Comparison of Amino Acid Decarboxylase and Dihydrolase Results by Moeller, Rapid, and Replicator Plate Methods

RONALD N. JONES,* PETER C. FUCHS, AND STEVE SNIDERMAN

Department of Pathology, Kaiser Foundation Hospitals and Laboratories, Portland, Oregon 97217,*
Department of Pathology, St. Vincent Hospital and Medical Center, Portland, Oregon 97225,
and Northwestern Memorial Hospital, Department of Pathology, Chicago, Illinois 60611

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A slightly modified Moeller medium for amino acid decarboxylase and dihydrolase testing by the replicator method correlated 96 to 99% with the reference Moeller broth method. False positive results were not encountered in this study.

The amino acid decarboxylase and dihydrolase tests are valuable reactions in the speciation of members of the *Enterobacteriaceae*. The recently introduced replicator method for the biochemical identification of bacteria (3) is adaptable to these tests as well. In contrast to other biochemical tests by the replicator method in which unmodified conventional media are employed, the decarboxylase and dihydrolase media have been altered slightly from the usual Moeller formula (4). Comparative studies are reported herein between the conventional Moeller method (4), rapid methods of Brooker et al. (1) and Fay and Barry (2), and the replicator method, using various medium modifications.

The organisms tested in these comparative studies were routine *Enterobacteriaceae* isolates from the clinical laboratories of the Kaiser Foundation Hospital and St. Vincent Hospital and Medical Center. The methods used were those previously described by Moeller (4) for the conventional broth decarboxylase and dihydrolase tests, Brooker et al. (1) for the rapid lysine decarboxylase test, Fay and Barry (2) for

the rapid ornithine decarboxylase test, and Fuchs (3) for the replicator method. The media tested by the replicator method include: Moeller medium (BBL-11430, Baltimore Biological Laboratory, Cockeysville, Md.) with 1.5% agar added; the medium of Brooker et al. with 1.5% agar added; the medium of Fay and Barry with 1.5% agar added; and modified Moeller agar medium, modified by doubling the concentration of bromocresol purple to 0.02 g/liter and increasing the glucose concentration to 2.5 g/liter. The replicator plates were incubated anaerobically either in the GasPak system or in a gassed-out jar containing 86% nitrogen, 10% CO₂, and 4% hydrogen at 35 C. Results were read at 16 to 18 h only. Moeller broth medium was covered with 1 cm of sterile mineral oil and then incubated at 35 C.

The results of the comparative studies performed are shown in Table 1. There is generally good agreement among all the media and methods tested. By the replicator method in direct comparison studies, the modified Moeller medium yields better results over the other

TABLE 1. Results of decarboxylase and dihydrolase tests in *Enterobacteriaceae* isolates (297 determinations) by the Moeller broth method read at 72 h and the replicator method, using Moeller agar, modified Moeller agar, and rapid media read at 16 to 18 h^a

Result	Lysine				Ornithine				Arginine			
	MB	MR	MMR	RLR	MB	MR	MMR	ROR	MB	MR	MMR	RAR
Positive	234	212	227	210	173	153	161	142	13	3	12	6
Negative	63	85	70	87	124	144	136	155	284	294	285	291
False positive		0	0	0		0	0	0		0	0	0
False negative		22	7	24		20	12	31		10	1	7
% Correlation		93	97	92		93	96	90		97	99	98

^a Abbreviations: MB, Moeller broth method; MR, replicator method using Moeller agar; MMR, replicator method using modified Moeller agar; RLR, replicator method using the rapid lysine decarboxylase test; ROR, replicator method using the rapid ornithine decarboxylase test; and RAR, replicator method using the rapid arginine dihydrolase test.

media tested, correlating 96 to 99% at 16 to 18 h with the conventional Moeller broth method read at 72 h. Better correlations (97 to 100%) are achieved by comparing replicator results at 16 to 18 h to reference Moeller broth results at 24 h. A significant number of *Enterobacteriaceae* isolates yield delayed positive reactions. Although there was excellent overall correlation between the conventional and replicator methods, end points of the latter methods were often weak and difficult to read. The increased indicator concentrations in the modified Moeller medium result in much clearer and stronger color zones with the positive reactions than the other media used. Hence, this method appears to be a reliable and economic alternative for

the Moeller broth method of decarboxylase and dihydrolase testing among the *Enterobacteriaceae*.

LITERATURE CITED

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