LITERATURE REVIEW

Santhosh S. “Investigation on the alpha taxonomy of bethylidae (hymenoptera: chrysidoididea) of southern western ghats”
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CHAPTER: 2
LITERATURE REVIEW

2.1 General Historical Overview of Family Bethylidae

HALIDAY (1839) first used the name Bethylidae. FORSTER (1856) used a different name Bethyloide for the same group, which ASHMEAD (1902) corrected to Bethylidae. However, ASHMEAD (1893) treated the family Bethylidae as a subfamily of the old family Proctotrypidae, when he published some new species. CAMERON (1883) incorporated the subfamily Bethylinae in the family Proctotrupidae. DALLA TORRE (1898) divided Cameron’s Bethylinae into two subfamilies, Bethylinae and Pristocerinae. On the other hand, ASHMEAD (1902) and BROWN (1906) placed Bethylidae or Bethylinae in the superfamily Vespoidea.

In the early 20th century, Kieffer studied the fauna of Bethylidae of the entire world and described many genera and species. In ‘Genera Insectorum’ KIEFFER (1908) gave descriptions for 491 species under 58 genera of Bethylidae of the world. Furthermore, in ‘Das Tierreich’, KIEFFER (1914) recognized 660 species under 102 genera, and presented a key to known species. He also established 5 tribes, namely Pristocerini, Sclerodermini, Epyrini, Mesitiini, and Bethylini.

Since the great world-wide revision of KIEFFER (1914), many workers described more than 1,000 species of this family. However, none of the authors provided world-wide inventory thereby producing a dispersed knowledge for the different regions of the planet. This has resulted in the difficulty of establishing relations between the faunas of the zoogeographical regions. With the intention to overcome such difficulties, GORDH and MÓCZÁR (1990) provided a catalogue for all the species of the family in the world, registering about 1,800 species, placed in 104 genera. Moreover, TERAYAMA (1995a, 1995b, 1996a) has carried out thorough revision of the subfamilies and tribes based on cladistic analysis and this has promoted a better agreement on the group, establishing some synonymies and placing genera incertae sedis in specific tribes.
2.2 World Bethylidae


PANZER (1801) described the first known Bethylid species Bethylus cenopterus (=Tiphia cenoptera) and Bethylus hemipterus (=Tiphia hemiptera) from Germany. LATREILLE (1802) erected the very first genus, Bethylus. KLUG (1808)
erected the genus *Pristocera*. LATREILLE (1809) erected the genus, *Sclerodermus* with the type species, *Sclerodermus domesticus* Klug. In some papers, the species *Sclerodermus domesticus* (Laterille) is named *Scleroderma domesticum* Laterille (KÜHNE and BECKER, 1974). They affirmed that although the species was described by Klug, the author of the concerned publication was Laterille. WESTWOOD (1832) conducted studies on Bethylids and erected *Epyris*. WESTWOOD (1833) erected the genus *Cephalonomia*. HALIDAY (1834) published notes on Bethyli. HALIDAY after four years in 1838, studied and published notes on the genus *Epyris* Westwood. WESTWOOD (1839) published a monograph on the genus *Sclerodermus*. DAHLBOM (1854) erected the genus *Cleptes* that was subsequently designated as *Heterocoelia* Dahlbom by BODENSTEIN (1939). FÖRSTER (1856) erected the genus *Goniozus*.

WESTWOOD (1874) erected the genera *Apenesia* Westwood and *Eupsenella* Westwood. In addition to that, WESTWOOD (1881) published descriptions of the following: *Sclerodermus bicolor*, *Sclerodermus wollastonii*, *Sclerodermus vigilans*, *Sclerodermus thwaitesiana*, *Sclerodermus soror*, *Sclerodermus linearis*, *Sclerodermus fonscolombei*, *Cephalonomia cursor* and *Cephalonomia peregrina*. ASHMEAD (1893) published a monograph on the North American Proctotrypidae in which he included the Bethylid wasps. KIEFFER (1904a) erected the genera *Pseudisobrachium* and *Homoglenus*. KIEFFER (1904b) erected the genus *Rhabdepyris*. KIEFFER (1904c) erected the genera *Odontepyris* Kieffer, *Discleroderma* Kieffer and *Parascleroderma*. KIEFFER (1905a) erected the genera *Trissomalus*, *Allepyris*, *Bradepyris*, *Dispyris*, *Glenosema*, *Holepyris*, *Neurepyris*, *Planepyris*, *Pristepyris*, *Proscleroderma*, *Scaphepyris*, *Trachepyris*, *Trissepyris* and *Anisobrachium*. KIEFFER (1905b) erected the genera *Prosierola*, *Allobethylus* and *Anisepyris*. KIEFFER (1905c) published a paper on Bethylidae of Europe and Algeria. TURNER conducted studies on fossorial Hymenoptera with special reference to Bethylidae (1915a, 1915b, 1917).

