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Transformation of the Conjugated Dienamide System of Some Natural Alkamides to the β,γ-Unsaturated Amide Function Using Zn/HOAc[†]

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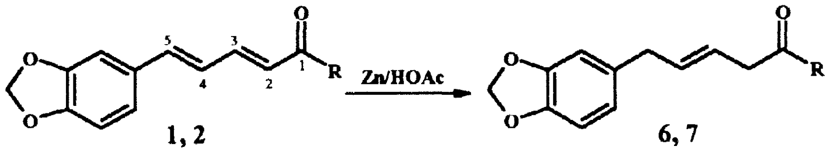
Abstract: The naturally occurring dienamides, piperine, piperlonguminine, guineensine, brachystamide-B and pergumidiene were converted to the corresponding β, γ-unsaturated amides by using Zn/HOAc.

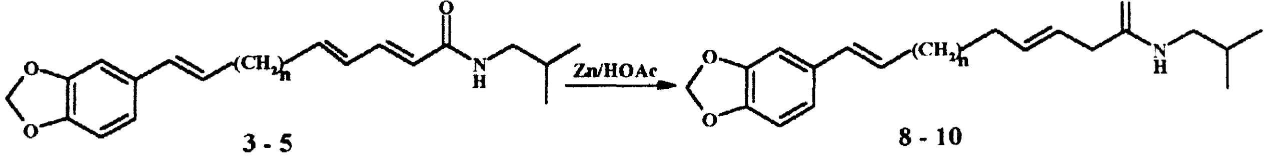
Key words: Dienamides, β, γ-unsaturated amide, Zn/HOAc

The amides of *piper* species are known to possess promising pesticidal and antitumour properties [1-3]. Various transformations of naturally occurring amides have recently been carried out [3-6] to prepare their analogues which may exhibit better activity. From the fruits of *Piper longum* Linn (piperaceae) we have isolated [7,8] several alkamides. A simple and efficient method has been developed for the conversion of the dienamide constituents of the plant, piperine (**1**), piperlonguminine (**2**), guineensine (**3**), brachystamide-B (**4**) and pergumidiene (**5**) to the corresponding β, γ-unsaturated amides by using Zn/HOAc.



1, 2 **6, 7**

1 and **6** : R = piperidyl ; **2** and **7** : R = i-BuNH-



3 - 5 **8 - 10**

3 and **8** : n = 6; **4** and **9** : n = 8; **5** and **10** : n = 9

[†] Part 8 in the series, "Synthetic Studies on Natural Products"; for part 7 see Das B, Venkataiah B. Syn. Commun. 1998 (submitted). IICT Communication No. 4132

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The structures of the products (**6**-**10**) were settled from their spectral properties[‡]. The products were formed by electron transfer from the metal to the reacting molecules to generate dianions followed by addition of protons from the solvent[‡].

In conclusion, we have developed a convenient and efficient method for the conversion of some natural dienamides to the corresponding β, γ-unsaturated amides. The dienamides are frequently found in nature but β, γ-unsaturated amides are rare [3,9]. The method developed by us will be useful for the preparation of β, γ-unsaturated amides which can be utilized for bioevaluation. The experimental procedure is simple[‡] and the reagents are readily available. The yield of the products is very high (91-95%). Such conversion of the naturally occurring dienamides to the corresponding β, γ-unsaturated amides by utilizing Zn/HOAc have not previously been reported.

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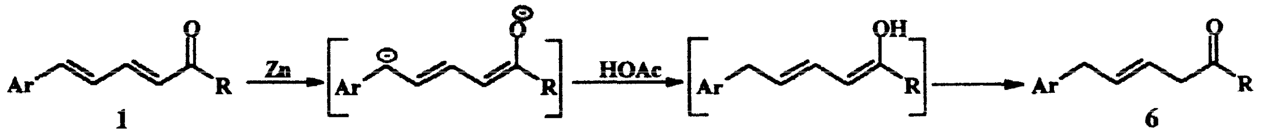
[‡] A typical experimental procedure is as follows: Piperine (**1**) (0.57g, 0.002 mole) in HOAC (10 ml) was stirred at room temperature. Zn (0.048g, 0.002 mole) was added to the mixture. After 2 hr the reaction mixture was filtered and water was added. The mixture was extracted with $CHCl_3$. The extract was washed with $NaHCO_3$ solution and water and subsequently dried. The concentrated extract was purified by column chromatography to afford dihydropiperine **6** (0.55 g, 95%).

The spectral properties of the representative molecule **6** are as follows: ^1H NMR (200 MHz, $CDCl_3$): δ 6.75-6.63 (3H, m, Ar-H), 6.96 (2H, s, $-OCH_2O-$), 5.68 - 5.62 (2H, m, H-3 and H-4), 3.60 (2H, t, J = 5.5Hz, $>NCH_2-$), 3.42 (2H, t, J = 5.5Hz, $>NCH_2-$), 3.33 (2H, d, J = 4.0Hz, H-5), 3.12 (2H, d, J = 4.0Hz, H-2), 1.78 - 1.50 (6H, m, $-(CH_2)_3-$ from piperidyl moiety); MS: m/z (%) 287 ($M^{+\cdot}$, 5), 152 (10), 135 (17), 115 (68). The ^1H NMR spectrum of **6** was verified by molecular modeling which showed the upfield shifting by δ 0.7 of the signals of H-3 and H-4 in the corresponding *cis*-isomer.

The mechanism of the formation of **6** is proposed as follows:



References:

[1] Kiuchi F, Nakamura N, Tsuda Y, Kondo K, Yoshimura H. Chem. Pharm. Bull. 1988, 36, 2452-2465.
[2] Duh, C -Y, Wu Y -C, Wang S -K. J. Nat. Prod. 1990, 53, 1575-1577.
[3] Banerji A. J. Ind. Chem. Soc. 1991, 69, 53-67.
[4] Rao AB, Rao MV, Kumar A, Krupadanam GLD, Srimannarayana G. Tetrahedron Lett. 1994, 35, 279-280.
[5] Das B, Kashinatham A, Madhusudhan P. Tetrahedron Lett. 1997, 38, 7457-7458.
[6] Das B, Kashinatham A, Madhusudhan P. Tetrahedron Lett. 1998, 39, 677-678.
[7] Das B, Kashinatham A, Srinivas KVNS. Planta Med. 1996, 62, 582-583.
[8] Das B, Kashinatham A, Madhusudhan P. Nat. Prod. Sci. 1998, 4, 23-25.
[9] Achenbach H, Fietz W, Woerth J, Waibel R, Portecop J. Planta Med. 1986, 52, 12-18.