

2014

A summary of the milliped faunas of Pakistan, Bangladesh, and Kashmir (Arthropoda: Diplopoda)

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INSECTA MUNDI

A Journal of World Insect Systematics

0368

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Date of Issue: June 13, 2014

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Insecta Mundi 0368: 1–7

ZooBank Registered: urn:lsid:zoobank.org:pub:EA59C110-B5C5-4C0A-A226-F950C18D6C0B

Published in 2014 by

Center for Systematic Entomology, Inc.

P. O. Box 141874

Gainesville, FL 32614-1874 USA

<http://centerforsystematicentomology.org/>

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A summary of the milliped faunas of Pakistan, Bangladesh, and Kashmir (Arthropoda: Diplopoda)

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Abstract. Three female callipodidan samples from northern Pakistan are assigned to *Bollmania kohalana* (Attems, 1936) (Caspiopetalidae), the only ordinal representative documented from the country; a new record of *Kaschmiriosoma loebli* Jeekel, 2003 (Polydesmida: Paradoxosomatidae), is also provided. Localities are summarized for the 14 Pakistani, 6 Kashmirian, and 5 Bangladeshi diplopods. The last include one unidentifiable female of *Zephronia* Gray, 1832 (Sphaerotheriida: Zephroniidae), and two adventive species, *Trachyjulus calvus* (Pocock, 1893) (Spirostreptida: Cambalopsidae) and *Asiomorpha coarctata* (Saussure, 1860) (Polydesmida: Paradoxosomatidae); all constitute new country records. Two obscurely documented Bangladeshi diplopods are *Gonoplectus cautus* (Attems, 1936) (Spirostreptida: Harpagophoridae), and *Trichopeltis watsoni* Pocock, 1895 (Polydesmida: Cryptodesmidae). The Pakistani polydesmidan, *Quasidesmus puschtun* Golovatch, 1991, is transferred from Pyrgodesmidae to Cryptodesmidae.

Key words: *Anaulaciulus*, *Bollmania*, Chittagong, Jammu and Kashmir, *Kaschmiriosoma*, Khyber Pakhtunkhwa, Punjab, Swat.

Introduction

While recently perusing diplopod holdings at the California Academy of Sciences (CAS), San Francisco, I discovered samples from two of the world's most poorly sampled countries, Pakistan and Bangladesh. All were collected in 1961 by Edward S. Ross and David Q. Cavagnaro when the countries were united and known as West and East Pakistan, respectively. Beyond representing poorly known faunas, the samples assume greater significance as Pakistan is now basically "off-limits" to westerners because of armed conflicts and cultural differences. Consequently, I put this material on record because few opportunities will probably arise in the near future to enhance knowledge of these poorly known Asian countries. Since the pioneering works on Indian Diplopoda (Attems 1936) and ones on, primarily, southern India and Sri Lanka (= Ceylon) (Carl 1922, 1932, 1941), six country and regional checklists have documented Asian millipeds between the Persian Gulf and South China Sea: Iran (Golovatch 1983, Enghoff and Moravvej 2005), Thailand (Enghoff 2005), Laos (Likhitrakarn et al. 2014), Vietnam (Enghoff et al. 2004), and the Himalayas (Golovatch and Martens 1996). I continue this trend by updating faunal knowledge of Pakistan, Bangladesh, and the Kashmir region, to consolidate records and facilitate research by future diplopodologists. Along with new works on India and Sri Lanka, checklists are particularly needed for Cambodia, Malaysia, and Myanmar, the remaining coastal countries of southern Asia, aside from the Arabian Peninsula, lacking consolidated diplopod treatments.

