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Diversity and Distribution of Indian Primitive Spiders (Araneae: Opisthothelae: Mygalomorphae) in Different State Inculding an Annotated Checklist

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ABSTRACT

Annotated checklist of Mygalomorphae so far recorded from different states and union territories of India reveal that a total of 111 species under 32 genera belonging eight families are distributed over 17 states and two union territories. The review cleared that diversity of the primitive spider fauna is maximum in Tamil Nadu followed by Kerala, West Bengal and Karnataka and they are distributed maximally along the coastal states excepting Karnataka. Western Ghats Biodiversity hotspot is the house of the fauna. There is nearly 72 % local endemism.

***Keywords*:** Diversity; distribution; primitive; Mygalomorphae; India; state; annotated; checklist

1. INTRODUCTION

Spiders, composing the order Araneae is the largest group among arachnids and separated into two suborders: Mesothelae (segmented spiders) and Opisthothelae (includes all other spiders). Later one is further divided into two infraorders: Mygalomorphae (ancient' spiders such as tarantulas, trapdoor and funnel web spiders) and Araneomorphae (modern'

spiders include the vast majority of spiders) (Coddington, 2005; WSC, 2015). The segmented spiders are easily distinguished by indentations on the top of the abdomen — evidence of spiders' common ancestry with scorpions (Culin *et al.*, 2014).

Araneomorphs have pincer like fangs, most have 6 spinnerets, and one pair of book lungs plus a pair of air tubes (tracheae). Mygalomorphs have reduced spinnerets, dagger like fangs and two pairs of book lungs similar to ancestral ground living spiders. Other external features that distinguish infraorders include the structure of the male palp, presence or absence of an epigynum in the female and internal genitalic features. Families are distinguished on the basis of plesiomorphic characteristics such as number and spacing of simple eyes, number of tarsal claws, number of spinnerets, habits and structure of chelicerae, while specialized (apomorphic) characters such as glands, setae, teeth and peculiarities of the genitalia are important for species recognition.

The current world list of spiders includes 45,776 species under 3974 genera distributed over 114 families (WSC, 2016). They, in India are represented by 1686 species belonging to 438 genera of 61 families (WSC, 2015; Keswani *et al*., 2012). Keswani *et al*., (2012) listed 91 species of Mygalomorphae under 28 genera belonging 8 Families.

Present list includes a total of 111 species of Mygalomorphae distributed over 32 genera under eight families from India.

2. MATERIALS AND METHODS

The present check-list is based on an examination of specimens deposited in the National Zoological Collection (NZC), Zoological Survey of India and on reviews of the published literatures, including several recent world catalogues of spiders (WSC, 2015; Tarantula Bibliography, 2015), recent book (Sebastian and Peter, 2009), checklist (Keswani *et al*., 2012), monograph (Sen *et al*. 2015), published papers in different National and International journals (Gupta *et al.*, 2013; Jose and Prasanth, 2015; Mirza and Sanap, 2012; Mirza *et al*., 2012, '14; Prasanth and Jose, 2014; Sanap and Mirza, 2013, '14, '15; Siliwal and Molur, 2007; Siliwal *et al.*, 2009, '12, '14, '15a, '15b).

Abbreviations: WSC = World Spider Catalogue, AS = Assam, AP = Andhra Pradesh, AN = Andaman & Nicobar Islands, ARP = Arunachal Pradesh, BH = Bihar, WB = West Bengal, UK = Uttrarakhand, OR = Orissa, MG = Meghalaya, PJ = Punjab, CG = Chhattisgarh, JH = Jharkhand, TN = Tamil Nadu, KL = Kerala, KT = Karnataka, MZ = Mizoram, MN = Manipur, SI = South India, MR = Maharashtra, SA = Southeast Asia, NI = Northern India, PC = Pondicherry, NPI = Northern Peninsular India.

