# Researchers find high concentrations of D-amino acids and D-lactate in estuarine polychaetes

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Collection sites of *T. osawai* at the Arakawa River. Credit: *Scientific Reports* (2024). DOI: 10.1038/s41598-024-55861-5

A research group has discovered that high concentrations of D-amino

acids, in addition to L-amino acids, are present in the body tissues of polychaetes and that their composition is species-specific.

Furthermore, seasonal differences were observed in the amino [acid](#) concentrations in the species of polychaetes inhabiting the Arakawa estuarine area flowing into Tokyo Bay. A significant increase in D-lactate was observed during the reproductive period, suggesting its involvement in reproductive activities.

Additionally, it was suggested that D-lactate is involved in adaptation to low salinity environments, as the concentration of D-lactate was higher in polychaetes inhabiting upstream areas compared to those inhabiting downstream areas. Based on these results, it is speculated that D-amino acids and D-lactate play important physiological roles in the life activities of polychaetes, which differ from those observed in mammals.

Further research on the physiological and biochemical aspects of the life activities of polychaetes, which continue to live in anaerobic environments, is expected.

This research was [published](#) on March 6, 2024, in the journal *Scientific Reports*.

In addition to L-amino acids, five kinds of D-amino acids, including D-alanine and D-proline, were detected in the body tissues of polychaetes, and significant species-specific characteristics depending on the species were identified. It was found that the D-lactate concentration in polychaetes exhibiting reproductive swarming, such as *Tylorrhynchus osawai* and *Hediste diadroma*, was ten- to hundred-times higher than that in other polychaetes.

Particularly in the case of *T. osawai*, which predominate the upstream areas, the D-lactate concentration significantly increased during the

reproductive period.

D-Lactate in *Tylorrhynchus osawai* inhabiting upstream areas was higher than that in individuals inhabiting downstream areas. Therefore, D-lactate may be related to reproductive activities and adaptation to low-salinity conditions. D-amino acids are widely found in aquatic invertebrates, such as bivalves and crustaceans, and play important physiological roles in osmoregulation, low oxygen tolerance, reproduction, and development.

Polychaetes are annelids that inhabit various environments, from the oceans to estuaries and freshwater areas, and are sometimes a [dominant group](#). However, there are limited reports on the concentration and role of D-amino acids in polychaetes. Therefore, the current research group quantified and compared the concentrations of free amino acids and lactate, the final products of anaerobic metabolism, in the body tissues of ten species of polychaetes collected from eight locations, including estuaries and inner bays.

D-amino acids were detected, in addition to L-amino acids, in polychaetes, and their composition varied depending on the species. Furthermore, high concentrations of D-lactate were detected in *Tylorrhynchus osawai* and *Hediste diadroma*, and the ratio of D-lactate to total lactate concentration (D-lactate concentration + L-lactate concentration) exceeded 98%.

Particularly, *T. osawai*, which is predominant in the estuary of the tidal zone affected by the tide, showed a significant increase in D-lactate concentrations during its reproductive period. Additionally, D-lactate in *T. osawai* inhabiting upstream areas was higher in concentration than in those inhabiting downstream areas. Therefore, D-lactate may be involved in reproductive activities and adaptation to low-salinity conditions.

The results of this study suggest that D-amino acids and D-lactate play important physiological roles in the life activities of polychaetes.

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**More information:** Mayu Onozato et al, Characterization of polychaetes inhabiting estuaries and inner bays by composition analysis of amino acids and lactate enantiomers, *Scientific Reports* (2024). [DOI: 10.1038/s41598-024-55861-5](https://doi.org/10.1038/s41598-024-55861-5)

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