ON THE SURVEY AND DOCUMENTATION OF THRIPS (THYSANOPTERA: INSECTA) FROM ARUNACHAL HIMALAYAS, NE. INDIA.

O. Tarunkumar Singh[1,3], J. Chakravorty[1], R. Varatharajan[2]
[1.] Department of Zoology, Rajiv Gandhi University, Rono Hills- 791112.
[2.] Life Sciences Department, Manipur University, Imphal-795003.
[3.] UGC. Dr. D. S. Kothari Post Doctoral Fellow.
e mail: oinamba2002@yahoo.co.in

ABSTRACT

Thrips are minute insects (0.5 – 10 mm. in length) of economic importance with bladder like feet and fringed wings. Although thrips are comparatively small sized insects, what they lack in size they compensate by their high reproductive rate which they achieve through parthenogenesis and sexual reproduction. With their piercing and sucking type of mouthparts, thrips feed on pollen grains, fungal spores and mycelia, plant sap and even soft bodied insects. Such feeding habits enable them to choose microhabitats like flowers, leaf sheaths, barks, plant galls and leaf litters. On the other side high rate of deforestation, reducing area of cultivated land and unscientific practices of agriculture in hilly terrains of Arunachal Pradesh has resulted in the decrease diversity of insects and thrips in particular. This has attributed to the loss of many beneficial and endemic insects before it has been recorded. The present study attempted to document thrips from various habitats of Arunachal Himalayas. A total of 40 species of thrips belonging to two sub orders Terebrantia and Tubilifera have been collected for the first time from the region, of which 31 species were of new record to the state. Systematic accounts of all the collected species have also been provided.

Key Words: Thrips, thysanoptera, Arunachal Himalaya, new record, endemic species.

INTRODUCTION

Arunachal Pradesh, the largest state in the northeastern Himalayan region is located between 26°28′N–29 °30′N latitude and 90°30′E–97° 30′ E longitude. Biogeographically, it is situated in the eastern Himalayan province with an entire territory forming a complex hill system with varying elevations ranging from 50m. in the foothills and gradually ascending above 7000m. MSL. By virtue of its geographical positions, climatic conditions and altitudinal variations, the state is a biodiversity rich region in northeastern India with largest tracts of tropical, wet evergreen subtropical, temperate and alpine forests (Ashish, *et.al.*, 2005). The state (83,743 sq.km.) occupies a major portion of India's eastern Himalayas and has 82% forest cover (FSI., 2000). The presence of good vegetative covers and also varieties of agricultural and horticultural crops in the region bounds to harbour diverse faunal resources especially arthropods and the thrips in particular.

Forest and agriculture play a vital role in the economy of the people of Arunachal Himalayas. Due to increase in population, exploitation of natural forests has also been increased tremendously. The rate of deforestation in Arunachal Pradesh is estimated to be 700 sq. km. per year (Sharma, 1997). The decline of forest in some districts was reported to be very sharp during the couple of years. For instance,

the decline in East Kameng is 71.82%, the highest in the state (Anonymous, 2006). Besides deforestation, jhuming (shifting cultivation), unscientific practices of agriculture and exploitation of natural resources in the region degrades the floral composition that seriously affects the density and diversity of insects in general. Under such situations diversity of thrips is bound to decrease and certain species enhance their host range thereby forming primary pest from the earlier level of minor pest status.

The potentiality of thrips as pest has been increased over the years due to their tendency towards inflicting significant damage to agricultural and horticultural crops (Ananth-akrishnan, 1984). Their association with a number of economically important plants coupled with aggregate feeding, quick development and fast multiplication enhance the infestation rate on crops. Besides, high tolerance in wide ranges of physical conditions and resistance to pesticides makes thrips an important pest. Knowing the importance of thrips in agriculture, horticulture and forestry, a survey and documentation has been carried out in Arunachal Himalayas, to sort out the state's wealth of beneficial insects and also safeguarding the plants especially timber plants, vegetables and plantion crops from primary pest thrips.

Studies on the diversity of Thrips (Thysanoptera) of Northeastern India are referable to that of Sen *et.al.*, (1988), Varatharajan (2005) and Tarunkumar Singh and Varatharajan (2007), wherein more than 200 species have been recorded from different habitats. However, survey pertaining to thrips of Arunachal Pradesh has not been attempted so far except the collection of 9 species (Sen *et.al.*, 1988). Therefore, the present study has been done with the view to know the faunastic composition of thrips in Arunachal Himalayas.

MATERIALS AND METHODS

I. Field survey and sampling:

Regular surveys were undertaken by visiting different habitats in East Kameng (362-1906m. MSL), West Kameng (334-2700m. MSL), Papum Pare (170- 800m. MSL) and West Siang (200- 2000m. MSL) districts of Arunachal Pradesh during January 2007 to June 2008. Collection was done at random using sample units i.e., 10 sweeps of grass for grass thrips, 1 collection funnel for litter thrips, foliage /trap for pest and foliage thrips, 1 gall for gall thrips (Varatharajan, 2005). Flower and gall thrips were extracted by delayed counting method (Irwin and Yeargan, 1980). Litter thrips were extracted by modified Tulgreen funnel method (Ananthakrishnan, 1984). Thrips were preserved in exsure preservative (10% ethanol: glacial

acetic acid: triton- X= 90ml. : 10ml. : 0.1ml.) (Bhatti, 1997).