Pakistan and Kashmir. As noted by Shelley and Golovatch (2011), diplopods, all indigenous, are known only from the northern 1/3 of Pakistan; none have been recorded from the southern 2/3, which encompasses Sind, Balochistan, and southern Punjab provinces (provs.), the Indus Delta and lower river valley, and the Thar, Cholistan, Thali, and Kharan deserts. Ten species are known from Khyber Pakhtunkhwa, the northernmost province that borders Kashmir. Possession of Kashmir is disputed and presently divided among Pakistan, India, and China. To my knowledge, diplopods have not been reported from the Chinese and Pakistani sectors, so I list those from Jammu and Kashmir State, India. Below, I cite the CAS samples and summarize Pakistani and Kashmirian diplopods in Tables 1 and 2, respectively.

Order Callipodida: Family Caspiopetalidae***Bollmania kohalana* (Attems, 1936)**

Apatidea kohalana Attems, 1936: 249–251, figs. 54–56.

Bollmania kohalana: Jeekel, 1955: 417. Golovatch, 1983: 160 (text and key); 1991: 867 (text). Stoev and Enghoff, 2005: 1886 (key). Stagl and Stoev, 2005: 15–16. Stoev et al. (2008): 14.

Bollmania sp.: Golovatch, 1991: 867.

CAS localities. *Punjab Prov.*, Murree, 1,200 m, F, 16 December 1961; and 32 km (20 mi) NE Rawalpindi, 850–950 m, F, 16 December 1961. *Khyber Pakhtunkhwa Prov.*, 3.2 km (2 mi) N Kohat, 600 m, 4F, 19 December 1961.

Remarks. In the original description, Attems (1936) reported two individuals and localities, but did not specify the type locality, so both specimens are syntypes. As suggested by Stagl and Stoev (2005), the first locality mentioned, implied to be the type locality by Stoev et al. (2008), is Kohala, on the Jhelum River north of Murree, south of Muzaffarabad, and east of Circle Bakote. I cannot locate the second site, but it is also in the Murree Subdivision though 4,000' higher and probably near Kohala.

The only male callipodidan from Pakistan is one of the syntypes of *A. kohalana*, so I combine all prior records under this species. Most samples are from the northeast near Islamabad and Rawalpindi and seem likely to be conspecific.

Order Polydesmida: Family Paradoxosomatidae: Tribe Sulciferini***Kaschmiriosoma loebli* Jeekel, 2003**

CAS locality. *Khyber-Pakhtunkhwa Prov.*, 3.2 km (2 mi) W Cherat, 1,200 m, MM, FF, 20 December 1961.

Remarks. Hoffman (1980) cited *Kaschmiriosoma* Schubart, 1935, as a genus of uncertain status and tribal position, but Jeekel (2003) assigned it to Sulciferini. This allocation has been followed by Golovatch (2012) and Nguyen and Sierwald (2013).

Table 1. Diplopod records from Pakistan.

Taxon	Province(s) and Locality(ies)	References	Remarks
Siphonophorida: Siphonophoridae. <i>Siphonophora duschman</i> Golovatch, 1991.	<i>Khyber Pakhtunkhwa Prov.</i> , above Miandam.	Golovatch 1991; Jeekel 2001.	The only highly disjunct locality in Central Asia of the order/family. As with Heterochordeumatidae (Chordeumatida) and <i>Delarthrum obscurum</i> (Polydesmida: Paradoxosomatidae), both in Pakistan, and <i>Kronopolites obscurum</i> , in Kashmir, <i>S. duschman</i> is probably the westernmost Oriental outlier of this speciose genus.
Callipodida: Caspiopetalidae <i>Bollmania kohalana</i> (Attems, 1936).	<i>Punjab Prov.</i> , Kohala, Gharial, Hazara, Murree, 32 km (20 mi) NE Rawalpindi. <i>Khyber Pakhtunkhwa Prov.</i> , Swat Dist., Malam Jabba, 3.2 km (2 mi) N Kohat.	Attems 1936 (as <i>Apatidea kohalana</i>); Jeekel 1955; Golovatch 1991; Read and Golovatch 1994; Stagl and Stoev 2005; Stoev et al 2008; herein.	Localities include those of <i>Bollmania</i> sp. by Golovatch (1991).
Chordeumatida: Heterochordeumatidae	<i>Khyber Pakhtunkhwa Prov.</i> , Swat Dist., Malam Jabba.	Golovatch 1991.	Based on an unidentifiable female with obvious, broad paranota (see Shear 2000, fig. 16). As with <i>Siphonophora duschman</i> (Siphonophoridae) and <i>Delarthrum obscurum</i> (Polydesmida: Paradoxosomatidae), both in Pakistan, and <i>Kronopolites occidentalis</i> in Kashmir, the heterochordeumatid record seems the westernmost outlier species of this southeast Asian family. Shear (2000) did not mention this Pakistani record and cited the family from Myanmar to Indonesia (Sumatra/Mentawai Islands).
Julida: Julidae. <i>Anaulaciulus pakistanus</i> Korsós, 2001.	<i>Khyber Pakhtunkhwa Prov.</i> , Swat Dist., Malam Jabba, above Utrot.	Korsós 1996, 2001.	Golovatch (1991) cited <i>Anaulaciulus</i> sp. from North Pakistan in general, which could be either <i>pakistanus</i> or <i>tigris</i> .

