CHAPTER-II

REVIEW OF LITERATURE

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The perusal of literature showed that the crickets have been studied widely with various aspects from different parts of the World (Brunner and Wattenwyl, 1873, 1893; Castner, 1988; Gupta, 1988; Nguyen and Smart, 1992a, 1992b; and Frank, 1994). However, from India very little attention is paid on crickets. Mating behaviour of Gryllid crickets have been attempted by Khalifa (1950), Alexander (1957), Alexander and Otte (1967), Cade (1980), Boake (1983), Searcy and Anderson (1986), Boucias *et al.* (1987) Vasanth (1988), Cade and Cade (1992), and Mark and David (2001), etc. Nematode parasites of crickets have been studied by Nguyen and Smart (1992a, 1992b), Parkman and Frank (1993) and Parkman *et al.* (1994), etc. Palynology of crickets has been studied by Sailer *et al.* (1984), David (1994), Frank and Robert (1994). Biology of Crickets has been reported by Fritz (1983), Castner (1987, 1988) and Hudson (1994), etc. Monitoring of crickets have been attempted by Walker (1966, 1982, 1986, 1989, 1996), Short and Koehler (1979) and Forrest (1980, 1983). Migratory behaviour has been studied by Walker and Fritz (1983). Biological control of

mole crickets has been studied by Smart and Khuong (1986) and Hudson *et al.* (1988).

Gynandromorphological studies in crickets have been attempted by Omachi (1926), Suzuki (1934), Tweedie (1965), Johnstone (1975), Castner (1988), Frank (1990, 1994), Meagher and Frank (1998), Frank and Parkman (1999) and Frank *et al.* (1995), etc.

The review of literature indicates that Linnaeus (1758) for the first time worked on taxonomy of crickets. Later, Pallas (1771), De Geer (1773), Fabricius (1775), Latreille (1804, 1829), Stoll (1813), Berthold (1827), Serville (1831, 1839), Burmeister (1838), Rambur (1839), Le Guillou (1841), Haan (1842), Guerin-Meneville (1845-1850), Walker (1859, 1869, 1871), Scudder (1869), Giebel (1870), Brunner and Wattenwyl (1873, 1893), Saussure (1874, 1877, 1878, 1897), Pantel (1896), Rehn (1902, 1903), Jacobson and Bianchi (1905), Kirby (1906), Karny (1909), Allard (1910, 1929), Schimmer (1911), Rehn and Hebard (1915), Chopard (1924a, 1924c, 1925a, 1925b, 1925c, 1925d, 1927, 1928b, 1929a, 1929b, 1930, 1931a, 1931b, 1933b, 1936, 1941, 1951, 1954, 1961, 1970), Hebard (1926), Caudell (1927), Shiraki (1930), Fulton (1930, 1952), Uvarov (1935, 1940),

Snodgrass (1935, 1937), Khan (1954), Sandrasagara (1954), Fernando (1957a, 1957b, 1957c), Latif and Asghar (1957), Ghouri and Mc Farlane (1958), West and Alexander (1963), Randell (1964), Walker (1966), Bey-Bienko (1966, 1968), Chopard and Dreux (1966), Chopard and Beier (1967, 1968), Mayr (1969), Rao and Mani (1974), Vickery (1977), Townsend (1980), Otte and Cade (1984) etc. attempted taxonomy and biodiversity of crickets from various parts of the world.

Scudder studied (1862, 1869, 1901, 1902) the North American Orthoptera. Walker (1869-1871) made a catalogue of crickets containing descriptions of many "new genera" and innumerable "new species" with critical remarks and affinities of the crickets. Brunner and Wattenwyl (1893) have described many new genera and species mostly from Myanmar, Java and Borneo. Rehn (1902, 1903) studied the Orthoptera of New Mexico and western Texas. Some New England Orthoptera have been studied by Allard (1910, 1929). One of the most notable Gryllid-taxonomists, Chopard has not only made extensive studies on African and European crickets, but also published (1918-1970) a great deal of his studies on Gryllids from India, Pakistan, Bangladesh, Sri Lanka, Myanmar,

Thailand, Laos, the Malaya Archipelago, Indonesia, Mentawai Islands (Near Sumtra), New Guinea and the Philippines. Chopard (1925b, 1951) also described and revised the Australian crickets. His contributions on crickets (1954, 1961, 1969) is highly appreciated by Scientists. A new species of *Nemobius* (Orthoptera: Gryllidae) has been reported from North Carolina by Fulton (1930, 1952). The notable work of Sandrasagara (1954) is on the checklist of the Sri Lankan Gryllidae and Bey-Bienko (1966, 1968) on description of many Indonesian and Nepalian species. Chopard and Dreux (1966) described several new species from Nepal.

The review of literature indicates that taxonomy of Indian crickets have been studied by Bolivar (1890, 1900, 1901, 1912, 1922), Anandale (1906), Ghosh (1912), Chopard (1918, 1924b, 1928a, 1929a, 1933a, 1935), Uvarov (1925), Guerin-Meneville (1833), Jones and Chopard (1936), Chopard and Chatterjee (1937), Banerjee and Chatterjee (1955), Chatterjee (1955), Bhowmik (1967a, 1967b, 1967c, 1968, 1969, 1970, 1971, 1975, 1976, 1977a, 1977b, 1977c, 1985), Tandon and Shishodia (1972, 1974), Biswas *et al.*

(1975), Vasanth *et al.* (1975), Shishodia and Tandon (1975a, 1975b, 1977), Tandon *et al.* (1976), Bhowmik and Halder (1976), Bhargava (1976, 1981), Sinha and Agrawal (1977), Vasanth (1978, 1980), Kaltenbach (1979), Awate and Sathe (2007, 2008), etc.

