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Baker's Yeast Treatment of Some Naturally Occurring Amides[1]

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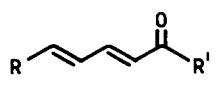
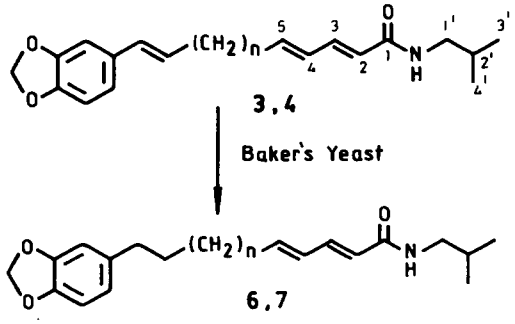
Abstract : The styryl double bond of brachystamide B and guineensine was found to be reduced by baker's yeast but that of piperine and piperlonguminine was uneffected. N-Isobutyl-2E,4E-decadienamide was also unchanged by baker's yeast treatment.

The amides of *Piper* species possess significant pesticidal properties[2]. Several chemical and biochemical transformations of naturally occurring amides have recently been carried out[2,3] to prepare their analogues which may exhibit better activity. We are currently investigating[4] the amide constituents of *Piper longum* Linn (Piperaceae). In continuation of our work[5] on the biochemical studies on natural products we have carried out baker's yeast treatment of piperine (**1**), piperlonguminine (**2**), brachystamide B (**3**), guineensine (**4**), and N-isobutyl-2E,4E-decadienamide (**5**), the amide constituents of *P. longum*, in order to find out the fate of their dienamide function and the styryl double bond as well as to prepare their analogues for bioevaluation.



1 : R = 3,4-Methylenedioxyphenyl, R' = Piperidyl
2 : R = 3,4-Methylenedioxyphenyl, R' = i-BuNH-
5 : R = C_5-H_{11}-, R' = i-BuNH-



3,6: n = 8
4,7: n = 6

It has been observed[1] that among the naturally occurring dienamides of *Piper* species some compounds possess an isolated styryl double bond (e.g. compounds **3** and **4**). It is very difficult to reduce this styryl

double bond chemically by keeping intact the dienamide function. However, several dienamides with an isolated styryl double bond and their corresponding dihydroderivatives where the styryl double bond has been saturated are frequently found[2,6] in nature. We have observed that the baker's yeast treatment of the amides **3** (brachystamide B) and **4** (guineensine) afforded the products **6** (brachystamide A[6]; yield 57%) and **7** (a hitherto unknown compound; yield 62%) respectively. The structures of **6** and **7** were established from their spectral properties[7]. Thus the baker's yeast treatment provided a mild and simple method for saturation of the isolated styryl double bond present in brachystamide B (**3**) and guineensine (**4**). Such biochemical reaction of natural amides is reported here for the first time.

The experimental procedure is simple. Baker's yeast (*Saccharomyces cerevisiae*, Type I, Sigma) (3 gm) was added to a vigorously stirred solution of sucrose (1.5 gm) in tap water (200 ml). The suspension was stirred for 1 hr at room temperature. Compound (**3** or **4**) (100 mg) was added and the stirring was continued. Three portions of fermenting baker's yeast [1.5 gm in a solution of sucrose (750 mg) in tap water (50 ml)] were added during 72 hr and the suspension was stirred for another 48 hr at room temperature. The mixture was extracted with EtOAc (3x100 ml). The extract was dried, concentrated and purified by column chromatography over silica gel to get the product (**6** or **7**).

The compounds, piperine (**1**) and piperlonguminine (**2**) where the styryl double bond is a part of the dienamide function were not at all changed by baker's yeast. The aliphatic dienamide **5** also remained unchanged. From this observation it can be concluded that the enzymes present in baker's yeast could not reduce the dienamide system but reduced the isolated styryl double bond regioselectively in our investigated natural dienamides.

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References and Notes

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7. The spectral properties of brachystamide A (**6**) was found to be identical to those reported in the literature[6]. For dihydroguineensine (**7**): ^{1}H NMR (200 MHz, $CDCl_3$): δ 7.14 (1H, dd, J=15.0 and 11.0 Hz, H-3), 6.90-6.68 (3H, m, Ar-H), 6.13-6.01 (2H, m, H-5 and H-4), 5.96 (2H, s, -OCH_2O-), 5.70 (1H, d, J=15.0 Hz, H-2), 5.42 (1H, brs, -NH-), 3.13 (2H, t, J=7.0 Hz, H_2-1'), 2.43-2.30 (2H, m, H_2-13), 2.14-2.05 (2H, m, H_2-6), 1.80 (1H, m, H-2'), 1.68-1.50 (2H, m, H_2-12), 1.42-1.20 (10H, brs, H_2-11-H_2-7), 0.90 (6H, d, J=7.0 Hz, H_3-3' and H_3-4'); MS m/z (%): 385 (M+; 2), 357 (8), 135 (100).

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