Diphenylcyclopropenone, originally synthesized in 1959 by Breslow and co-workers, was the first molecule to be prepared with a carbonyl group in a three-membered ring. This stable molecule has aromatic character and reacts with both electrophilic and nucleophilic reagents. Due to its strained ring diphenylcyclopropenone acts as an ambident electrophile with the potential for nucleophilic addition at the carbonyl group or conjugate addition. These factors allow participation in a wide variety of synthetically useful reactions, and the use of diphenylcyclopropenone in the preparation of a plethora of heterocyclic systems has been systematically studied over the past few decades.

Cycloaddition chemistry plays a major role in the synthetic versatility of diphenylcyclopropenone. For example, reaction with imines, and other compounds containing a C=N moiety, results in the formation of azacyclopentenones (pyrrolinones), such as 1 and 2 (Scheme 1), via formal [2+3] cycloaddition.

Aly and co-workers have shown that reaction of diphenylcyclopropenone with two equivalents of substituted thiosemicarbazides results in the formation of 1,2,4-triazolo[4,3-b]pyridazinethiones (Scheme 2). N-substituted hydrazine derivatives of thiosemicarbazides react stoichiometrically to yield pyridazinethiones (Scheme 3). In each case, the reaction is mechanistically described as a formal [3+3] cycloaddition.

**Scheme 1**

**Scheme 2**
A selection of the wide variety of hetero- and carbocyclic systems that can be formed from diphenylcyclopropenone are shown in Scheme 4, and include 1,2-dihydro-3H-pyrrol-3-ones,7 pyrrolo[2,1-b]-1,3,4-oxadiazoles,8 azabicyclo[4.2.1]nonenes9 and cycloheptatrienes,10 structures 3-6 respectively (Scheme 4).

Outside of the field of synthetic chemistry, diphenylcyclopropenone finds utility in medicine, where it is often referred to as diphencyprone, DPCP or DCP. Applied topically, diphenylcyclopropenone is used as a treatment for cutaneous warts,11 atopic dermatitis,12 and alopecia areata.13 Recently, the successful use of DPCP as a single agent in the treatment of cutaneous metastatic melanoma has been reported,14 use in combination chemotherapy and with radiotherapy has previously been disclosed.15,16

References: