CHALCIDOIDEA (HYMENOPTERA: INSECTA) STATUS AND DIVERSITY IN INDIA

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In the field of insect pest control, increasing attention is being paid to the ecofriendly and environmentally safe methods. Biological control has come to stay as one of the best alternatives to chemical control and the utilisation of insect parasites and predators has emerged as one of the most fruitful strategies in Integrated Pest Management. Biological control, however, depends to a considerable extent on taxonomy for the correct identification of both pests and their natural enemies.

The superfamily Chalcidoidea, commonly called the Chalcid wasps is one of the largest groups of parasitic Hymenoptera. Most members of the group attack major insect orders, many of which are agricultural and forest pests of economic importance. Chalcids attack a wide range of hosts which include 12 orders of insects and two orders of Arachnida (Table 1). Through their parasitic mode of life, they destroy populations of potential pest species in the field by regulating their numbers, thus playing an important role in the biological control of serious pests.

The chalcids are cosmopolitan and include about 2,000 genera and 19,000 described species from the world (Noyes, 1990). They are characterised by their minute size, ranging from 0.18mm to about 25mm and are readily distinguished from other groups of parasitic Hymenoptera by the reduced forewing venation without closed cells.

Despite the abundance of Chalcidoid taxa, their complex biological interactions and baffling morphology, the group has received relatively little attention in India. Several attempts have been made to document the Indian fauna by Mani (1938, 1989), Joseph, Narendran and Joy (1973), Subba Rao and Hayat (1985, 1986), Boucek (1979), Narendran (1989, 1991) and, Noyes and Hayat (1984).

Members of 19 families of Chalcidoidea are known from India (Sureshan, 1998). Among these, the Encyrtidae, Chalcididae, Eurytomidae, Aphelinidae and Trichogrammatidae are well documented. The families Tanaostigmatidae, Tetracampidae, Eulophidae, Pteromalidae, Perilampidae, Ormyridae etc., are less studied.

The approximate number of valid genera and species of Indian Chalcidoidea is 528 and 1724 respectively. This forms only 27 per cent and nine per cent respectively of the world genera and species (Table 2).

Chalcidoidea on the whole exhibit a very low level of endemism at generic level in India. However, at family level, Encyrtidae and Agaonidae show higher levels of endemism in general followed by Pteromalidae, Eurytomidae, Eulophidae, Aphelinidae and Eucharitidae. The families Leucospidae, Perilampidae, Torymidae, Signiphoridae and Tetracampidae contain no endemic genera. The range of endemism in species varies between 40 and 100 per cent among different families (Table 2). Second to the Oriental species, Palaearctic elements dominate in Indian Chalcid fauna, followed by Australian and Ethiopian species. Nearctic and Neotropical species are very poorly represented in India.

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References

- Boucek, Z. (1979).** A preliminary review of Pteromalidae (Hymenoptera) of India and adjacent countries. *Oriental Insects* 12: 433-468.
- Joseph, K.J., T.C. Narendran and P.J. Joy (1973).** *Oriental Brachymeria*. A Monograph of the oriental species of *Brachymeria* (Hymenoptera: Chalcididae). Dept. Zool., Uni. of Calicut, 215 pp.
- Mani, M.S. (1938).** Chalcidoidea. *Catalogue Indian Ins.* 23. ii. Delhi, 170 pp.
- Mani, M.S. (1989).** *The fauna of India and the adjacent countries. Chalcidoidea (Hymenoptera) part I & II.* Zool. Sur. India, 1067 pp.
- Narendran, T.C. (1989).** *Oriental Chalcididae (Hymenoptera: Chalcidoidea)* Dept. Zool. Uni. of Calicut, 440 pp.
- Narendran, T.C. (1991).** *Torymidae and Eurytomidae of Indian Sub-continent (Hymenoptera: Chalcidoidea)* Dept. Zool. Uni. of Calicut, 500 pp.
- Noyes, J.S. (1990).** The number of described Chalcidoid taxa in the world that are currently regarded as valid. *Chalcid forum*. 13: 9-10.
- Noyes, J.S. and M. Hayat. (1984).** A review of the genera of Indo-Pacific Encyrtidae (Hymenoptera: Chalcidoidea) *Bull. British Mus. Nat. Hist. (Ent.)* 48(3): 131-395.
- Subba Rao, B.R. and M. Hayat (eds.) (1985).** The Chalcidoidea (Insecta: Hymenoptera) of India and the adjacent countries Part I. Review of families and keys to families and genera. *Oriental Insects* 19: 161-310 & 15 pp.
- Subba Rao, B.R. and M. Hayat (eds.) (1986).** The Chalcidoidea (Insecta: Hymenoptera) of India and the adjacent countries. Part II. A catalogue. *Oriental Insects* 20: 1-430.
- Sureshan, P.M. (1998).** Faunal diversity in India: Chalcidoidea (Hymenoptera). In: *Faunal Diversity in India*, J.R.B. Alfred *et al.* (Eds.) pp. 336-341, Envis Centre Zool. Surv. India, Calcutta.