3. RESULTS AND DISCUSSION

India has 29 states and seven union territories, from which only 17 states and two union territories primitive spiders are recorded so far (Figure 1). A total of 111 species of Mygalomorphs distributed over 32 genera belonging eight families are known so far (Table 1). From Tamil Nadu state maximum number of species recorded followed by Kerala, West Bengal, Maharashtra and so on (Figure 1). Maximum number of families is recorded form West Bengal followed by Orissa and Tamil Nadu (Figure 2) while maximum number of

genera from Tamil Nadu followed by West Bengal and Kerala (Figure 2). Among all the families, maximum number of species is recorded under Theraphosidae followed by Idiopidae and Barychelidae (Figure 3). Theraphosids are recorded from almost all the recorded states excepting Orissa, Mizoram and Manipur.

The distribution pattern of primitive spiders clearly shows that the western and north western states i.e. Gujarat, Rajasthan, Punjab, Haryana, Jammu and Kashmir, Madhya Pradesh and Uttar Pradesh having very few or absent (Figure 4). Only seven species are recorded from other countries i.e. almost 94% fauna are endemic to India. Local endemism is very much evident here: genus *Diplothele* O. P. Cambridge with three species of Barychelidae has only been recorded from Orissa; genus *Scalidognathus* Karsch with three species of Idiopidae so been recorded from Tamil Nadu only; single representative of *Macrothele* Ausserer under Hexathelidae is recorded only from West Bengal; only a single species of *Sasonichus* Pocock under Barychelidae is been reported from Kerala and *Ischnothele indicola* Tikader of Dipluridae only described from Assam.

Exact distribution of eleven species under four families are unknown (* marked) viz. exact distribution within India: *Latouchia cryptica* (Simon) of Ctenizidae, *Idiops fossor* (Pocock) of Idiopidae, *Chilobrachys andersoni* (Pocock), *C. flavipilosus* (Simon), *Lyrognathus crotalus* Pocock, and *Poecilotheria tigrinawesseli* Smith of Theraphosidae; exact distribution within Southeast Asia as well as India: *Haplopelma vonwirthi* Schmidth and *Phlogiellus subermattus* (Giltay) of Theraphosidae; doubtful distribution with neighbouring country: *Idiops designatus* O. P. Cambridge of Idiopidae (either India or Pakistan), *Raveniola concolor* Zonstein of Nemesiidae (either India or China) and *Poecilotheria vittata* Pocock of Theraphosidae (either India or Sri Lanka).

Table 1. Annotated checklist of primitive spiders so far recorded from India.

Family	Genus	Species	Distribution	
			In India	Elsewhere
Atypidae Thorell	*Atypus* Latreille	*sutherlandi* Chennappaiya	WB	
		wii Siliwal *et al.*	UK	
Barychelidae Simon	*Diplothele* O. P. Cambridge	*gravelyi* Siliwal *et al.*	OR	
		tenebrosus Siliwal *et al.*	OR	
		walshi O. P. Cambridge	OR	
	Sason Simon	*andamanicum* Simon	AN	
		rameshwaram Siliwal & Molur	TN	
		robustum (O. P. Cambridge)	KL, TN	Sri Lanka

	Sasonichus Pocock	*sullivani* Pocock	KL	
	Sipalolasma Simon	*arthrapophysis* (Gravely)	AP, OR	
	Tigidia Simon	*nilgiriensis* Sanap *et al.*	TN	
		rutilofronis Sanap *et al.*	TN	
		sahyadri Siliwal *et al.*	KT	
Ctenizidae Thorell	*Conothele* Thorell	*giganticus* Siliwal *et al.*	MZ	
		khunthokhanbi Kananbala *et al.*	MN	
		vali Siliwal *et al.*	ARP	
		varvarti Siliwal *et al.*	OR	
	Latouchia Pocock	*cryptica* (Simon)	UK, SI*	
Dipluridae Simon	*Indothele* Coyle	*dumicola* (Pocock)	MR, WB	
		mala Coyle	AP	
		rothi Coyle	TN	
	Ischnothele Ausserer	*indicola* Tikader	AS	
Hexathelidae Simon	*Macrothele* Ausserer	*vidua* Simon	WB	
Idiopidae Simon	*Heligmomerus* Simon	*barkudensis* (Gravely)	OR, WB	
		biharicus (Gravely)	BH	
		garoensis (Tikader)	MG, WB	
		maximus Sanap & Mirza	KL	
		prostans Simon	TN	
	Idiops Perty	*bombayensis* Siliwal *et al.*	MR	
		constructor (Pocock)	TN	Thailand
		designatus O. P. Cambridge	PJ*	
		fortis (Pocock)	WB	