ROHWER (1917) described *Goniozus emigratus* (Rohwer) from material collected from Oahu, a parasite of the pink bollworm, *Pectinophora gossypiella*.
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(Saunders). BRIDWELL (1917a, 1917b) studied Bethylidae of Hawaii and published notes on *Epyris* and other Bethylids. BRUCH (1917a, 1917b) published a systematic study on Bethylidae. WATERSTON (1923) erected the genus *Prorops*. Extended summaries of the habits of the family were presented by BRIDWELL (1919, 1920). GELDERN (1927) studied the systemic effects following the sting of a species of *Epyris* Westwood. BERLAND (1928) separated superfamily Bethyloidea from superfamily Proctotrupoidea [= Proctotrupidae in CAMERON (1883)] and raised Kieffer's 5 tribes to subfamily rank. The name Mesitinae was given initially by BERLAND (1928) which was later changed to Mesitiinae, according to the International Code of Zoological Nomenclature (4th Edition). WHEELER (1928) presented summaries of the main habits of the family Bethylidae. GAHAN (1930) presented synonymical and descriptive notes on parasitic Hymenoptera including Bethylidae. One of the most thorough studies on a single species was that by VAN EMDEN (1931) on *Cephalonomia gallicola* Ashmead, a gregarious external parasitoid of the larvae and pupae of the anobiid beetle, *Stegobium paniceum* Linne.

ESSIG (1932) and ESSIG and MICHELBAKER (1932) conducted studies on stinging Bethylids with special reference to the genus *Epyris*. RICHARDS (1932) prepared notes on the genus *Bethylus* Latreille (= *Perisemus* Förster). RICHARDS (1933, 1939) carried out further studies and contributed a thorough revision of the British Bethylidae. HOFFER (1936) described and presented a systematic treatment on Bethylidae of France. BACK and COTTON (1938) studied the parasites including Bethylids of the grain pests. Immature stages of the family were discussed in detail by CLAUSEN (1940). REID (1941) published his studies on the thorax of the wingless and short-winged Hymenoptera with special reference to Bethylidae. ASAHINA (1953) reported a remarkable case of the biting of *Sclerodermus nipponicus* Yuasa in Tokyo. KAWASHIMA (1959) reported eye injury caused by the sting of *Sclerodermus nipponicus* Yuasa and discussed the morphology of the wasp.
EVANS (1961) revised the genus Kieffer of North and Central America. EVANS (1962) revised the genus Bethylus of North America. EVANS (1963a) revised the genus Apenesia Westwood in the Americas. EVANS (1963b) revised the genus Pristocera Klug in the Americas. BENOIT (1963a) thoroughly studied the African Bethylidae and presented a monograph on subfamily Pristocerinae. BENOIT (1963b) published rectifications to the Monograph on African Bethylidae in the same year. EVANS (1964) conducted an extensive revisionary study and contributed to the taxonomy of the New World Bethylid fauna. In this revision, he recognized 4 subfamilies in Bethylidae, namely Pristocerinae, Epyrinae, Mesitiiinae and Bethylinae, and regarded Berland’s subfamily Scleroderminae as a tribe of subfamily Epyrinae. EVANS (1964) contributed a revision of the American Bethylidae. EVANS (1965) revised the genus, Rhabdepyris in the New World.

