HETEROCYCLES, Vol. 23, No. 1, 1985

SYNTHESIS OF BENZ[f]INDOLE SKELETON

Yasuoki Murakami, Toshiko Watanabe, and Chiemi Miyagi
School of Pharmaceutical Science, Toho University, 2-2-1 Miyama, Funabashi, Chiba 274
Hisashi Ishii
Faculty of Pharmaceutical Sciences, Chiba University, 1-33 Yayoi-cho, Chiba 260

There have been only a few methods for synthesis of benz[f]indole skeleton. Goldsmith reported the preparation of the 9-methoxybenz[f]indole(2), mp 229-230°C, from the 1-methoxynaphthylhydrazone(1) by Fischer indolization(F.I.) with HCl/EtOH, and this method has been believed as a sole benz[f]indole by F.I. Although Goldsmith must have considered that 1-methoxy group served as a blocking group against cyclization, we have experienced that Fischer indolization could occur at the ortho-position occupied by a methoxy group in cases of some phenyl- and naphthylhydrazones. Thus we re-examined the Fischer indolization of 1, and obtained the same compound (mp 232-233°C) as Goldsmith. However, we found that this compound was not 9-methoxybenz[f]indole(2) but 5-chlorobenz[e]indole(3) by chemical means. This consideration forced us to develop a new route to benz[f]indole.

The target compound was 9-methoxybenz[f]indole(2) which Goldsmith had wanted to prepare. The method involved the Friedel-Crafts acylation of starting ethyl pyrrole-2-carboxylate(4) with phthalic anhydride at C-4 and the following scheme is shown in the Chart. Protection of nitrogen by benzyl group was necessary, because N-methylation occurred simultaneously with the desired O-methylation. The final debenzylation step was accomplished by treating 5 with $AlCl_3$ in anisole, which is a novel debenzylation method developed recently by us. The present method can be applied to the synthesis of other related benz[f]indoles.