II. Preparation of permanent slides and identification:

In order to determine the identity, collected specimens were prepared for permanent mount. Mounting was done by modified mounting method using terpineol and canadabalsm (Varatharajan, 2005). The permanent slides were observed under Olympus trinocular research microscope and photographed under Leitz trinocular microscope. They were identified using standard keys of Indian Thysanoptera (Ananthakrishnan and Sen, 1980; Sen *et.al.*, 1988; Bhatti, 1990; Varatharajan, 2005). Determination of the identities was finalized by comparing with the paratypes and reference slides in the Entomology Museum of Life Sciences Department, Manipur University.

RESULT AND DISCUSSION

During one year preliminary survey, 40 species of thrips belonging to two sub orders- Tubulifera and Terebrantia have been identified. These include 18 species under 16 genera from Terebrantia and 22 species under 18 genera from Tubulifera. Detailed systematic accounts of the species are discussed as follows-

Systematic account

Order - Thysanoptera

Suborder - Terebrantia

Tribe - Dendrothripini

Genus1. *Dendrothrips* Uzel, 1895.

Dendrothrips schimae Kudo, 1989.

1989. *Dendrothrips schimae* Kudo, *Jpn. J. Ent.* 57 (1): 42-45.

1990. *Dendrothrips schimae*: Bhatti, *Zoology*, 2 (4): 225.

2005. *Dendrothrips schimae*: Varatharajan, *Monograph. M. U.*,: 32.

Specimen studied: 5♀♀ 1♂; Rupa (West Kameng, 1408m. MSL); Dt. 6-2-08.

Distribution: Nepal, Nagaland, Arunachal Pradesh.

Remark: New record to Arunachal Himalaya. Endemic to Himalayan region.

Subtribe: Scirtothripina

Genus 2. *Scirtothrips* Shull, 1909.

Scirtothrips dorsalis Hood, 1919.

1919. *Scirtothrips dorsalis* Hood, *Insect. Incit. Menstr.*, 7: 90- 91.

1980. *Scirtothrips dorsalis*: Ananthakrishnan and Sen, *ZSI. Handbk. Ser.*, 1: 57&130.

1988. *Scirtothrips dorsalis*: Sen *et.al., ZSI. Occl. Paper*, 100: 16.

2005. *Scirtothrips dorsalis*: Varatharajan, *Monograph. M. U.*,: 17.

Specimen studied: 10♀♀ 1♂; Rono hills (Papum Pare, 900m. MSL), Bhalukpong (West Kameng, 230m. MSL.); Dt. 7-4-07&8-8-07.

Distribution: Widely Distributed.

Remark: New record to Arunachal Himalaya. This species is the major pest of chilli.

Tribe - Chirothripini

Genus 3. *Sciothrips* Bhatti, 1969.

Sciothrips cardamomi (Ramakrishna, 1935).

1935. *Taeniothrips cardamomi* Ramakrishna, *Bull. Ent. Res.*,26 (3): 357.

1969. *Sciothrips cardamomi*: Bhatti, *Oriental Ins.*, 3 (4): 379

1980. *Sciothrips cardamomi:* Ananthakrishnan and Sen, *ZSI. Handbk. Ser.*, 1: 58&131.

1988. *Sciothrips cardamomi* : Sen *et.al., ZSI. Occl. Paper,* 100: 15.

2005. *Sciothrips cardamomi*: Varatharajan, *Monograph. M. U.*,: 17.

Specimen studied: 4♀♀; Rupa (West Kameng, 1408m. MSL); Dt. 10-8-07.

Distribution: Western Ghats, Manipur, Arunachal Himalaya and Bangladesh.

Tribe -Thripini

Subtribe - Anaphothripina.

Genus 4. *Anaphothrips* Uzel, 1895.

Anaphothrips sudanensis Trybom, 1911.

1911.*Anaphothrips sudanensis* Trybom, *Results Swedish Zool. Exped. Egypt. Pt.*, 4: 1-4.

1980. *Anaphothrips sudanensis*: Ananthakrishnan and Sen, *ZSI. Handbk. Ser.*, 1: 597132.

1988. *Anaphothrips sudanensis*: Sen *et.al., ZSI. Occl. Paper,* 100: 8.

2005. *Anaphothrips sudanensis*: Varatharajan, *Monograph. M. U.*,: 17.

Specimen studied: 10♀♀ 2♂♂; Rono hills (Papum Pare, 900m. MSL), Kane (West Siang, 14500m. MSL); Dt. 6-8-07&5-4-07.

Distribution: Widely distributed.

Remark: New record to A.P. This species is very common in the mixed grasslands especially in the foothills with various polymorphic forms (apterous, macropterous and bicolourous forms).

Genus 5. *Ayyaria* Karny, 1926.

Ayyaria chaetophora Karny, 1926.

1926. *Ayyaria chaetophora* Karny, *Mem. Dept. Agri. India Ent. Ser.*, 9:193.

1980. *Ayyaria chaetophora*: Ananthakrishnan and Sen, *ZSI. Handbk. Ser.*, 1:63&135.

2005. *Ayyaria chaetophora*: Varatharajan, *Monograph. M. U.*,: 18.

Specimen studied: 6♀♀ 1♂; Seppa (East Kameng, 363m. MSL), Bhalukpong (West Kameng, 231m. MSL); Dt.3-8-07&6-4-07.

Distribution: Widely distributed.

Remark: New record to Arunachal Himalaya. This species is frequently encountered from the flowers under Fabaceae.

Genus 6. *Dichromothrips* Priesner, 1932.

Dichromothrips nakahari Mound, 1976.