KROMBEIN (1967) presented supplement to the synoptic Catalog of Hymenoptera of America North of Mexico. EVANS (1969a) studied Phoretic copulation in Hymenoptera, especially in Bethylidae. EVANS (1969b) revised the genus, Epyris Westwood in the Americas. NAGY (1969) conducted his systematic studies on Mesitiiinae. NAGY (1970) contributed a revision of the European species of the genus Epyris Westwood. Móczár’s work on Mesitiiinae from around the world was published in two parts, the first part (MÓCZÁR, 1970a) contains description of some new genera and species in which he erected the genus Sulcomesitius and the second part (MÓCZÁR, 1970b) was a revision of genera Sulcomesitius and Metrionotus. MÓCZÁR (1971a) erected genus Pycnomesitius. The third part of the “Mesitiiinae of World” by MÓCZÁR (1971b) deals with genera Mesitius Spinola, Pycnomesitius Móczár, Parvoculus Móczár, Pilomesitius Móczár and Heterocoelia Dhalbom.

TACHIKAWA and YUKINARI (1974) studied parasites of Goniozus japonicus Ashmead in Japan. KÜHNE and BECKER (1974) published a paper, which is probably the most comprehensive paper on Scleroderma domesticum. HEDQVIST (1975) published keys to subfamily, genera and species of Bethylidae in his revision of Bethylids of Sweden with description of a new genus Snappania, Suthosh, S.
which was later synonymized with *Plastanoxus* Kieffer. TACHIKAWA (1976) published the record of *Cephalonomia gallicola* (Ashmead) from Japan. GORDH (1976) studied the morphology and biology of *Goniozus gallicola* (Kieffer) in detail. BERLAND (1976) conducted studies on Bethylids of France and presented an Atlas of French hymenopterans with special reference to Bethylidae. EVANS (1977) revised the genus, *Holepyris* Kieffer in the Americas. EVANS (1978) did the recent revision on American Bethylidae, which is a classic contribution to the systematics of the family and provides an impetus for sorting biological details of the Bethylid species. All known species were described and key to differentiate genera and species within genera were provided. TRJAPITZIN (1978) described Bethylids from the European Part of the USSR. GORDH (1979) catalogued the Hymenoptera including Bethylidae in America, North of Mexico.

RUBINK and EVANS (1979) published notes on the nesting behaviour of the Bethylid wasp, *Epyris eriogoni* Kieffer and the morphology also was discussed. MAMAEV and YAGDYEV (1979) published a paper on problems of practical use of the entomophagous insects of the genus *Sclerodermus*. VASKOV (1981) published notes on the insect fauna which are potential prey of *Sclerodermus turenicum*. GORDH and HAWKINS (1981) published a paper on *Goniozus emigratus* (Rohwer), a primary external parasite of *Paramyelois transistella* (Walker) with the comments on bethylids attacking Lepidoptera. GORDH (1982a) presented taxonomic recommendations concerning biological control. GORDH (1982b) described a species of *Goniozus* imported into California for the biological control of the navel orange worm. EVANS (1984) studied biology of insects, especially Bethylidae. MERTINS (1985) studied the biology and morphology of *Laelius utilis* Cockerell, a parasitoid of *Anthrenus fuscus* in Iowa. GORDH (1986a) studied a species of *Goniozus Förster from southern Africa parasitizing sugarcane borer,* *Eldana saccharina* Walker, and taxonomic notes on species of the genus in Africa were also presented.

HAWKINS and GORDH (1986) contributed to the bibliography of the world literature of the Bethylidae. EVANS (1987) conducted observations on immature
stages of Bethylidae. ARGAMAN (1988) erected a new subfamily Afgoiogfinae based on the genus *Afgoiogfa* Argaman from Italy and included *Parascleroderma* Kieffer in this subfamily as the second genus. ARGAMAN (1989) studied and published notes on some Western Palaeartic Pristocerinae, in which *Dissomphalus claudivani* Argaman is described from Israel, confirming the occurrence of the genus in the Western Palaeartic Region. Three new specific synonyms and two new combinations were proposed. KROMBEIN (1989) revised the subfamily Pristocerinae from Botswana. GORDH and MÓCZÁR (1990) presented a Catalogue of World Bethylidae. This checklist outlined bibliographic information and distribution of each species, treating 1794 species in 91 genera in 5 subfamilies excluding fossil records. In this checklist they rejected the segregation of subfamily Afgoiogfinae from Pristocerinae. KROMBEIN (1990) revised Epyrinae from Botswana. STREJCEK (1990) erected the genus *Acephalonomia* under the tribe Cephalonomiini with the type *Acephalonomia cisidophaga*. CARPENTER (1990) published notes on Brother's aculeate phylogeny.

