An Easy Route to Dibenz[*c*,*e*]azepines *via* Nitrile Ylide Cyclisation: the Electrocyclic Equivalent of a Bischler–Napieralski Reaction

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N-(2-Arylbenzyl)benzimidoyl chlorides (9) are converted into dibenz[c,e]azepines (6) by treatment with potassium t-butoxide, via cyclisation of nitrile ylides (4).

Recent work has established that the 1,7-cyclisation of diene-conjugated 1,3-dipolar intermediates can provide effective routes to a variety of monocyclic and fused sevenmembered heterocyclic systems such as azepines,1,2 diazepines,^{3,4} triazepines,⁵ and oxepines.⁶ This communication is concerned with the reactions of systems of types (3) and (4) in which both α,β - and γ,δ -double bonds of the diene are aromatic. In earlier work on diazo compound cyclisations it was found that systems incorporating a benzene or heteroaromatic ring in the α,β - or γ,δ -position, for example (1a)⁷ and (1b),⁸ cyclised to give benzo-fused 1,2-diazepines (2a) and (2b), respectively, but that the inclusion of *two* aromatic rings as in (3) (or thiophene-containing analogues) completely precluded cyclisation: such diazo compounds reacted only via loss of nitrogen to give carbene-derived products.9 We now report that, in contrast, nitrile ylides (4), of the same type as (3), undergo rapid cyclisation to provide an easy and effective new route to the dibenz[c,e] azepine system (6)[†] (Scheme 1

	Table 1	I. Yields	of dibenzazepin	es (6).
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(6)	R	Ar'	Yield (%)
а	Н	Ph	69
b	Cl	Ph	77
с	Cl	o-ClC ₆ H ₄	72
d	Cl	o-FC ₆ H ₄	65
e	Cl	$3,4-(MeO)_2C_6H_3$	78

[†] The products had lit.¹⁰ m.p.s for known examples (**6a**, **b**, **d**) or were identified by elemental analysis and n.m.r. spectroscopy.

and Table 1). Examples of this system are known to be useful as anxiolytics.¹⁰ The nitrile ylides (4) were generated at $0 \,^{\circ}$ C or room temperature by the reaction of the imidoyl chlorides (9) with potassium t-butoxide in tetrahydrofuran; their presence was indicated in some cases by a transient purple colour. An attraction of this route is the ease of preparation of the amide





Scheme 1



Scheme 2

precursors (8) by conventional methods under mild conditions, for example as shown in Scheme 2 utilising as the key step Meyer's oxazoline route to biaryls¹¹ (7) followed by conversion of the oxazoline ring into CHO, CH=NOH, CH₂NH₂, and CH₂NHCOAr'. The imidoyl chlorides (9) were prepared by conventional routes¹² or by the use of dimethylformamidinium chloride as reagent (prepared *in situ* by reaction of thionyl chloride with *N*,*N*-dimethylformamide). This synthesis thus permits the incorporation of a wide range of substituents into the dibenzazepine ring and the 7-aryl group (Ar').

Overall the conversion of the amide (8) into the dibenzazepine (6) is equivalent to a Bischler-Napieralski-type reaction, but is achieved under very mild conditions. It apparently proceeds *via* an electrocyclic aromatic substitution process which is intrinsically less sensitive to the polar influence of substituents in the aromatic ring under attack than the Bischler-Napieralski reaction which involves electrophilic substitution.

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