1976. *Dichromothrips nakahari* Mound, Biol., J. Linn. Soc., 8 (3): 258-259.

1980.*Dichromothrips nakahari*: Ananthakrishnan and Sen, *ZSI. Handbk. Ser.*, 1: 67&137.

2005. *Dichromothrips nakahari* : Varatharajan, *Monograph. M. U.*,: 19.

Specimen studied: 12♀♀; Kane (West Siang, 1450m. MSL), Rono hills (Papum Pare, 900m. MSL); Dt. 5-4-07&6-3-08.

Distribution: India- Northeastern Hills. Word- New York, Miami, San Francisco.

Remark: New record to Arunachal Himalaya. This species is associated with orchid flowers in Arunachal Himalaya.

Genus 7. *Frankliniella* Karny, 1910.

Frankliniella intonsa (Trybom, 1895).

1895. *Thrips intonsa* Trybom, *Ent. Tidskr.*, 16 (3): 188.

1912. *Frankliniella intonsa*: Karny, *Zool. Anz.*, 4 (4): 334.

1980. *Frankliniella intonsa*: Ananthakrishnan and Sen, *ZSI. Handbk. Ser.*, 1: 69&138.

1988. *Frankliniella intonsa*: Sen *et.al., ZSI. Occl. Paper*, 100: 10.

2005. *Frankliniella intonsa* :Varatharajan, *Monograph. M. U.*,: 19.

Specimen studied: 10♀♀; Doimuk (PapumPare, 800m. MSL), Bomdila (West Kameng, 2430m. MSL); Dt. 13-3-08&1-4-08.

Distribution: India- West Bengal, Manipur, Nagaland, Arunachal Pradesh. World- Bangladesh, China, Taiwan, Hainan, Korea, Japan, Manchuria, Turkey, Europe.

Remark: New record to Arunachal Himalaya. Collected from the flowers of Chenopodiaceae and Liliaceae.

Genus 8. *Megalurothrips* Bagnall, 1915.

Megalurothrips distalis (Karny, 1913).

1913. *Taeniothrips distalis* Karny, *Arch. Naturgesch* (A) 79 (2): 122-124.

1969. *Megalurothrips distalis*: Bhatti, *Oriental Ins.*, 3 (3): 241.

1980. *Megalurothrips distalis*: Ananthakrishnan and Sen, *ZSI. Handbk. Ser.*, 1: 70&139.

1988. *Megalurothrips distalis*: Sen *et.al., ZSI. Occl. Paper*, 100: 12.

2005. *Megalurothrips distalis*:Varatharajan, *Monograph. M. U.*,: 33.

Specimen studied: 10♀♀ 1♂; Kane (W. Siang, 1450m. MSL). Seppa (East Kameng, 363m. MSL); Dt. 5-4-07&12-8-07.

Distribution: Widely distributed.

Remark: Associated with Fabaceae flowers and minor pest of *Phaseolus lunatus* L.

Megalurothrips peculiaris (Bagnall, 1918).

1918. *Physothrips peculiaris* Bagnall, *Ann. Mag. Nat. Hist.*, 1 (9): 206- 207.`

1969. *Megalurothrips peculiaris*: Bhatti, *Oriental Ins.*, 3 (3): 242.

1980.*Megalurothripspeculiaris*:Ananthakrishnan and Sen, *ZSI. Handbk. Ser.*, 1: 70&139.

1988. *Megalurothrips peculiaris*: Sen *et.al., ZSI. Occl. Paper,* 100: 11-13.

2005. *Megalurothrips peculiaris*: Varatharajan, *Monograph. M. U.,*: 33.

Specimen studied: 8♀♀1♂; Kane (West Siang, 1450m. MSL), Rono hills (Papum Pare, 950m. MSL); Dt. 6-4-07&6-4-08.

Distributed: Widely distributed in India. World-Nepal, Bangladesh, Philippines.

Remark: New record to Arunachal Himalayas.

Genus 9. *Microcephalothrips* Bagnall, 1926.

Microcephalothrips abdominalis (Crawford, 1910)

1910. *Thrips abdominalis* Crawford, *Pomona college J. Ent.*, 2 (1): 57.

1926. *Microcephalothrips abdominalis*: Bagnall, *Ann. Mag. nat. Hist.*, 18 (9): 113.

1980. *Microcephalothrips abdominalis* :Ananthakrishnan and Sen, *ZSI. Handbk. Ser.*, 1: 71&139.

1988. *Microcephalothrips abdominalis*: Sen *et.al., ZSI. Occl. Paper,* 100: 14.

2005. *Microcephalothrips abdominalis*: Varatharajan, *Monograph. M. U.,*: 20.

Specimen studied: 5♀♀; Kane (West Siang, 1450m. MSL); Dt. 6-4-07.

Distribution: Widely distributed.

Remark: This species built up good densities in *Spilanthe* sp. (Asteraceae) flower in the premonsoon season.

Genus 10. *Parabaliothrips* Priesner, 1935.

Parabaliothrips coluckus (Kudo, 1977).

1977. *Krasibothrips coluckus* Kudo, *Kontyu*, 45 (1): 4-8.

1980. *Krasibothrips coluckus*: Ananthakrishnan and Sen, *ZSI. Handbk. Ser.*, 1: 69&138.

1990. *Parabaliothrips coluckus*: Bhatti, *Zoology,* 2 (4): 244.

2005. *Parabaliothrips coluckus*: Varatharajan, *Monograph. M. U.,*: 18.