AZEVEDO (1992) erected the genus *Alongatepyris*, under the tribe Sclerodermini. KROMBEIN (1992) conducted a major systematic study of the genera of Epyrinae with ramose male antennae. FINNAMORE and BROTHERS (1993) contributed a chapter on Chrysidioidea in the Hymenoptera of the World. They did not recognize subfamilies Afgoiogfinae of Argaman and Galodoxinae of Nagy and provided key to the subfamilies of Bethylidae and key to families of the superfamily Chrysidioidea. BROTHERS and CARPENTER (1993) published the phylogeny of Aculeata that includes Chrysidioidea and Vespoida. POLASZEK and KROMBEIN (1994) reassessed the taxonomic status of the genera comprising the bethylid subfamily Bethylinae using computerized phylogenetic analysis. They synonymised *Trissomalus* Keiffer with *Odontepyris* Keiffer and *Anoxus* Thomson with *Bethylus* Latreille. In addition, several species were transferred generically, several new combinations were presented and distribution and biology of Bethylinae were summarized.
TERAYAMA (1995a) briefly revised the subfamily Bethylinae with a key to world genera and their distribution maps. In that work, 7 genera were recognized and their distributions were treated along with which possible phylogenetic relationships were discussed. FINNAMORE and GAULD (1995) synonymised *Apenesia* with the genus *Pristocera* without any explanation. TERAYAMA (1995b) revised the Bethylid tribe Sclerodermini, recognized 9 genera and discussed possible phylogenetic relationships, synonymized *Nesepyris* Bridwell with *Allobethylus* Kieffer and included the genus *Bethylopsis* Fouts in the tribe. The genus *Bethylopsis*, the precise taxonomic position of which being unknown, was included in this tribe. He provided a key to the world genera under Sclerodermini. TERAYAMA (1995c) revised Taiwanese *Pristocera* and gave a key to species.

TERAYAMA (1996a) revised the subfamily Pristocerinae, in which he discussed the phylogenetic relationships and raised the subgenus *Acrepyris* of the genus *Pristocera* to the generic status and provided a key to world genera of Pristocerinae. TERAYAMA (1996b) newly recorded the genus *Glenosema* Kieffer from the Oriental Region on the basis of 3 species, *G. siamensis* Terayama, *G. chiangmaiensis* Terayama and *G. doiinthanonensis* Terayama. A key to Oriental *Glenosema* was also provided. TERAYAMA (1997a) conducted a historical review of the taxonomic and systematic studies of Bethylidae in which phylogenetic hypothesis, family level relationships within Chrysidoidea and genus level relationships within each subfamily were provided and the present status of faunal surveys were also discussed.

SANTOS and AZEVEDO (2000) studied *Anisepyris* Kieffer from Brazil in which the eleven described species were considered and 19 new species were described. ROND (2001) provided the most recent list of Bethylidae found in Germany with references and remarks. VARGAS and TERAYAMA (2002) described five new species from Colombia. TERAYAMA (2003a) cladistically analyzed the higher phylogeny of Bethylidae using all possible subfamilies and published the results in two parts. Although the 'Parapenesia problem' has been unsolved, he erected a new subfamily Parapenesiinae based on the type genus

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Parapenesia Kieffer from South Africa. The first part contains the opposing views on the subfamily classification, a short historical background and the internal phylogeny of Pristocerinae, Epyrinae, Bethylinae, Mesitiinae, Galodoxinae, and the newly erected Parapenesiniae. He provisionally synonymized Afgoiogfinae with Pristocerinae by the cladistic analysis. The second part of “Phylogenetic systematics of the subfamily Bethylidae” by TERAYAMA (2003b) provided keys to all the six subfamilies, three tribes and 64 world genera. In this, he synonymised the genera Homoglenus Kieffer and Procalyoza Kieffer with genera Epyris Westwood and Aniseepyris Kieffer respectively. Along with that Terayama transferred genus Bradepyris Kieffer from Epyrinae to Mesitiinae. WAICHERT and AZEVEDO (2004) described 14 new taxa of Pseudisobrachium from Brazil. PLOEG and NEL (2004) described a new fossil bethylid, Protobethylus eocenicus from lowermost Eocene amber of France.