<i>Anaulaciulus tigris</i> Korsós, 2001.	Khyber Pakhtunkhwa Prov., Swat Dist., above Miandam.	Korsós 1996, 2001.	
Polydesmida: Polydesmidae. <i>Epanerchodus swatensis</i> (Golovatch, 1991).	North Pakistan in general; <i>Khyber Pakhtunkhwa Prov.</i> , Malam Jabba, above Miandam, upstream from Kalam, Lawarai Pass, above Naran	Golovatch 1991; Read and Golovatch 1994; Golovatch et al. 2011.	Originally described in <i>Usbekodesmus</i> , synonymized under <i>Epanerchodus</i> by Golovatch et al. (2011) and reiterated by Golovatch et al. (2012a). Localities include those for <i>Usbekodesmus</i> sp. (Golovatch 1991). Read and Golovatch (1994) suggested that the species may be endemic to North Pakistan.
Polydesmida: Cryptodesmidae <i>Quasidesmus puschun</i> Golovatch, 1991.	<i>Khyber Pakhtunkhwa Prov.</i> , Malam Jabba, above Miandam, Lawarai Pass	Golovatch 1991.	Transferred from Pyrgodesmidae to Cryptodesmidae per Dr. Golovatch's recommendation (in litt.).
Polydesmida: Paradoxosomatidae: Alogolykinae: Polydrepanini <i>Delarthrum obscurum</i> Attems, 1936.	Pakistan in general; North Pakistan in general; <i>Punjab Prov.</i> , Abbotabad, Changla Gali.	Attems 1936, 1937; Jeekel 1968; Golovatch 1991; Nguyen and Sierwald 2013.	<i>Delarthrum</i> is a speciose Himalayan genus with nearly 50 primarily Nepalese species (Golovatch 2014). As with <i>Siphonophora dushman</i> (Siphonophorida:idea) and Heterochordeumatidae, both in Pakistan, and <i>Kronopolites occidentalis</i> in Kashmir, <i>D. obscurum</i> seems the westernmost outlier of the genus.
Paradoxosomatinae: Sulciferini <i>Kaschmiriosoma contortipes</i> Schubart, 1935.	Pakistan in general; North Pakistan in general; <i>Khyber Pakhtunkhwa Prov.</i> , Naran, Hazara. KASHMIR, region in general; INDIA, <i>Jammu and Kashmir State</i> , Sind Valley, Matayan.	Schubart 1935; Silvestri 1936; Attems 1937; Jeekel 1968, 2003; Golovatch 1983, 1991; Read and Golovatch 1994; Golovatch and Martens 1996; Nguyen and Sierwald 2013.	
<i>Kaschmiriosoma nulla</i> (Attems, 1936).	Pakistan in general; <i>Punjab Prov.</i> in general.	Attems 1936, 1937; Jeekel 1968, 2003.	
<i>Kaschmiriosoma pleuropterum</i> (Attems, 1936).	Pakistan in general; <i>Punjab Prov.</i> in general; Changla Gali.	Attems 1936, 1937; Jeekel 1968, 2003; Golovatch 1991.	
<i>Kaschmiriosoma nodosum</i> Jeekel, 2003.	<i>Khyber Pakhtunkhwa Prov.</i> , Swat Dist., above Utrot. Lawarai Pass. <i>Chitral Prov.</i> , Bumburet, above Madaglasht.	Jeekel 2003; Nguyen and Sierwald 2013.	
<i>Kaschmiriosoma loebli</i> Jeekel, 2003	<i>Khyber Pakhtunkhwa Prov.</i> , Swat Dist., Marghuzar; 3.2 km (2 mi) W Cherat.	Jeekel 2003; Golovatch 2012; Nguyen and Sierwald 2013; herein.	
Xanthodesmini <i>Streptogonopus phipsoni</i> (Pocock, 1892).	<i>Punjab Prov.</i> , Ahmedabad, Rawalpindi.	Attems 1936, 1937; Jeekel 1968.	Presumably not Ahmedabad, Gujarat State, India.