Specimen studied: 6♀♀; Bomdilla (West Kameng, 2430m. MSL); Dt.9-8-07.

Distribution: India- North eastern Himalayan region. World; Nepal and Taiwan.

Remark; New record to Arunachal Himalaya.

Genus 11. *Thrips* Linnaeus, 1758.

Thrips hawaiiensis (Morgan, 1913).

1913. *Euthrips hawaiiensis* Morgan, *Proc. U.S. nat. Hist. Mus.*, 46: 3.

1980. *Thrips hawaiiensis*: Ananthakrishnan and Sen, *ZSI. Handbk. Ser.*, 1:76&141.

1988. *Thrips hawaiiensis*: Sen *et.al., ZSI. Occl. Paper,* 100: 18&21.

2005. *Thrips hawaiiensis*: Varatharajan, *Monograph. M. U.,*: 35.

Specimen studied: 12♀♀2♂♂; Rono Hills (Papum Pare, 950m. MSL), Kane (West Siang, 1450m.MSL), Rupa (West Kameng, 363m. MSL); Dt. 5-3-07, 6-2-08&5-4-07.

Distribution: Widely distributed.

Remark: New record to Arunachal Himalaya. This species is a highly polyphagous and cosmopolitan in distribution.

Thrips himalayanus (Pelikan, 1970).

1980. Thrips himalayanus: Ananthakrishnan and Sen, *ZSI. Handbk. Ser.*, 1: 75.

1990. Thrips himalayanus: Bhatti, *Zoology*, 2 (4): 260-265.

2005. Thrips himalayanus: Varatharajan, *Monograph. M. U.*,: 35.

Specimen studied: 3♀♀; Bomdilla (West Kameng, 2430m. MSL); Dt. 1-4-08.

Distribution: Northeast Himalayan region.

Remark: New record to Arunachal Himalaya. Endemic to NE. Himalayan region. The present species is collected from *Rhododendron* flowers.

Subfamily - Panchaetothripinae.

Genus 12. *Caliothrips* Daniel, 1904.

Caliothrips luckmanni Wilson, 1975.

1975. *Caliothrips luckmanni* Wilson, Mem. Ann. En. Ins., 23: 86-88.

1980. *Caliothrips luckmanni*: Ananthakrishnan and Sen, *ZSI. Handbk. Ser.*, 1: 79&143.

2005. *Caliothrips luckmanni*: Varatharajan, *Monograph. M. U.*,: 22.

Specimen studied: 8♀♀; Rono hills (Papum Pare, 950m. MSL), Rupa (West Kameng, 1408m. MSL); Dt. 4-3-0-7&6-2-08.

Distribution: Delhi, Madhya Pradesh, Tamil Nadu, Nagaland, Arunachal Pradesh.

Remark: New record to Arunachal Himalaya. Endemic to India. This species is found to infest mango leaves (*Mangifera indica*) in Arunachal Himalaya.

Genus 13. *Monilothrips* Moulton, 1929.

Monilothrips kempi Moulton, 1929.

1929. *Monilothrips kempi* Moulton, Rec. Indian Mus., 31: 94- 35.

1980. *Monilothrips kempi*: Ananthakrishnan and Sen, *ZSI. Handbk. Ser.*, 1: 81&144.

1988. *Monilothrips kempi* : Sen *et.al.*, *ZSI. Occl. Paper*, 100: 23-24.

2005. *Monilothrips kempi* : Varatharajan, *Monograph. M. U.*,: 22.

Specimen studied: 10♀♀1♂; Rono hills (Papum Pare, 950m. MSL), Seppa (East Kameng, 363m. MSL); Dt.6-11-07&5-5-08.

Distribution: India- West Bengal, U.P., Tamil Nadu, Manipur, Nagaland and Arunachal Pradesh. World- South Africa and North America.

Remark: New record to Arunachal Himalaya. Collected from ferns.

Genus 14. *Panchaetothrips* Bagnall, 1912.

Panchaetothrips indicus Bagnall, 1912.

1912. *Panchaetothrips indicus* Bagnall, rec. Indian Mus., 7: 258-260.

1980. *Panchaetothrips indicus*: Ananthakrishnan and Sen, *ZSI. Handbk. Ser.*, 1: 81&144.

1988. *Panchaetothrips indicus*: Sen *et.al., ZSI. Occl. Paper,* 100: 25.

2005. *Panchaetothrips indicus*: Varatharajan, *Monograph. M. U.,*: 21.

Specimen studied: 12♀♀2♂♂; Kane (West Siang, 1450m. MSL), Bomdilla (West Kameng, 2430m. MSL), Seppa (East Kameng, 363m. MSL); Dt. 6-4-07, 1-4-08&7-5-08.

Distribution: India- Widely distributed.

Remark: new record to Arunachal Himalaya. This species is a major pest of turmeric (*Curcuma longa*). The present species are encountered from the wild Malvaceae and Musaceae leaves in Arunachal.

Genus 15. *Retithrips* Marchal, 1910.

Retithrips syriacus (Mayet, 1890).

1890. thrips (Heliothrips) syriacus Mayet, *Les. Ins. De la Vigne,*: 451.

1930. *Retithrips syriacus*: Bodenheimer, *Monogr. zur. Angrew. Ent.,* 10: 168.

1980. *Retithrips syriacus*: Ananthakrishnan and Sen, *ZSI. Handbk. Ser.,* 1: 81&145.