VIKBERG and KOPOPEN (2005) treated Laelius Ashmead from Finland and Sweden with descriptions of three new taxa. They designated a neotype for Bethylus femoralis Förster, lectotype for Bethylus rufipes Förster and listed all nominal species of Laelius from Palaeartctic region and keys were presented for females and males. AZEVEDO (2005) described a new species of Allobethylus from Australia and a key to seven world species were also provided. AZEVEDO (2006a) studied the geographical distribution of Bethylidae in Australia. AZEVEDO (2006b) proposed two new genera, Megaprosternum from Australia and Solepyris from Brazil and Ecuador under the tribe Sclerodermini and provided a key to world genera of the same tribe. GOBBI and AZEVEDO (2006) investigated the Brazilian fauna of the genera Holepyris. TERAYAMA (2006) carried out thorough systematic treatment of 20 genera of the family Bethylidae from Japan. He described 52 new species and one new genus, Allplastanoxus Terayama. He also published the phylogenetic analysis using cladistic method at the subfamily level for Epyrinae in the same publication. AZEVEDO (2008a) studied Neotropical Pseudisobrachium and made twelve nomenclatural acts and recognized 110 valid species and two lectotypes were designated. AZEVEDO (2008b) investigated nine valid species of the rarely collected New World bethylid genera Prosierola Kieffer. ALENCAR and
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AZEVEDO (2008) proposed a new species group, *microstictus* of *Dissomphalus* and thirteen new species were described from Neotropics. VARGAS and AZEVEDO (2008) revised the rarely collected Neotropical genus *Alongatepyris* of the tribe Sclerodermini and described a new species from Columbia. According to the study of LANES and AZEVEDO (2008) on the phylogeny and taxonomy of Sclerodermini, the genus *Discleroderma* Kieffer is polyphyletic and transferred *Discleroderma yakushimensis* Terayama and *D. undulatum* Krombein to *Sclerodermus* Latreille, reinstated the genus *Nothepyris* Evans to accommodate *Lepidosternopsis sulcata* and *L. brasiliensis* (Evans) and described two new genera *Platepyris* and *Tuberepyris* from Ethiopian region. LIM et al. (2009) described *Odontepyris telortis* based on materials from Korea. BARBOSA and AZEVEDO (2009) recorded *Laelius* from Afrotropical region for the first time and two species were discovered. AZEVEDO (2009) amended the diagnosis of the rarely collected bethylid genus *Solepyris* Azevedo based on the second species of the genus described from Brazil. BARBOSA and AZEVEDO (2010) studied *Laelius* from Arabian Peninsula. AZEVEDO et al. (2010) published the preliminary results of the investigation on Bethylidae collected by light traps and Malaise traps at genus level from the Arabian Peninsula. AZEVEDO and ALENCAR (2010) rediscovered and synonymised the Afrotropical genus *Trissepyris* Kieffer with *Epyris* Westwood. AZEVEDO (2010) reviewed the Afrotropical *Dissomphalus* with emphasis on genitalia.

2.3 Oriental Bethylidae

MOTSCHULSKY (1863) catalogued Sri Lankan insects including Bethylids and described *Goniozus montanus* Kieffer (=*Bethylus distigmus* Motschulsky) and *Holepyris amplipennis* (Motschulsky). CAMERON (1888) described *Epyris orientalis* Cameron from Bengal, India which was later transferred to *Pristocera* by KIEFFER (1914). CAMERON (1897) described *Epyris amatorius* Cameron from Bengal. MAGRETTI (1897) described *Acrepyris antennatus* (Magretti) (=*Pristocera antennata* Magretti), *Pristocera cariana* Magretti, *Sulcomesitius haemorrhoidalis* (Magretti) (=*Mesittius carcell* var. *haemorrhoidalis*), and *Discleroderma*
tuberculatum (Magretti) (=Scleroderma tuberculata) from Burma. CAMERON (1899b) conducted a major study on Indian hymenopteran fauna including many Bethylids and described Rhabdepyris fuscinervis (Cameron) (= Epyris fuscinervis Cameron).