		fossor (Pocock)	SI*	
		joida Gupta *et al.*	KT	
		kaasensis Mirza *et al.*	MR	
		madrasensis (Tikader)	TN	
		mettupalayam Ganeshkumar & Siliwal	TN	
		oriya Siliwal	OR	
		rubrolimbatus Mirza & Sanap	MR	
	Scalidognathus Karsch	*montanus* (Pocock)	TN	
		nigriaraneus Sanap & Mirza	TN	
		tigerinus Sanap & Mirza	TN	
Nemesiidae Simon	*Atmetochilus* Simon	*bifidus* (Gravely)	WB	
	Damarchilus Siliwal *et al.*	*nigricus* Siliwal *et al.*	ARP	
		rufus Siliwal *et al.*	ARP	
	Damarchus Thorell	*assamensis* Hirst	AS	
		excavates Gravely	OR	
	Raveniola Zonstein	*concolor* Zonstein	Himalaya *	
Theraphosidae Thorell	*Annandaliella* Hirst	*ernakulamensis* Jose & Sebastian	KL	
		pectinifera Gravely	TN	
		travancorica Hirst	KL	
	Chilobrachys Karsch	*andersoni* (Pocock)	India*	Myanmar, Malaysia
		assamensis Hirst	AS	
		femoralis Pocock	MR, KT	
		fimbriatus Pocock	MR	

		flavopilosus (Simon)	India*	Myanmar
		fumosus (Pocock)	WB	
		hardwickei (Pocock)	AP, BH, CG, JH, KL, MR, WB	
		himalayensis (Tikader)	WB	
		himalayensis (Tikader)	MG, WB	
		stridulans (Wood Mason)	AS, ARP, WB	Bangladesh
		thorelli Pocock	AS	
	Haploclastus Simon	*cervinus* (Simon)	TN	
		devamatha Prasanth & Jose	KL	
		kayi Gravely	KL	
		nilgirinus Pocock	KT, KL, TN	
		satyanus (Barman)	MG	
		tenebrosus Gravely	TN	
		validus (Pocock)	MR	
	Haplocosmia Schmidt & Von Wirth	*himalayana* (Pocock)	AS, HP, UK, WB	
	Haplopelma Simon	*vonwirthi* Schmidt	SA*	
	Heterophrictus Pocock	*aareyensis* Mirza & Sanap	MR	
		blatteri (Gravely)	KL, MR	
		raveni Mirza & Sanap	MR	
	Lyrognathus Pocock	*crotalus* Pocock	NI*	
		saltator Pocock	MG	
	Neoheterophrictus Siliwal & Raven	*amboli* Mirza & Sanap	MR	
		bhori (Gravely)	KL	