1988. *Retithrips syriacus* : Sen *et.al., ZSI. Occl. Paper,* 100: 6&26

2005. *Retithrips syriacus*: Varatharajan, *Monograph. M. U.,*: 21.

Specimen studied: 12♀♀; Bhalukpong (West Kameng, 213m. MSL); Dt. 8-8-07.

Distribution: Widely distributed.

Remark: New record to Arunachal Himalaya. Collected from *Ricinus* (Euphorbiaceae) and *Mangifera indica* (Anacardiaceae) leaves. Infest the mango leaf by aggregate feeding and colonization.

Genus 16. *Selenothrips* (Karny, 1911).

Selenothrips rubrocinctus (Giard, 1901).

1901. *Physopus rubrocinctus* Giard, *Bull. Soc. Ent. Fra.*, 15: 263-265.

1980.*Selenothrips rubrocinctus*:Ananthakrishnan and Sen, *ZSI. Handbk. Ser.,* 1: 81&145.

1988 *Selenothrips rubrocinctus* : Sen *et.al., ZSI. Occl. Paper,* 100: 7&27.

2005. *Selenothrips rubrocinctus*: Varatharajan, *Monograph. M. U.,*: 22.

Specimen studied: 6♀♀; Seppa (East Kameng,363m. MSL); Dt. 7-5-08.

Distribution: India- Southern India, North eastern states. World- Asia, Australia.

Remark: New record to Arunachal Himalaya. This species is collected from *Ricinus communis* (Euphorbiaceae) leaves .

Suborder - Tubulifera

Family - Phlaeothripidae

Subfamily - Phlaeothripinae.

Genus 1. *Androthrips* Karny, 1911.

Androthrips ramachandrai Karny, 1926.

1926. *Androthrips ramachandrai* Karny, *Mem. Dept. Agri. Indian ent. Ser.*, 9 (6): 226.

1980. *Androthrips ramachandrai*: Ananthakrishnan and Sen, *ZSI. Handbk. Ser.,* 1: 84&147.

1988. *Androthrips ramachandrai*: Sen *et.al., ZSI. Occl. Paper,* 100: 32&38.

2005. *Androthrips ramachandrai*: Varatharajan, *Monograph. M. U.,*: 29.

Specimen studied: 3♀♀; Kane (West Siang, 1450m. MSL); Dt.7-4-07.

Distribution: Tamil Nadu, Manipur and Arunachal Pradesh.

Remark: Endemic to India.

Genus 2. *Araeothrips* Ananthakrishnan, 1976.

Araeothrips longisetis Ananthakrishnan, 1976.

1976. Araeothrips longisetis Ananthakrishnan, *Proc. Indian Acad. Sci.,* 83B (5); 203-204.

1988. Araeothrips longisetis: Sen *et.al., ZSI. Occl. Paper,* 100: 31&39.

2005. Araeothrips longisetis: Varatharajan, *Monograph. M. U.,*: 28&47.

Specimen studied: 5♀♀; Rupa (West Kameng, 1405m. MSL); Dt. 10-8-07.

Distribution: Western Ghat, Arunachal Pradesh and Nagaland.

Remark: Endemic to India. This species is collected from Bamboo leaf in Arunachal Himalaya.

Araeothrips vamana Muraleedharan, 1982.

1982. *Araeothrips vamana* Muraleedharan, *Rec. ZSI.,* 79: 374-376.

1988. *Araeothrips vamana* : Sen *et.al., ZSI. Occl. Paper,* 100: 39-41.

2005. *Araeothrips vamana* : Varatharajan, *Monograph. M. U.,*: 28&47.

Specimen studied: 6♀♀; Rupa (West Kameng, 1405m. MSL); Dt. 1-4-08.

Distribution: Manipur, Nagaland and Arunachal Pradesh.

Remark: Endemic to Northeastern Himalayan region. The present species is collected from *Castaniopsis* sp. (Fagaceae) leaf.

Genus 3. *Crotonothrips* Ananthakrishnan, 1965.

Crotonothrips nagaensis Muraleedharan, 1982.

1982. *Crotonothrips nagaensis* Muraleedharan, *Rec. ZSI.,* 79: 376-378.

1988. *Crotonothrips nagaensis*: Sen *et.al., ZSI. Occl. Paper,* 100: 49-50.

2005. *Crotonothrips nagaensis*: Varatharajan, *Monograph. M. U.,*: 26&48.

Specimen studied: 3♀♀; Rupa (West Kameng, 1405m. MSL); Dt. 6-2-08.

Distribution: Manipur, Arunachal Pradesh.

Remark: New record to Arunachal Himalaya. Endemic to Northeastern Himalayan region.

Genus 4. *Dexiothrips* Hartwig, 1952.

Dexiothrips madrasensis (Ananthakrishnan, 1964).

1964. *Malacothrips madrasensis* Ananthakrishnan, *Ent. Tidsk., 85 (12): 109-110.*

1980.Apelaunothrips madras-ensis: Anantha-krishnan and Sen, *ZSI. Handbk. Ser.,* 1: 85& 147.

1988. *Dexiothrips madrasensis*: Sen *et.al., ZSI. Occl. Paper,* 100: 30&51.

2005. *Dexiothrips madrasensis*: Varatharajan, *Monograph. M. U.*,: 24&48.

Specimen studied: 3♀♀; Seppa (east Kameng, 363m. MSL); Dt. 12-8-07.

Distribution: India- Western and Eastern Ghats, Manipur, Nagaland, Arunachal Pradesh.

Remark: New record to Arunachal Himalaya. Endemic to India.