ASHMEAD (1903) described Goniozus indicus from Coimbatore, India. ASHMEAD (1904b, 1905) studied Bethylidae from Philippines. CAMERON (1904) discovered the presence of Epyris albopilosus from Darjeeling, India. CAMERON (1907) conducted studies on the parasitic hymenopterans and described Disepyris pallidinervis from Bombay, India. CAMERON (1910) described Goniozus borneanus from Borneo. ENDERLEIN (1912) erected the genus Calyoza Enderlein on the basis of Calyozina ramicornis from Taiwan. TURNER (1914) described many fosorial hymenopterans including Pristocera eironeformis from Koornool District, India. ROHWER (1915) described Goniozus fulvicornis (Rohwer) (=Trissomalus fulvicornis Rohwer) from Karnataka, India and LAL (1939) described Goniozus cuttockensis from Orissa.

AYYAR (1917) catalogued wasps and bees described from Indian region. ENDERLEIN (1920) erected the genus Calyozella based on the type species C. flavipennis from the Indonesian island of Sumatra. KIEFFER (1922) conducted studies on Bethylids of Philippines. AYYAR (1927) presented notes on the parasitic hymenopterans of economic importance including Bethylids from South India. RAO and CHERIAN (1928) studied the biology and habits of females of Goniozus nephantidis (Muesebeck), the Bethylid parasite of Opisina arenosella Walker. MUESEBECK (1934) described seven species of Indian Bethylidae viz. Trachepyris indicus (=Pristobethylus indicus), Goniozus nephantidis (=Perisierola nephantidis), Goniozus mellipes (=Perisierola mellipes), Odontepyris quadrifoveatus (=Parasierola quadrifoveata), Pristocera areolata, Epyris politiceps and Epyris coriaceous from southern India and published the results in the Indian Museum Notes. MIWA and SONAN (1935) described Pristocera formosana, a species of Bethylid wasp parasitizing on Elaterid larvae from Korea and Taiwan. BEESON and CHATTERJEE (1939) presented their studies on the biology and morphology of
parasites of teak defoliators in India. MUESEBECK (1940) studied two bethylid parasites of sugarcane borers from India. PRUTHI and MANI (1942) studied distribution, hosts and habits of the Indian Bethylidae.

AYYAPPA and CHEEMA (1952) studied Laelius voracis Muesebeck, an ectoparasite on the larvae of Anthrenus vorax (Waterhouse). DHARMARAJU (1952) studied biological control of the black-headed caterpillar of coconut using bethylid parasitoids in the East Godavari District of India. KURIAN (1952) presented descriptions of four bethylid species from India. KRISHNAMURTI and USMAN (1954) reported some insect parasites of economic importance from Mysore, India. KURIAN (1954a) published ‘Catalogue of Oriental Bethyloidea’. KURIAN (1954b) described three species viz. Rhabdepyris sanctipauli, Goniozus pulveriae and Goniozus salvadorae. He redescribed Laelius voracis in the same work. PEYRĪ (1953) published detailed morphology of Sclerodermus domesticus. KURIAN (1955) described 36 species from India that includes 12 species of Goniozus, five species of Neodisepyris, four species each of Epyris and Rhabdepyris, three species each of Sulcomesitius and Sclerodermus, two species of Odontepyris and one species each of Cephalonomia and Laelius. KROMBEIN (1958) presented a synoptic catalogue of Hymenoptera of America North of Mexico. PRASAD and ALI (1958) published notes on Goniozus species parasitic on stem and root-borers of sugarcane in Bihar. MENON et al. (1959) described Rhabdepyris rhizoperthae, parasitic on Rhizopertha dominica Fabricius, a pest of stored cereals. ANTONY and KURIAN (1960) studied the morphology, habits and life history of Goniozus nephantidis (Muesebeck). BUTANI (1960) recorded the parasites and predators of sugarcane pests in India, which includes bethylid species as well.