		crurofulvus Siliwal *et al.*	KT	
		madraspatanus (Gravely)	TN	
		sahyadri Siliwal *et al.*	KT	
		smithi Mirza *et al.*	KT	
		uttarakannada Siliwal *at al.*	KT	
	Phlogiellus Pocock	*subarmatus* (Thorell)	AN	
		subinermis (Giltay)	SA*	
	Plesiophrictus Pocock	*fabrei* (Simon)	TN	
		linteatus (Simon)	PC	
		meghalayaensis Tikader	MG	
		millardi Pocock	MR	
		nilagiriensis Siliwal *et al.*	TN	
		sericeus Pocock	MR	
	Poecilotheria Simon	*formosa* Pocock	TN	
		hanumavilasumica Smith	TN	
		metallica Pocock	AP	
		miranda Pocock	JH, WB	
		regalis Pocock	KL, KT, TN	
		rufilata Pocock	KT, KL	
		striata Pocock	KT, KL, TN	Malaysia
		tigrinawesseli Smith	NPI*	
		vittata Pocock	India or Sri Lanka *	
	Sahydroaraneus Mirza & Sanap	*collinus* Pocock	TN	
		hirsti Mirza & Sanap	KL	

		raja (Gravely)	KL	
	Selenocosmia Ausserer	*javanensis* (Walckenaer)	AN	Malaysia to Sulawesi
		kulluensis Chamberlin	HP	
		sutherlandi Gravely	WB	
	Thrigmopoeus Pocock	*insignis* Pocock	KT, KL	
		psychedelicus Sanap & Mirza	KL	
		truculentus Pocock	KT	