Genus 5. *Dolichothrips* Karny, 1912.

Dolichothrips montanus Ananthakrishnan, 1964.

1964. *Dolichothrips montanus* Ananthakrishnan, *Ent. Ts. Agr.*, 85.

1980. *Dolichothrips montanus*: Ananthakrishnan and Sen, *ZSI. Handbk. Ser.*, 1: 90&151.

2005. *Dolichothrips montanus*: Varatharajan, *Monograph. M. U.*,: 35&48.

Specimen studied: 6♀♀; Rono hills (Papum Pare, 950m. MSL); Dt. 10-6-07.

Distribution: Western Ghat, Nagaland, Arunachal Pradesh.

Remark: New record to Arunachal Himalaya. Collected from tender shoots of *Jasmium* sp. (Malvaceae).

Genus 6. *Ecacanthothrips* Bagnall, 1910.

Ecacanthothrips tibialis (Ashmead, 1905).

1905. *Idolothrips tibialis* Ashmead, *Ent. News*, 16: 20.

1980. *Ecacanthothrips tibialis*: Ananthakrishnan and Sen, *ZSI. Handbk. Ser.*, 1: 92&151.

1988. *Ecacanthothrips tibialis*: Sen *et.al.*, *ZSI. Occl. Paper*, 100: 52.

2005. *Ecacanthothrips tibialis*: Varatharajan, *Monograph. M. U.*,: 24&48.

Specimen studied: 1♀; Bomdilla (West Kameng, 2430m.MSL); Dt.9-8-07.

Distribution: Widely distributed.

Remark: New record to Arunachal Himalaya. Only a single individual is collected from the moist litters in the present study.

Genus 7. *Gigantothrips* Zimmerman, 1900.

Gigantothrips elegans Zimmerman, 1900.

1900. *Gigantothrips elegans* Zimmerman, *Bull. Inst. Bot. Buit.*, 7: 18-19.

1980. *Gigantothrips elegans*: Ananthakrishnan and Sen, *ZSI. Handbk. Ser.*, 1: 92&152.

1988. *Gigantothrips elegans*: Sen *et.al.*, *ZSI. Occl. Paper*, 100: 53.

2005. *Gigantothrips elegans*: Varatharajan, *Monograph. M. U.*,: 27&48.

Specimen studied: 12♀♀; Rono hills (Papum Pare, 950m. MSL), Rupa (West Kameng, 1408m. MSL); Dt. 6-8-07&1-4-08.

Distribution: India- widely distributed. World- Philippines, Japan, Thailand, Java, Siam.

Remark: New record to Arunachal Himalaya. This species colonizes at the lower side of the *Ficus virens* (Moraceae) leaf.

Genus 8. *Gynaikothrips* Karny, 1900.

Gynaikothrips bengalensis Ananthakrishnan, 1973.

1973. *Gynaikothrips bengalensis* Ananthakrishnan, *Oriental ins.*, 7 (4): 543-544.

1980. *Gynaikothrips bengalensis*: Ananthakrishnan and Sen, *ZSI. Handbk. Ser.*, 1: 93&153.

1988. *Gynaikothrips bengalensis*: Sen *et.al.*, *ZSI. Occl. Paper*, 100: 53&56.

2005. *Gynaikothrips bengalensis*: Varatharajan, *Monograph. M. U.*,: 27&48.

Specimen studied: 5♀♀; Bhalukpong (West Kameng, 213m. MSL); Dt. 8-8-07.

Distribution: West Bengal, Tripura, Manipur, Arunachal Pradesh.

Remark: New record to Arunachal Himalaya. Endemic to India.

Genus 9. Haplothrips Amyot and Serville, 1843.

Haplothrips gowdeyi (Franklin, 1908).

1908. *Anthothrips gowdeyi* Franklin, *Proc. U.S. nat. Mus.*, 33:724.

1980. Haplothrips gowdeyi: Ananthakrishnan and Sen, *ZSI. Handbk. Ser.*, 1: 95&153.

2005. Haplothrips gowdeyi: Varatharajan, *Monograph. M. U.*,: 29&48.

Specimen studied: 15♀♀2♂♂; Rono hills (Papum Pare, 950m. MSL), Kane (West Siang, 1450m. MSL), Seppa (East Kameng, 363m. MSL); Dt.3-4-08, 9-5-08& 5-8-07.

Distribution: Widely distributed.

Remark: New record to Arunachal Himalaya. This is a polyphagous species collected from various host plants including grasses.

Haplothrips tenuipennis Begnall, 1918.

1918. *Haplothrips tenuipennis* Begnall, *Ann. Mag. nat. Hist.*, 9 (1): 210.

1980. *Haplothrips tenuipennis*: Ananthakrishnan and Sen, *ZSI. Handbk. Ser.*, 1: 95&153.

1988. *Haplothrips tenuipennis*: Sen *et.al.*, *ZSI. Occl. Paper*, 100: 58-59.

2005. *Haplothrips tenuipennis*: Varatharajan, *Monograph. M. U.*,: 29&48.

Specimen studied: 13♀♀1♂; Rono hills (Papum Pare, 950m. MSL), Kane (West Siang, 1450m. MSL); Dt. 3-4-07&7-4-07.

Distribution: India- Widely distributed. World-Bangladesh, Java.

Remark: New record to Arunachal Himalaya. Minor pest of *Mangifera indica* (Anacardiaceae).

Genus 10. *Hoplothrips* Amyot and Serville, 1843.

