

## GENERAL INTRODUCTION

Hymenopteran parasitoids play an important role in the Biological Control of insect pests. The parasitic forms, except a few which destroy beneficial insects, attack Lepidoptera, Diptera, Coleoptera, Neuroptera, Hemiptera and several other Orders of insects including the suborder Symphyta of the Order Hymenoptera. *Apanteles glomeratus* (L.) was the first parasitoid introduced into the United States of America from England in 1883, in order to combat *Pieris brassicae* (L.) (De Bach, 1964). The Braconidae includes the maximum number of described species in the Hymenoptera. The vast majority of braconids are primary parasitoids of other insects, especially upon the larval stages of Coleoptera, Diptera, and Lepidoptera and also some Homoptera (Aphidoidea) and Embioptera. As parasitoids they invariably kill their hosts. The Braconid parasitoids have been successfully used to combat the pest species as bio-control agents (Silvestri, 1914; Willard and Mason, 1937; Clausen *et al.*, 1965; Fischer, 1971; Greathead, 1975; Legner, 1978; Hendrikse *et al.*, 1980; Kumar, 1984; Wharton, 1984; Drea and Hendrickson, 1986; Guppy *et al.*, 1988; Wharton, 1989; Shaw and Huddleston, 1991; Baranowski *et al.*, 1993). Recently, in the integrated pest management programmes the parasitoids are also used as natural component (Petitt, 1993).

The Alysinae and Opiinae constitute one of the speciose subfamilies of Braconidae, containing over 2300 described species worldwide. Members of both the subfamilies are most important group of parasitoids of cyclorrhaphous Diptera, especially the fruit flies and leaf miners. More than a hundred species

of this group have been successfully used in the classical biological control programmes (Wharton and Gilstrap, 1983; Waterhouse, 1993; Ovruski *et al.*, 2000). During recent years, the classification of the Alysiinae and Opiinae have been revised by several workers, mainly for the Holarctic and Australasian region (Fischer 1972, 1987; Wharton, 1988; Wharton and Austin 1991; Wharton 2002; Carmichael *et al.*, 2005). The Alysiinae and Opiinae were first catalogued by Shenefelt (1974) and Fischer (1971) respectively. Their works have clarified the concepts of genera and species. Major additions towards the taxonomy of Alysiinae and Opiinae include various regional revisions by Fullaway (1951); Fischer (1966, 1971b, 1972, 1977, 1987); Tobias (1986, 1998, 2006); Wharton (1977, 1980, 1997a, b, 2002) Belokobylskij (1998a) and Chen and Wu (1994).

In spite of great economic importance of Alysiinae and Opiinae in the bio-control of insect pests, their use as bio-control agents is hampered to a great extent by the lack of reliable taxonomic studies on this group parasitoids. Apart from Fischer (1987), the taxonomy of the Alysiinae and Opiinae had received very little attention and only a few papers have been published from India. This motivated the present author to undertake the study of the taxonomy of Indian Alysiinae and Opiinae. This is based upon extensive survey and collection of parasitoids from various pest species.

The present thesis is divided into two parts. Part I deals with taxonomy of Indian Alysiinae and Part II with taxonomy of Indian Opiinae. In all 19 genera (11 of Alysiinae and 8 of Opiinae) have been recognized recognized

from India, of which 3 genera viz., *Aphaereta* Foerster, *Chorebus* Haliday and *Orthostigma* Ratzeburg are recorded for the first time and 31 new species have been described from India (Alysiinae 6 species; Opiinae 25 species). Keys for the identification of Indian genera and species of Alysiinae and Opiinae are given. The types of the new species and material of known species have been deposited in the Insect collection, Department of Zoology, Aligarh Muslim University, Aligarh, India