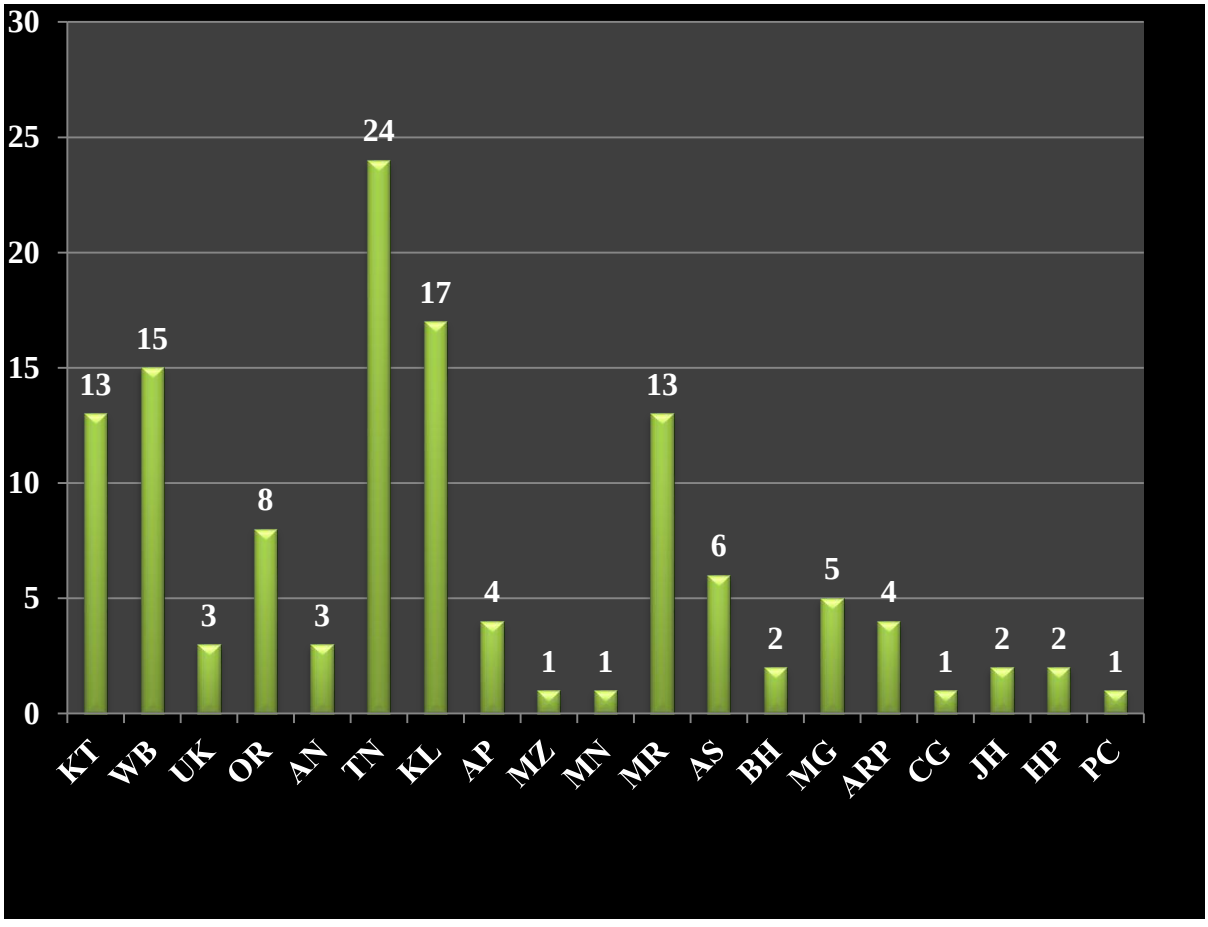

Figure 1. Diversity of primitive spiders in different Indian states and union territories.

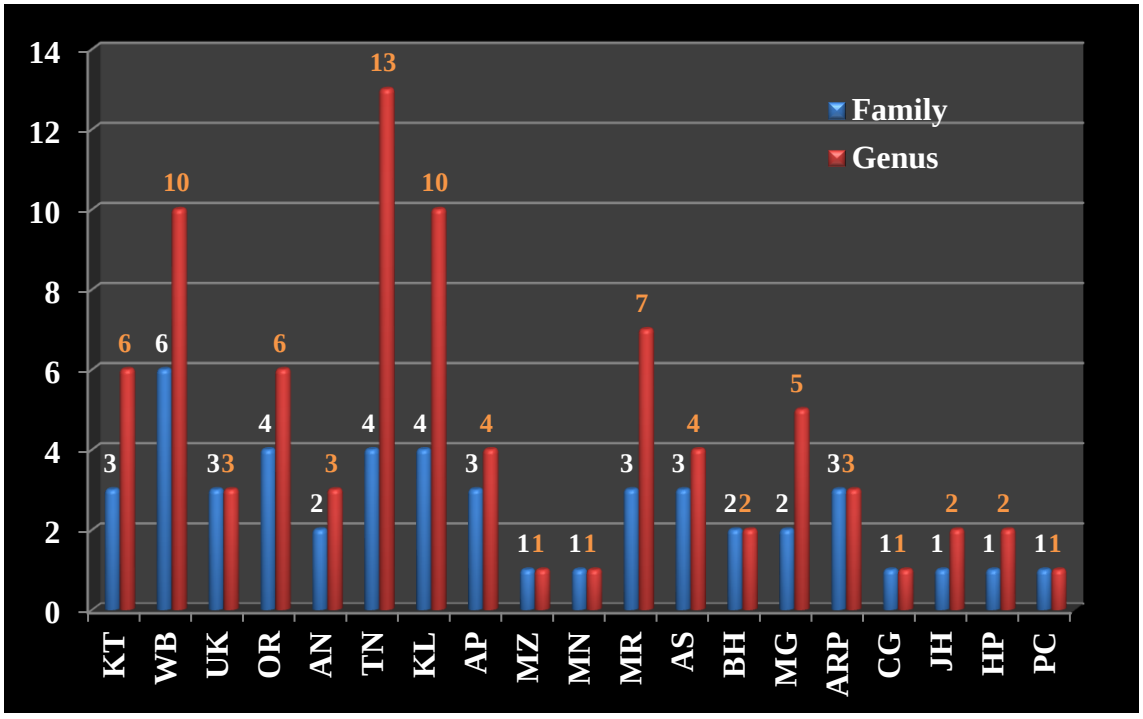

Figure 2. Diversity of higher taxa of primitive spiders in different Indian states and union territories.

