

EARTHWORMS AND AMINO-ACIDS IN SOIL

BRAHMACHARI analysed chromatographically aqueous extracts of the earthworm castings and soil at different levels from the garden of the Indian Statistical Institute, Calcutta, and obtained four ninhydrin-positive spots from the top soil as well as from the casts. At a depth of six inches the number of acids decreased to three. None were found in the subsoil. Since earthworms are known to build top soil by ingesting and transporting the subsoil, it was concluded that amino-acids were concentrated during this process.

In the present investigation, free amino-acids of the castings of two species of earthworms were compared to the parent soil under culture conditions.

*Pheretima posthuma* L. Vaill and *Pontoscolex corethrurus* Fr. Mull. were cultured in boxes according to Tembe and Dubash.<sup>2</sup> Sub-cultures were then prepared according to Barley<sup>3</sup> as adapted by Dubash and Ganti.<sup>4</sup> Before preparing the sub-cultures, the animals were fed moist filter-paper till their guts were completely cleared of all soil. Castings were collected after 24 hr., air-dried and stored in polythene bags. The samples were extracted with 80% ethyl alcohol on a mechanical shaker and then electrolytically desalted as described by Block *et al.*<sup>5</sup> Final extracts were prepared in 10% isopropanol and kept in the refrigerator. Amino-acids were separated by circular paper chromatography using *n*-butanol-acetic acid-water (4:1:5) and identified from the Rf values obtained with synthetic amino-acid mixtures. The results are given in Table I.

Results show that free amino-acids are not depleted by the earthworms. This is in line with the observation of Baldwin.<sup>6</sup> Arginine, which was as a trace in soil, is concentrated in the castings of both the animals. In *Pontoscolex corethrurus* cystine appeared in the castings even though it was absent from the soil. It could have originated in the body either through transamination or alternatively it may have been derived from the intestinal microflora. Small as these changes appear to be, they were

TABLE I

A comparison of the amino-acids obtained in soil and castings along with their Rf values

Amino-acid	Rf value	Soil	Earthworm castings	
			<i>P. posthuma</i>	<i>P. corethrurus</i>
Leucine (s) ..	0.83	+	+	+
Valine ..	0.714	+	+	+
Tyrosine ..	0.66	+	+	+
$\alpha$ -alanine ..	0.52	+	+	+
Lysine ..	0.47	+	+	+
Arginine ..	0.415	*	+	+
Cystine ..	0.28	-	-	+

+ Indicates presence; \* Indicates traces; - Indicates absence.

brought about by a single passage through the intestine. Repeated ingestion during building up of the top soil may increase the concentration. Amino-acids are not only substrates for ammonification but are also capable of being absorbed and utilized for growth by intact plants.<sup>7</sup> Hence, their conservation and concentration by earthworms is noteworthy.

We are indebted to Dr. D. V. Bal, Director, Institute of Science, Prof. Mrs. E. Gonzalves, former Head of the Botany Department, Institute of Science, and Principal T. G. Khubchandani of the Jaihind College and the Basant Singh Institute of Science, Bombay, for their encouragement and inspiration.

Jaihind College and  
Basant Singh Institute,  
Bombay, November 4, 1963.

P. J. DUBASH.  
S. S. GANTI.

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