Hoplothrips orientalis (Ananthakrishnan, 1969).

1969. *Carathrips orientalis* Ananthakrishnan, Indian forester, 95(3): 179-181.

1971. *Hoplothrips orientalis*: Ananthakrishnan, *J. Bom. nat. Hist. Soc.*, 67 (3): 490.

1980. *Hoplothrips orientalis*: Ananthakrishnan and Sen, *ZSI. Handbk. Ser.*, 1: 96&155.

2005. *Hoplothrips orientalis*: Varatharajan, *Monograph. M. U.*,: 27&48.

Specimen studied: 10♀♀; Rono hills (Papum Pare, 950m. MSL); Dt. 12-4-08.

Distribution: Tamil Nadu, Andhra Pradesh, Manipur, Nagaland, Arunachal Pradesh.

Remark: New record to Arunachal; Himalaya. This species is collected from semi dried twigs.

Genus 11. *Liothrips* Uzel, 1895.

Liothrips aberrans Muraleedharan and Sen, 1978.

1978. *Liothrips aberrans Muraleedharan* and Sen, *Bull.ZSI.*, 1 (3): 259-261.

1980. *Liothrips aberrans*: Ananthakrishnan and Sen, *ZSI. Handbk. Ser.*, 1: 100&156.

1988. *Liothrips aberrans*: Sen *et.al., ZSI. Occl. Paper,* 100: 68-69.

2005. *Liothrips aberrans*: Varatharajan, *Monograph. M. U.*,: 36&49.

Specimen studied: 5♀♀; Rupa (West Kameng, 1408m. MSL); Dt. 10-8-07.

Distribution: West Bengal ,Sikkim, Nagaland, Arunachal Pradesh.

Remark: New record to Arunachal Himalaya. Endemic to Northeast India. Collected from leave rolling galls of *Bixa orellana* (Bixaceae).

Liothrips anathakrishnani Sen, 1976.

1976. *Liothrips anathakrishnani* Sen, *Oriental Ins.,* 10(3): 373-375.

1988. *Liothrips anathakrishnani* : Sen *et.al., ZSI. Occl. Paper,* 100: 69-70..

2005. *Liothrips anathakrishnani*: Varatharajan, *Monograph. M. U.*,: 36&49.

Specimen studied: 6♀♀1♂; Bomdilla (West Kameng, 2430m. MSL); Dt. 9-8-07.

Distribution: Arunachal Himalaya (Tawang, Bomdilla).

Remark: Endemic to high altitudinal habitats of Arunachal Himalaya.

Liothrips Himalayanus Ananthakrishnan and Jagadish, 1970.

1970. *Liothrips Himalayanus* Ananthakrishnan and Jagadish, Oriental Ins., 4(3): 259-261.

1980. *Liothrips Himalayanus*: Ananthakrishnan and Sen, *ZSI. Handbk. Ser.*, 1: 100.

1988. *Liothrips Himalayanus*: Sen *et.al., ZSI. Occl. Paper,* 100: 74-76.

2005. *Liothrips Himalayanus*: Varatharajan, *Monograph. M. U.*,: 36&49.

Specimen studied: 5♀♀; Kane (West Siang, 1450m.MSL); Dt. 5-4-07.

Distribution: Darjeeling, Manipur, Arunachal Pradesh.

Remark: New record to Arunachal Himalaya. Endemic to Northeastern Himalayan region.

Genus 12. *Neoheegeria* Schmutz, 1909.

Neoheegeria montana Ananthakrishnan and Jagadish, 1970.

1970. *Neoheegeria montana* Ananthakrishnan and Jagadish, *Oriental Ins.*, 4(3): 262-264.

1980. *Neoheegeria montana*: Ananthakrishnan and Sen, *ZSI. Handbk. Ser.*, 1: 109&160.

1988. *Neoheegeria montana*: Sen *et.al., ZSI. Occl. Paper,* 100: 92-93

2005. *Neoheegeria montana*: Varatharajan, *Monograph. M. U.,*: 29&50.

Specimen studied: 5♀♀; Seppa (East Kameng, 363m. MSL); Dt.5-5-08.

Distribution: Darjeeling, Manipur, Nagaland , Arunachal Pradesh.

Remark: New record to Arunachal Himalaya. Endemic to Northeastern Himalayan region. Collected from grasses.

Genus 13. *Thlibothrips* Priesner, 1951.

Thlibothrips inquilinus Ananthakrishnan and Varadarasan, 1978.

1978. *Thlibothrips inquilinus* Ananthakrishnan and Varadarasan, oriental Ins., 12(3): 397-399.

1980. *Thlibothrips inquilinus*: Ananthakrishnan and Sen, *ZSI. Handbk. Ser.,* 1: 115&165.

2005. *Thlibothrips inquilinus*: Varatharajan, *Monograph. M. U.,*: 27&50.

Specimen studied: 8♀♀; Rupa (West Kameng, 1405m. MSL); Dt. 10-8-07.

Distribution: Western and Eastern Ghats, Jharkhand, Manipur, Nagaland, Arunachal Pradesh.

Remark: New record to Arunachal Himalaya. Endemic to India. Gall inquiline of *Litsea monopetala* (Meliaceae) leaf.

Genus 14. *Xylaplothrips* Priesner, 1928.

Xylaplothrips debilis Ananthakrishnan and Jagadish, 1971.

1971. *Xylaplothrips debilis* Ananthakrishnan and Jagadish, Zool. Anz., 186: 266-267.