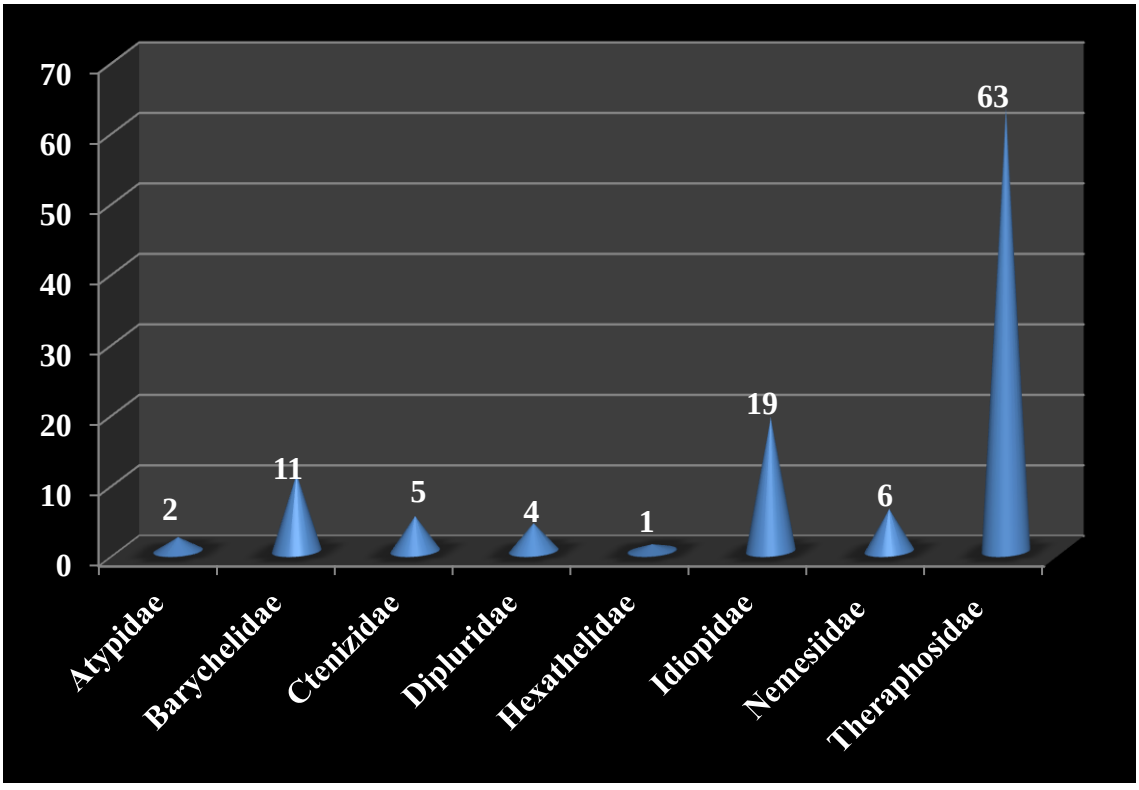

Figure 3. Diversity of primitive spiders in different families recorded so far from India.