Walker (1869-1871) for the first time made records of Gryllids from India. In an earlier work, Saussure (1874) has ignored Walker's British museum catalogue as being of no use unless the types are referred. Saussure (1877-1878) erected the chief pillar in the foundation of the classification of Gryllids. The earliest and the strongest base to Gryllid classification was given by Saussure (1877-1878) who divided the family into 6 tribes Gryllotalpiens, Grylliens, Myrmecophiliens, Oecanthiens, Trigonidiens and Enoptriens based on tarsal form and armature of posterior tibae. He divided each of these, except the Trigonidiens, into legions consisting of numerous genera. Since then there appears to be no general agreement on the taxonomic rank of many groups. Saussure (1894-1897) also modified and elaborated his monographs (1877-1878). Bolivar's (1900) study of South Indian crickets is regarded as the first sincere attempt at a taxonomic study of Indian crickets. Blatchley (1903)

studied the Orthoptera (crickets) of India. Kirby (1906) has listed over 80 species from India. Chopard (1924b) was the first to study crickets of Northeast India. He described 3 new genera, each with a new species. Chopard (1935) has recorded 18 species from Meghalaya and Assam including 1 new genus and 4 new species. Jones and Chopard (1936) described a new Gryllid genus from India.

Chopard (1951, 1969) has erected the subfamilies to family status under superfamily Grylloidea.The family Gryllidae has been divided into 10 subfamilies viz; Mogoplistinae, Myrmecophilinae, Scleropterinae, Cachoplistinae, Pteroplistinae, Pentacentrinae, Phalangopsinae, Trigonidiinae, Eneopterinae and Oecanthinae by Chopard and Beier (1967-1968). Many of these have been further subdivided into tribes. Subfamily Oecanthinae has been given family rank, viz; Oecanthidae. Randell (1964) has given a key to the tribes, subtribes and genera of subfamily Gryllinae, founded totally on the characters of the male genitalia. From Northeast India, Randell (1964) in a note worthy work, erected 5 new genera including 2 found in one of these, viz; *Velarifictorus* has now come to include several species placed in *Scapsipedus* Saussure. The other genera

Plebeiogryllus, contains only one species, *P. guttiventris* Walker. Walker (1966), in annotated Checklist of the Oecanthinae of the World, gave subfamily rank to Oecanthinae.

Bhowmik (1967-1977) has recorded 14 species of Gryllids from Northeast India. Of these, 3 species of the genera *Anaxipha* Saussure, *Calyptotrypus* Saussure and *Velarifictorus* Randell (described in *Scapsipedus* Saussure) and variety of *Loxoblemmus equestris* Saussure, viz; *manipurensis,* were described as new. Bhowmik (1969) has placed family Gryllidae under what he calls suborder Grylloidea, which undoubtedly refers to super family Grylloides of most other authors. Chopard's system was broadly followed by Kevan and his co-workers uprating most division in the Orthoptera by one grade. The same system was summerised by Vickery (1977).

A considerable amount of work on the taxonomy of Indian crickets, including the Northeast Indian region have been came in existence from the year 1967. From Arunachal Pradesh and the adjoining areas of Assam in Northeast India, Tandon and Shishodia (1972) have recorded 20 species of Gryllids scattered in 10 genera. Shishodia and Tandon (1975b) have

recorded 8 genera from Tripura. In preliminary study on the Gryllidae of Meghalaya Biswas *et al.* (1975) recorded 15 species as new to the state. From Meghalaya city Vasanth *et al.* (1975) described 2 new species of *Velarifictorus* and one of *Teleogryllus*. Vasanth (1978) described for the first time, the females *Velarifictorus jaintianus* Biswas and Ghosh, *V. khasiensis* Vasanth and Ghosh (both described as new by Vasanth *et al.*, 1975) and of *Stephoblemmus humbertiellus* Saussure, all from Northeast India. Biswas *et al.* (1975) and Bhowmilk (1977a, 1977b, 1977c) have allowed the system of dividing family Gryllidae into subfamilies while, Tandon and Shishodia (1972) have given family rank to the subfamilies.

Townsend (1980) reported 2 species of *Teleogryllus* Chopard from Northeast India. While, Vasanth (1993) divided the family Gryllidae into 14 subfamilies, viz; Gryllinae, Nemobiinae, Mogoplistinae, Myrmecophlinae, Scleropterinae, Cachoplistinae, Pteroplistinae, Pentacentrinae, Phalangopsinae, Trigonidiinae, Eneopterinae, Podoscirtinae, Itarinae and Oecanthinae. Recently, Vasanth (1993) described a total of 81 species belonging to 39 genera scattered in 12 subfamilies of the family Gryllidae from Northeast India.

Recently, Awate and Sathe (2007, 2008) described two new species of the genus *Gryllotalpa* Latreille, namely *Gryllotalpa kolhapurensis* and *Gryllotalpa westerni* from India.

In the present study, two families namely, Gryllotalpidae and Gryllidae were selected for taxonomical studies of crickets. For description of species, classification system of Chopard (1933a) has been adopted. In the present work 4 new species of *Gryllotalpa* and 5 new species of *Gryllus* have been described.