KURIAN and ANTONY (1961) studied the systematic position, host preference and distribution of Goniozus nephantidis (Muesebeck), a larval parasite of Opisina arenosella and its allied species. VENKATRAMAN and CHACKO (1961) published some factors influencing the efficiency of Goniozus marasmi Kurian, a parasite of the maize and jowar leaf roller. DHARMARAJU (1962) presented a checklist of parasites, hyperparasites, predators and pathogens including
Bethylids of the black headed caterpillar pest of coconut, *Opisina arenosella* Walker recorded in Ceylon and in India and their distribution in these countries. DHARMARAJU (1963) continued studies on biological control of *Opisina arenosella* Walker using Bethylids in Sri Lanka. AVASTHY and CHAUDHARY (1963) studied the morphology and biology of a species of *Goniozus* attacking the armyworm *Pseudaletia unipuncta* Haw. GIFFORD (1965) revised the reported *Goniozus indicus* Ashmead as a parasite of sugarcane borer. AVASTHY and CHAUDHARY (1966) further studied the morphology and biology of a species of *Goniozus* attacking the armyworm *Pseudaletia unipuncta* Haw. RAM and SUBBA RAO (1968) provided the description of *Goniozus stomopterycis*, a primary larval parasite of *Stomopteryx nerteria* (Meyrick) in South India and a revised key to the Oriental species of *Goniozus* Förster. NAGY (1968b) described *Pycnomesitius krombeini* (= *Mesitius krombeini*) from Mangalore; *Sulcomesitius discolor* (= *Mesitius discolor*) from Delhi and *Sulcomesitius pondo* (Benoit) (= *M. clavicornis* (Nagy)) from an unknown locality in Kerala.

RAM (1969) described *Goniozus delhiensis* a primary larval parasite of *Dichocrocis punctiferalis* (Guen.). MÓCZÁR (1970b) described *Sulcomesitius evansi* from South India. MÓCZÁR (1971b) described *Metrionotus biroi* from Bombay. SATPATHY and KOTWAL (1973) conducted studies on the sex ratio of *Goniozus nephantidis* (Muesebeck) as influenced by external factors. NAGY (1974) erected a new subfamily Galodoxinae based on type genus *Galodoxa* Nagy collected from Philippines, in which he stated that the subfamily Galodoxinae is allied, on the ground of some features, to the fossil subfamily Protopristocerinae, which is very much like the genus *Pristocera* of Pristocerinae but has the winged female. MÓCZÁR (1977) described *Sulcomesitius indicus* from Anamalai Hills of South India in his revisionary work on the genus *Sulcomesitius*.

published his revisionary work on Oriental Mesitiinae that contains description of 13 new species, keys to world genera and key to species of *Heterocoelia* Dahlbom, *Sulcomesitius* Móczár, *Pycnomesitius* Móczár, *Metrionotus* Móczár and *Anaylax* Móczár. GEORGE and ABDURAHIMAN (1985) conducted studies on reproductive biology of *Goniozus* sp., an external parasite of a mango leaf webber, *Lamida moncusalis* Walker. MÓCZÁR (1986) described five species of Mesitiinae from Gibraltar, Nigeria and Nepal. GORDH (1986b) described *Goniozus keralensis* from India and contributed taxonomic notes on related species. XIAO and WU (1987) described the new taxa, *Goniozus sinicus* from China. BROWN (1987) synonymised the genus *Neoclystopsenella* Kurian with *Tapinoma* of Formicidae. KROMBEIN (1987a) published the synonymic notes on the Bethylidae described by Motschulsky in which he synonymised the genus *Dolus* Motschulsky with *Epyris*. KROMBEIN (1987b) continued his studies on Ceylonese wasps with special reference to the genus *Trachepyris* Kieffer and several species of Bethylids were described along with which new combinations and new synonymies were proposed. He presented results in the 18th part of the biosystematic studies of Ceylonese wasps, in which he published a review of the genera *Trachepyris* Kieffer. GORDH (1988) described *Goniozus sensorius* from India used in biological control of *Diaphania indica* (Saunders) attacking Ivy Gourd, *Coccinia grandis* (Linn.) Voight (reported as *Coccinia indica* Wright and Arnott).