Table 2. Diplopod records from Kashmir.

Taxon	Locality(ies)	References	Remarks
Polyxenida: Polyxenidae. <i>Polyxenus</i> sp.	Kashmir in general.	Silvestri 1936; Golovatch 1991; Golovatch and Martens 1996.	
Chordeumatida: Kashmireumatidae <i>Kashmireuma nielsenii</i> Mauriès, 1982.	Kashmir in general; INDIA, <i>Jammu and Kashmir State</i> , Gulmarg, Sonamarg.	Mauriès 1982; Golovatch and Martens 1996.	The record of <i>Kashmireuma</i> sp. (Mauriès 1982) is included here.
Julida: Julidae <i>Anaulaciulus kashmirensis</i> Korsós, 2001.	Kashmir in general; INDIA, <i>Jammu and Kashmir State</i> , Sonamarg, Nichinai Valley.	Korsós 1996, 2001; Golovatch and Martens 1996.	
<i>Anaulaciulus topali</i> Korsós, 2001.	Kashmir in general; INDIA, <i>Jammu and Kashmir State</i> , Pahalgam, Yusmarg.	Korsós 1996, 2001; Golovatch and Martens 1996.	
Polydesmida: Paradoxosomatidae: Paradoxosomatinae: Sulciferini <i>Kaschmiriosoma contortipes</i> Schubart, 1935.	Kashmir in general; INDIA, <i>Jammu and Kashmir State</i> , Sind Valley, Matayan.	Schubart 1935; Silvestri 1936; Attems 1937; Jeekel 1968, 2003; Golovatch 1983, 1991; Read and Golovatch 1994; Golovatch and Martens 1996; Nguyen and Sierwald 2013.	
<i>Kronopolites occidentalis</i> Golovatch, 1983	Kashmir in general	Golovatch 1983, 1991; Golovatch and Martens 1996.	As with <i>Siphonophora dushman</i> (Siphonophorida:idea), Heterochordeumatidae, and <i>Delarthrum obscurum</i> (Polydesmida: Paradoxosomatidae), all in Pakistan, <i>K. obscurum</i> is probably the westernmost outlier of this speciose Oriental genus.

Bangladesh. Shelley and Golovatch (2011) identified nine countries lacking records of Diplopoda, both indigenous and adventive – Turks and Caicos (Western Hemisphere, Caribbean Region); Vatican City (Europe); Mauritania and perhaps Egypt (Africa); and Bahrain, Kuwait, Oman, Qatar, and United

Arab Emirates (Arabian Peninsula). I once had Bangladesh on this roster but was advised of records in Attems (1936) when it was “East Bengal,” India. Checking all miscellaneous localities in this work in Google Maps, Google Earth, and/or Wikipedia, I found two species from modern Bangladesh, both in the southernmost Division, Chittagong; Demange (1961) also reported the harpagophorid from the larger northern section. I also discovered that “Bangladesh” itself is mentioned in two works, Hoffman and Burkhalter (1978) and Jeekel (2006). I cite the CAS species, all new country records, followed by those documented in literature.