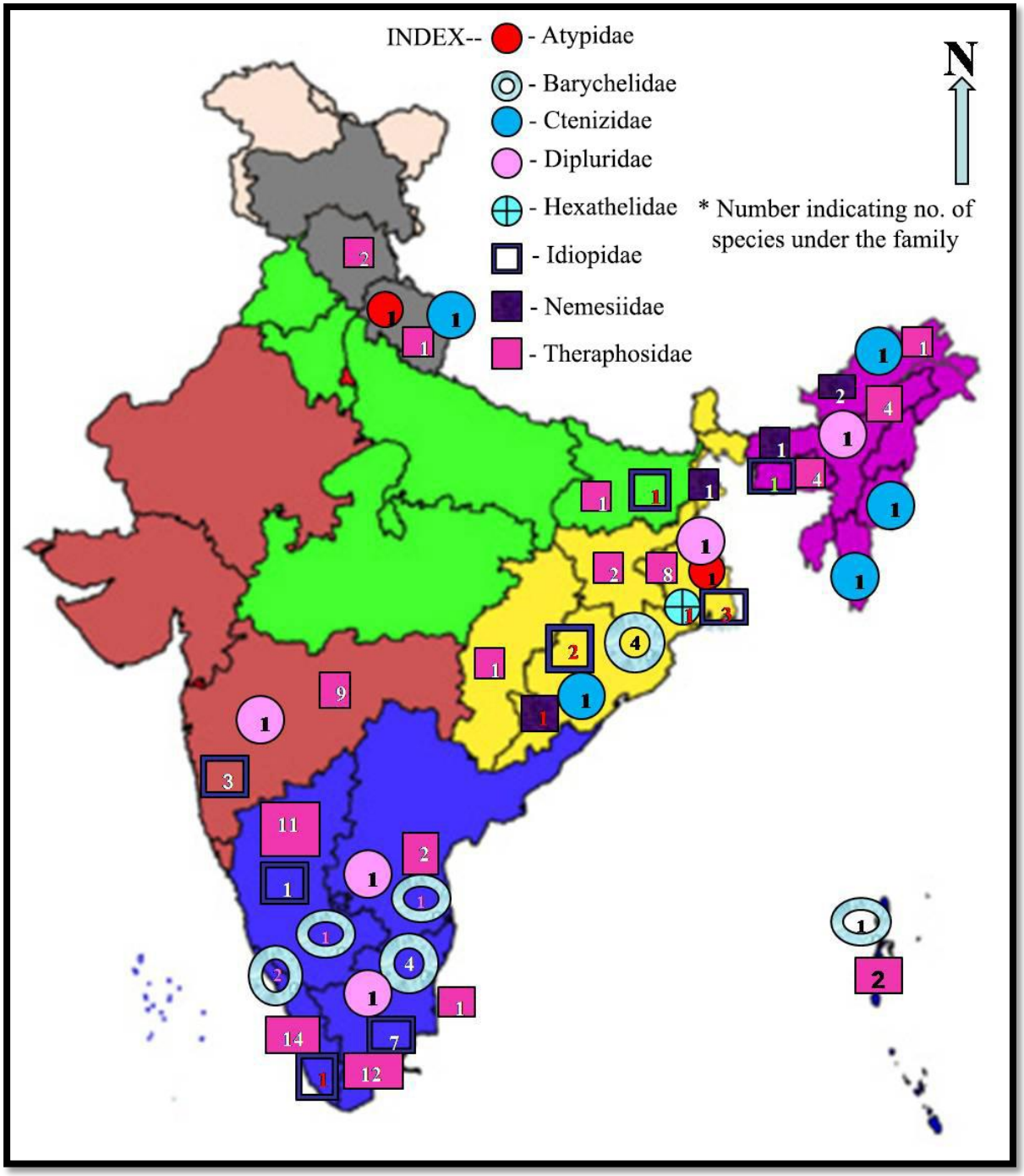

Figure 4. Distribution pattern of primitive spider families recorded from India.

3. CONCLUSION

The purpose of the present review is to focus on the diversity and distribution of primitive spiders in different states and union territories of India and at the same time providing an annotated checklist of species so far recorded from the area. The study reveals

that the Western Ghats Biodiversity Hot spots abodes the maximum diversity. They are mostly distributed along the coastal states i. e. Tamil Nadu, Kerala, West Bengal, Maharashtra and Orissa excepting Karnataka. It is due to habitat preference and for this there is so much of local endemism (nearly 72 % species are recorded only from single state). The annotated list will be helpful any worker of primitive spider fauna.

