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Letter to the Editor

Oxidation of tertiary amines by monoamine oxidases

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The recent paper by Barwell et al (1989), on the oxidation of hordenine by monoamine oxidase, raises some points that are of more general interest in relation to earlier observations.

The enzymic oxidation of hordenine, by what is now called monoamine oxidase, was first described by Kohn (1937) and by Richter (1937). It was Richter who demonstrated the formation of dimethylamine and who discussed the general problem of the oxidation of tertiary amines; he suggested that the formation of an imino compound as an intermediate in the enzymic reaction could be accounted for if it was assumed that the ionized form of hordenine was the substrate of the enzyme:

$$R.CH_2.\overset{+}{N}H(CH_3)_2 \rightarrow R.CH = \overset{+}{N}(CH_3)_2$$

(See also Smith et al 1962; Hellerman et al 1972).

Barwell et al (1989) have established that hordenine is preferentially, but not exclusively, acted upon by monoamine oxidase B, and more slowly by monoamine oxidase A. This is of great interest in view of these earlier observations:

1. It has long been known that hordenine and related tertiary amines are oxidized at very variable rates by enzyme preparations from different sources (see Blaschko 1952, 1974). In a systematic study of the effect of progressive *N*-methylation upon the enzymic oxidation, Randall (1946) showed that the tertiary amines were relatively more readily oxidized by preparations from cat liver, when compared with those from guinea-pig liver. It would seem worthwhile to re-examine these old observations in the light of our present knowledge of monoamine oxidases A and B.

2. There is another tertiary amine that has acquired interest for pharmacologists and toxicologists in recent years: this is 1-methyl-4-phenyl-1,2,3,6-tetrahydropyridine (MPTP), a substance that produces a condition similar to parkinsonism when administered to man and mammals (Langston 1985, 1987). MPTP itself is not the active agent; it is acted upon by monoamine oxidase, and the toxic effect is caused by one of its oxidation products. It has been discovered by Salach et al (1984) that, in close analogy to hordenine, MPTP is preferentially, but not exclusively, oxidized by monoamine oxidase B.

To summarise: the readiness to act upon tertiary amines may be a general feature of monoamine oxidase B.

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