GORDH et al. (1993) described *Goniozus hanoiensis* new to science and studied the biology of the same species emerged from *Cnaphalocrosis medinalis* from Vietnam. TERAYAMA (1993) presented a checklist of Bethylidae of the Oriental and Southeastern part of Palaeartic regions. TERAYAMA (1995c) also studied the Taiwanese *Pristocera*. TERAYAMA (1995d) erected two new genera viz. *Caloapenesia* based on the type species, *Caloapenesia thailandiana* and *Caloapenesia philippinensis* and *Neoapenesia* based on the type species, *Neoapenesia leytensis* from Oriental Region. In this paper, he synonymized two genera viz. *Psilobethylus* Kieffer with *Dissomphalus* and *Nausakosia* Benoit with *Prosapenesia* Kieffer. TERAYAMA (1995e) discovered *Protisobrachium* from Oriental region. TERAYAMA (1995f) described three new species of the genus

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Dissomphalus from Southeast Asia. TERAYAMA (1996c) revised Taiwanese Apenesia and described six new species. TERAYAMA (1997b) described four new species of Odontepyris Kieffer from Taiwan and Korea along with the list of world species of Odontepyris. TERAYAMA and YAMANE (1997) described one species each of Apenesia and Dissomphalus from Borneo. TERAYAMA (1998) recorded the genus Parascleroderma from the Oriental region on the basis of P. atayal Terayama, P. thaina Terayama, P. okajimai Terayama and P. renaiensis Terayama. TERAYAMA and YAMANE (1998) described 4 species of the genus Pristocera Klug from South East Asia along with which P. carinate Magretti was redescribed and recorded P. formosana Miwa and Sonan for the first time from Korea.

TERAYAMA (2001) described seven new species of Dissomphalus Ashmead from Oriental region, mostly from Southeast Asia and one from Nepal and provided a key to Oriental Dissomphalus. TERAYAMA et al. (2002) described three new species of Acrepyris from China. XU et al. (2002a) described Odontepyris fujianus from China. XU et al. (2002b) discovered a new species of Parascleroderma Kieffer and published the description with the key to the Chinese species of the genus. XU et al. (2002c) described three new species of Goniozus from China. XU, TERAYAMA and HE (2002) studied Chinese Apenesia and described three new species. XU et al. (2003a) described the first species of Laelius from China. XU et al. (2003b) studied Mesitiinae of China and described five new taxa and provided keys to species of Sulcomesitius from China. XU, HE and MA (2003a) examined the systematic relationships of Chinese species of Holepyris and provided descriptions of seven new taxa along with a key to Holepyris species from China. XU, HE and MA (2003b) described four species of Epyris from China. TERAYAMA (2004a) erected a new genus Formosiepyris based on the type species, F. marishi from Thailand. He described two more species, F. shiva from India and F. takasago from Taiwan. TERAYAMA (2004b) described seventeen new species of the subfamily Pristocerinae, most of them from Nepal. AZEVEDO (2004) discovered the female of the genus Caloapenesia Terayama from Vietnam. Description of the species Caloapenesia brevis Azevedo and a key to males of the same genus are also presented in the same. TERAYAMA (2004c) described seven...
bethylids belonging to subfamily Bethylinae as new to science from Asia and Australia; *Goniozus hualienensis* from Taiwan, *Bethylus himalayanus* from Nepal, *Sierola indra* from Bangalore, India and proposed a new genus *Archaeopristocera* based on a specimen from Dominican amber.

XU and HE (2005) described a new species of *Formosiepyris* from China and provided a key to world species. TERAYAMA (2005) described 43 new species from Oriental and Ethiopian region, established a new genus *Proplastanoxus* from Thailand and redefined *Calyozina*. That work includes one new species, *Epyris karnatakensis* from Yellapur, India. AZEVEDO and WAICHERT (2006) described *Apenesia sahyadrica* emerged from *Xylotrechus quadripes* Chevrolat, Coffee berry borer from Coffee Research Station, Chikmagalur, India. The new species is compared to other related Oriental *Apenesia*. XU and HE (2006a) described three new taxa of *Odontepyris* and provided a key to the Chinese species of *Odontepyris*. XU and HE (2006b) revised the Chinese *Heterocoelia* Dahlbom with a key to Oriental species. VARKONYI and POLASZEK (2007) rediscovered and revised the rarely collected genus *Foenobethylus* Kieffer with the description of four new species from Southeast Asia and assigned it to the subfamily Pristocerinae based on preliminary phylogenetic assessment. XIAO and XU (2008) described *Odontepyris hainanus* and provided a key to the Chinese species of *Odontepyris*. XU et al. (2008) discovered and described a Chinese species, *Cephalonomia rhizoperthae* that emerged from *Rhizopertha dominica* (F.). SANTHOSH and NARENDRAN (2009) described Goniozus armigerae parasitic on *Helicoverpa armigera* (Hüb.)