1980. *Xylaplothrips debilis*: Ananthakrishnan and Sen, *ZSI. Handbk. Ser.,* 1: 116&166.

1988. *Xylaplothrips debilis*: Sen *et.al., ZSI. Occl. Paper,* 100: 105-106.

2005. *Xylaplothrips debilis*: Varatharajan, *Monograph. M. U.,*: 29&50.

Specimen studied: 3♀♀; Rupa (West Kameng, 1405m. MSL); Dt. 10-8-07.

Distribution: Kerala, Andhra Pradesh, Arunachal Pradesh.

Remark: Endemic to India. Collected from leaf litters.

Subfamily- Idolothripinae.

Genus 15. *Dinothrips* Bagnall, 1908.

Dinothrips sumatrensis Bagnall, 1908.

1908. *Dinothrips sumatrensis* Bagnall, *Trans. Nat. Hist. Soc. Northumb.*, 3: 191.

1980. *Dinothrips sumatrensis*: Ananthakrishnan and Sen, *ZSI. Handbk. Ser.,* 1: 118&168.

1988. *Dinothrips sumatrensis*: Sen *et.al., ZSI. Occl. Paper,* 100: 108-109.

2005. *Dinothrips sumatrensis*: Varatharajan, *Monograph. M. U.,*: 31&51.

Specimen studied: 1♀; Kane (West Siang, 1450m. MSL); Dt. 6-5-07.

Distribution: India-Western and Eastern Ghats, NE regions. World- Sumatra, Srilanka, Bhutan, Malaysia, Java, Borneo.

Remark: Mycophagous with polymorphic forms common.

Genus 16. *Elaphrothrips* Buffa, 1903.

Elaphrothrips spiniceps Bagnall, 1932.

1932. *Elaphrothrips spiniceps* Bagnall, *Ann. Mag. nat. Hist.,* 10 (10): 514.

1980. *Elaphrothrips spiniceps*: Ananthakrishnan and Sen, *ZSI. Handbk. Ser.,* 1: 120&168.

1988. *Elaphrothrips spiniceps*: Sen *et.al., ZSI. Occl. Paper,* 100: 115.

2005. *Elaphrothrips spiniceps*: Varatharajan, *Monograph. M. U.,*: 31&51.

Specimen studied: 5♀♀; Kane (West Siang, 1450m. MSL); Dt. 5-5-07.

Distribution: India, Nepal, Myanmar, Taiwan, Java.

Remark: New record to Arunachal Himalaya.

Genus 17. *Meiothrips* Priesner, 1929.

Meiothrips menoni Ananthakrishnan, 1964.

1964. *Meiothrips menoni* Ananthakrishnan, *Opus. Ent. Suppl.*, 25: 99-101.

1980. *Meiothrips menoni* : Ananthakrishnan and Sen, *ZSI. Handbk. Ser.,* 1: 121&169.

2005. *Meiothrips menoni*: Varatharajan, *Monograph. M. U.,*: 31&51.

Specimen studied: 4♀♀; Kane (West Siang, 1450m. MSL); Dt. 6-5-07.

Distribution: Widely distributed in India.

Remark: New record to Arunachal Himalaya. Endemic to India.

Genus 18. *Nesothrips* Kirkaldy, 1907.

Nesothrips lativentris (Karny, 1913).

1913. *Rhaebothrips lativentris* Karny, *Formosa-Ausb. Suppl. Ent.*, 2: 129-130.

1983. *Nesothrips lativentris*: Mound and Palmer, *Bull. Br. Mus. Nat. Hist.(Ent.),* 46 (1): 48.

1988. *Nesothrips lativentris*: Sen *et.al., ZSI. Occl. Paper,* 100: 118-119.

2005. *Nesothrips lativentris*: Varatharajan, *Monograph. M. U.,*: 30&51.

Specimen studied: 2♀♀; Rupa (West Kameng, 1408m. MSL); Dt.10-8-07.

Distribution: India- Northeastern region. World-Mauritius, Philippines, Japan, Guam, Queensland, Hawaii, Jamaica, Virgin Island.

Remark: This is a mycophagous species.

The present investigation resulted on the collection of 15 species of Terebrantia viz., *Anaphothrips sudanensis, Ayyaria chaetophora, Caliothrips luckmanni, Dichromothrips nakahari, Dendrothrips schimae, Frankliniella intonsa, Megalurothrips peculiaris, Monilothrips kempi, Panchaetothrips indicus, Parabaliothrips coluckus, Retithrips syriacus, Scirtothrips dorsalis, Selenothrips rubrocinctus, Thrips hawaiiensis and T. himalayanus* for the first time from Arunachal Himalaya hitherto known only from other regions. Further, 16 species of Tubulifera viz., *Araeothrips vamana, Crotonothrips nagaensis, Dexiothrips madrasensis, Dolichothrips montanus, Ecacanthothrips tibialis, Elaphrothrips*

spiniceps, Gigantothrips elegans, Gynaikothrips bengalensis, Haplothrips gowdeyi, H. tenuipennis, Hoplothrips orientalis, Liothrips aberrans, L. himalayanus, Meiothrips menoni, Neoheegeria montana and Thlibothrips inquilinus have also been recorded newly from Arunachal Himalaya which were known only from the rest of India. Besides these, the collection of 5 species of pest thrips namely, *Caliothrips luckmanni, Haplothrips tenuipennis, Panchaetothrips indicus, Retithrips syriacus and Scirtothrips dorsalis* is a very significant finding of the study,.

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