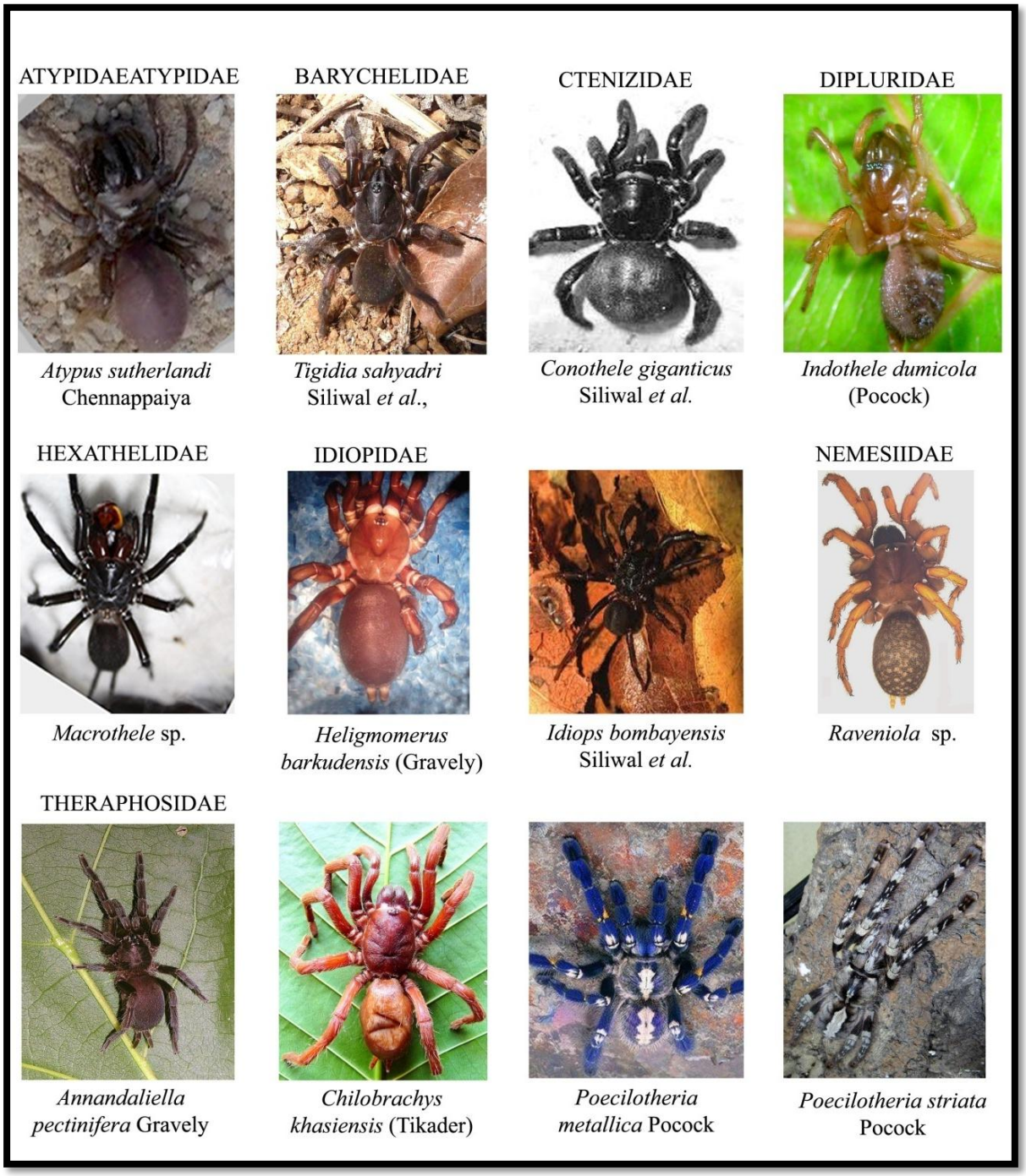

Plate: Photographic images of representatives of different families recorded from India.

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