

CLASSIFICATION OF THE FAMILY BRACONIDAE

Linnaeus (1758) described braconids, ichneumonids and other Terebrantia under the genus *Ichneumon* L. The family name Braconidae attributed to Nees (1812). He (1812, 1814, 1816) for the first time attempted to establish a hierarchical framework of Braconidae.

He divided the Ichneumonideous genera into two division – the *Ichneumonides Genuini* and the *Ichneumonides Adsciti*. These two divisions being further divided into numerous genera; the Adsciti being primarily divided into two groups named, Bracones and Bassi. Nees mainly concentrated on the “*Ichneumonides adsciti*”, which contained the species now included in Braconidae. He used the word “familia” to denote both groups of species within a genus as well as groups of genera.

Stephens (1835) separated the Ichneumonidae into four families mainly on the basis of the number of joints in the maxillary palpi: Ichneumonidae, Braconidae (5-jointed), Alysiidae (6-jointed) and Aphidiidae (4-jointed). Wesmael (1835) named the *Ichneumonides Genuini* and *Adsciti* as *Ichneumonides* characterised by having two recurrent (m-cu) veins and braconids having only one recurrent vein in the fore wing, respectively. He further divided the Braconids into two groups viz., ‘braconides endodontes’ (having the teeth of the mandibles directed inwardly; the mandibles meeting together when closed) and ‘braconides exodontes’ (having the teeth of the mandibles directed outwards; the mandibles when closed, not touching each other). The later group is now called the Alysiinae (Achterberg, 1993). The endodontes being further divided into four subdivisions viz., (i) Polymorphi (clypeus entire, abdomen 6 to 7 jointed, posterior part of the vertex convex, second submarginal cell (when present large) (ii) Cryptogastri (clypeus entire, posterior part of vertex convex, abdomen dorsally presenting not more than two transverse sections, second submarginal cell (when present large) (iii) Areolarii (clypeus entire, vertex more or less emarginate behind, abdomen 6 to 7 jointed,

second submarginal cell (when present very small) and (iv) Cyclostomi (clypeus deeply notched, leaving a circular aperture between it and the jaws, abdomen generally 6 to 7 jointed, second submarginal cell when present large). The “polymorphi” contain the subfamilies Aphidiinae, Cenocoeliinae, Euphorinae, Helconinae, Ichneutinae, Macrocentrinae, Opiinae and Orgilinae. The “cryptogastrii” contain Cheloninae and Sigalphinae. The “areolarii” contain Agathidinae and Microgastrinae. The “cyclostomi” contain Braconinae, Doryctinae, Hormiinae, Rogadinae and Rhyssalinae.

Haliday (1838) divided Ichneumonideous genera into five families including Evaniidae, Ichneumonidae, Agriotypidae, Braconidae and Aphidiidae on the basis of the nature of connection between the second and third dorsal segments (tergites) of the abdomen (metasoma) and outer discoidal (second discal) cell of the fore wing. Westwood (1840) followed the system of Wesmael (1835) and added a sixth division i.e., “Flexiliventes” for the Aphidiinae. Foerster (1862) divided the family Braconidae into 26 subfamilies, adding the suffix “-oidae”. Marshall (1891) added a seventh division “Pachylommatidae” to the family which later designated Hybrozontinae by Achterberg (1976). Marshall, further divided these large groups into 26 subfamilies for the Palaearctic region and used the suffix “-ides”. Dalla Torre (1898) compiled the world list of Braconidae. Ashmead (1900) provided the first general key to the subfamilies of Braconidae. He separated Alysiinae as family Alysiidae, while the remaining genera were placed in 17 subfamilies.

Szépligeti (1904) divided Braconidae into 31 subfamilies, of which the subfamily Lysiognathinae belongs to Ichneumonidae. Fahringer (1925) and Tobias (1971) proposed keys to the subfamilies for the Palaearctic region. Marsh (1963) gave a key for the Nearctic region. Later, he (1971) disregarded this key because of some disagreement to the limits of the various subfamilies in the Braconidae. Achterberg (1976) discussed the systematic position and evolutionary trends of the Braconidae, dividing the family into 22 subfamilies. Achterberg (1984, 1988), Quicke and Achterberg (1990), Achterberg *et al.*

(1992) and Whitfield and Mason (1994) gave the phylogeny of Braconidae. Concurrently, Sharkey (1993) has divided the family into 29 subfamilies viz., Adellinae, Agathidinae, Alysinae, Amicrocentrinae, Aphidiinae, Apozyginae, Braconinae, Cardiochilinae, Cheloninae, Doryctinae, Dirrhopinae, Euphorinae, Gnampodontinae, Helconinae, Homolobinae, Ichneutinae, Khoikhoiinae, Macrocentrinae, Meteoridiinae, Meteorinae, Microgastrinae, Miracinae, Neoneurinae, Opiinae, Orgilinae, Rogadinae, Sigalphinae, Trachypetinae and Xiphozelinae. Recently, Achterberg (1993) has divided the family into 47 subfamilies viz., Adeliinae, Agathidinae, Alysinae, Amicrocentrinae, Aphidiinae, Apozyginae, Betylobraconinae, Blacinae, Braconinae, Cardiochilinae, Cenocoeliinae, Charmontinae, Cheloninae, Dirrhopinae, Doryctinae, Economiinae, Euphorinae, Exothecinae, Gnampodontinae, Helconinae, Histeromerinae, Homolobinae, Hormiinae, Ichneutinae, Khoikhoiinae, Lysiterminae, Macrocentrinae, Masoninae, Mendesellinae, Mesostoinae, Meteorideinae, Microgastrinae, Microtypinae, Miracinae, Neoneurinae, Opiinae, Orgilinae, Pambolinae, Proteropinae, Pselaphaninae, Rhyssalinae, Rogadinae, Sigalphinae, Telengaiinae, Trachypetinae, Vaepellinae and Xiphozelinae.

One of the major differences in the way subfamilies are treated by Tobias (1986), Quick and Achterberg (1990), Achterberg (1993) and Sharkey (1993) involves the placement of the cyclostome groups. These genera have been variously classified as Hormiinae (Hedqvist, 1963; Wharton, 1993), Rogadinae (Wharton, 1988b), Doryctinae (Belokobylskij and Tobias, 1986) as a separate subfamily or a series of smaller subfamilies (Achterberg, 1993). And Whitfield and Wharton (1997) treated all these genera under the subfamily Hormiinae. Overall, the subfamily classification is somewhat controversial and decidedly unstable, with much of the debate centered on whether to recognize a relatively small number of larger subfamilies or a large number of smaller ones.

The subfamily Alysinae and Opiinae are derived members of the cyclostome lineage within the Braconidae. The phylogenetic relationships of the subfamilies have been firmly established (Griffiths, 1964; Capek, 1970;

Achterberg, 1983; Buckingham and Sharkey, 1988; Quicke and Achterberg, 1990; Wharton *et al.*, 1992), as they are parasitoids of cyclorrhaphous Diptera. They have many shared taxonomic characters (Synapomorphies) as well as similar life cycle patterns.