INTRODUCTION

The family Braconidae contains species which are exclusively parasitoids of various pest species mainly belonging to the Lepidoptera and also of other insect orders. These parasitoids keep the pest populations under check in their natural habitats. However, due to hazardous nature of chemicals used in the control of pest species, alternative and safer and more eco-friendly methods of control have been investigated especially in the last century all over the world (Bosen and DeBach, 1991). One of the best alternative method of control of insect pests has proved to be the use of other insects (called parasitoids) for the control of pest species.

The Ichneumonoidea, the Chalcidoidea and the Proctotrupoids and other members of the order Hymenoptera contain species which are almost exclusively parasitic in or on other insects. Among these parasitic hymenopteran groups, Braconidae (Ichneumonoidea) contain species, which are exclusively parasitoids of Lepidoptera, Coleoptera and other pest species of economic importance.

The family Braconidae is the second largest family of the order Hymenoptera containing with 17,500 valid species in the world, (Wharton and Achterberg, 2000; Shi et al., 2005) and about 500 species from India. The members of the family Braconidae vary in size from 1 mm. to 30 mm. in length. Braconid wasps may be recognised by the absence of a costal cell in the forewing, fusion of metasomal terga 2 and 3, called syntergum, presence of trochantellus, and absence of vein 2 m-cu in forewing except in the subfamily Apozyginae.

The family Braconidae is currently divided into 34 subfamilies (Wharton et al., 1997). The present thesis deals with the taxonomy of two subfamilies, Euphorinae and Meteorinae. These subfamilies were selected for taxonomic studies because of the megre work available on the Indian fauna, and because of the potential importance of parasitoids of these two subfamilies in the bio-control of pest species.
The subfamily Euphorinae is cosmopolitan in distribution, containing 54 (sub) genera and about 500 species (Chen and van Achterberg, 1997). All euphorines are solitary or gregarious koinobiont endoparasitoids of larval and adult Coleoptera, Heteroptera, Neuroptera, Psocoptera, Orthoptera, Lepidoptera and Hymenoptera (Shenefelt, 1969; Shaw, 1985, 1987, 1988, 1996 and 1997a; Belokobylskij, 1995 and 1996; Chen and van Achterberg, 1997). Thus euphorine parasitoids are of great economic importance, for example, species of *Microctonus* Wesmael, *Leiophron* Nees and *Peristenus* Foerster have been used in the biological control programmes against such pests as gypsy moth, the alfalfa weevil and lygus plant bugs respectively (Shaw, 1985, 1997a; Day et al., 1992). Recently a South American species *Microctonus hyperodae* Loan was imported into New Zealand to aid in the suppression of the Argentine stem weevil, *Listronotus bonariensis* (Kuschel) (Shaw, 1993; Mc Niell et al., 1993).

Most of the euphorine parasitoids are considered beneficial insects. However, a few species are parasitoids of beneficial insects, such as *Dinocampus coccinellae* (Schrank) parasitising the ladybird beetle (Shaw, 1985) and *Syntretomorpha szaboi* attacks the Oriental honeybee, *Apis cerana* Fabricius in India (Walker et al., 1990).

The subfamily Meteorinae is a moderately large subfamily containing two genera, and about 174 species from the world (Shaw, 1988 and 1997b). The meteorines are solitary or gregarious koinobiont endoparasitoids of the larval Coleoptera and Lepidoptera and many species of *Meteorus* Haliday have broad host ranges (van Achterberg, 1979; West and Miller, 1989 and Maeto, 1990). The vast majority of meteorines are solitary parasitoids attacking exophytic lepidopteran larvae and many are nocturnally active. Several species of *Meteorus* have been used successfully in biological control programme (Huddleston, 1980, 1983; Muesbeck, 1923). *Meteorus versicolor* (Wesmael) was introduced into New England (U.S.A.) in early 1900s to control the brown tail moth, *Euproctis chrysorrhoea* (Muesbeck, 1923).

In spite of great economic importance of Euphorinae and Meteorinae in the biological control of insect pests, their use as bio-control agents to a great extent is
hampered by the lack of reliable taxonomic studies on these parasitoids. The taxonomy of the subfamily Euphorinae and Meteorinae had received very little attention and only a few papers have been published from India (Viereck, 1912; Wilkinson, 1929, 1930; Beeson, 1941; Narayanan et al., 1960; van Achterberg, 1979; Shujauddin, 1981; Sharma, 1985; Walker et al., 1990; Papp, 1990, 1997; Narendran and Rema, 1996; Ahmad et al., 2002; Haider et al., 2003; Shamim et al., 2004; Narendran et al., 2005). This motivated the present writer to undertake the study of the taxonomy of Indian Euphorinae and Meteorinae and an extensive survey of this groups of parasitoids has been carried in India.

The present thesis is divided into two parts; Part I deals with the taxonomy of Indian Euphorinae and Part II with the taxonomy of Indian Meteorinae. In all 12 genera (10 of Euphorinae and 2 of Meteorinae) and 49 species have been recognised from India, of which 23 species have been described as new. The genus *Peristenus* Foerster is recorded for the first time from India. Keys for identification of Indian genera and species of Euphorinae and Meteorinae are given.

The types and other material presented in the thesis have been deposited in the Insect collection, Department of Zoology A.M.U., Aligarh.