Table 1. Host records of Chalcidoidea

Family	Phytophagous				Parasitic																												
					Lepidoptera			Diptera			Coleoptera			Larvae of aculeate Hymenoptera	Eggs of spiders	Eggs of mites	Eggs or larvae of neuroptera	Eggs of heteroptera	Eggs of psocoptera	Eggs of Odonata	Eggs of Thysanoptera	Eggs of Orthoptera	Coccids	Pseudococcids	Eggs of Homoptera	Eggs of Phasmida	Larvae of Ants	Ootheca of Cockroach	Ootheca of Mantids	Aphids	Eggs of Cicada	Cocoons of Moths, Butterflies	Cynipidae
	Syconia of fig	Plant galls	Seeds	Grass stem	Egg	Larvae	Pupae	Egg	Larvae	Pupae	Egg	Larvae	Pupae																				
Chalcididae																																	
Leucospidae																																	
Eurytomidae																																	
Torymidae																																	
Agaonidae																																	
Pteromalidae																																	
Perilampidae																																	
Eucharitidae																																	
Eupelmidae																																	
Eulophidae																																	
Tetracampidae																																	
Tanaostigmatidae																																	
Mymaridae																																	
Trichogrammatidae																																	
Aphelinidae																																	
Encyrtidae																																	
Elasmidae																																	
Signiphoridae																																	
Ormyridae																																	
Mymaromatidae																																	
Rotoitidae																																	

Table 2. Diversity of Chalcidoidea

Family	Genera			Species				
	World-wide	In India	Percent represented in India	World-wide	In India	Percent represented in India	Endemic to India	Percent endemic in India
Leucospidae	4	1	25	134	7	5	5	71
Chalcididae	91	34	37	1466	176	12	70	40
Eurytomidae	79	27	34	1200	180	15	130	72
Torymidae	103	21	20	950	55	6	42	76
Agaonidae	69	23	33	608	86	14	53	62
Ormyridae	2	2	100	66	3	5	3	100
Pteromalidae	551	102	19	3003	140	5	88	63
Eucharitidae	50	8	16	348	22	6	20	91
Perilampidae	19	4	21	229	12	5	9	75
Tetracampidae	14	2	14	44	2	5	2	100
Tanaostigmatidae	9	1	11	88	1	1	1	100
Eupelmidae	45	18	40	715	79	11	68	86
Encyrtidae	451	150	33	3277	415	13	342	82
Signiphoridae	4	3	7	75	9	12	7	78
Eulophidae	280	61	22	3400	210	6	159	76
Elasmidae	1	1	100	203	30	15	21	70
Aphelinidae	38	26	68	975	135	14	82	61
Trichogrammatidae	76	28	37	650	66	10	59	89
Mymaridae	100	17	17	1303	96	7	88	92
Mymaromatidae	1	-	0	3	-	0	-	0
Rotoitidae	1	-	0	1	-	0	-	0
Total	1988	528	27	18738	1724	9.2	1249	72