New Country Records for Bangladesh
Order Sphaerotheriida: Family Zephroniidae
***Zephronia* sp.**

CAS locality: Chittagong Div., Chittagong Dist., Sitakunda Upazila, Baraiyadhala Forest Reserve, 45m, F, 21 September 1961.

Remarks. Dr. Thomas Wesener (Museum A. Koenig, Bonn, Germany) has kindly advised me of a single unidentified female sphaerotheriidan taken by the same collectors at the same time and housed in the same CAS collection.

Order Spirostreptida: Family Cambalopsidae
***Trachyjulus calvus* (Pocock, 1893)**

CAS locality: Chittagong Div., Chittagong Dist., Lohagara Upazila, Chittagong (city), M, F, 10 September 1961.

Remarks. *Trachyjulus calvus* is a somewhat pantropical species that has been introduced to Venezuela and Brazil in the Western Hemisphere (Hoffman 1977, Golovatch et al. 2012b). Its discovery in a synanthropic habitat in Chittagong suggests adventive status, but with natural occurrence in Myanmar, it could also be indigenous to southern Bangladesh.

Order Polydesmida: Family Paradoxosomatidae: Tribe Orthomorphiini
***Asiomorpha coarctata* (Saussure, 1860)**

CAS locality: Chittagong Div., Chittagong Dist., Lohagara Upazila, Chittagong (city), MM, FF, 10 September 1961.

Remarks. I assign this species to *Asiomorpha* Verhoeff, 1939, in accordance with the latest treatment (Nguyen and Sierwald 2013).

Previously Documented Species
Order Spirostreptida: Family Harpagophoridae.
***Gonoplectus cautus* (Attems, 1936)**

Published records. Chittagong Div., Rangamati Dist., Langadu Upazila, Myanimukh, at confluence of Myani and Kasalong rivers (Attems 1936, Hoffman and Burkhalter 1978, Jeekel 2006). Sylhet Div., Sylhet Dist., Sylhet Upazila, Chargola Valley (Demange 1961, Hoffman and Burkhalter 1978).

Remarks. Described in *Thyroglutus* Attems, 1936, *cautus* was transferred to *Gonoplectus* Chamberlin, 1921, by Demange (1961) and has subsequently been cited in keys (Attems 1942, Demange 1986) and lists (Attems 1942, Jeekel 2006). Myanimukh, spelled “Mianimukh” by Attems (1936), the type locality, is a small place on northern Kaptai Lake in the “Chittagong Hills Tract.”

Order Polydesmida: Family Cryptodesmidae
***Trichopeltis watsoni* Pocock, 1895**

Published record. Chittagong Div., Chittagong Dist., Lohagara Upazila, “Shishgk Valley, Chittagong Hills Tract,” exact location uncertain but apparently near National Medical Hall east of Chittagong itself (Attems 1936, 1940).

Remarks. *Trichopeltis watsoni*, a widespread Asian species whose type locality is the North Chin Hills, Chin State, Myanmar, has a convoluted nomenclatural history (Golovatch et al. 2010). Pocock (1895) originally assigned it to this genus, but Cook (1896) designated it the type species of his new genus, *Otodesmus*. Attems (1914) repeated this assignment though he earlier (Attems 1899) cited *watsoni* under both *Trichopeltis* and *Otodesmus*. Attems (1936) reported it from the Chittagong Hills among other localities but mistakenly named the genus, *Trichodesmus*; four years later, he (Attems 1940) correctly cited it in combination with *Trichopeltis*. Hoffman (1973, 1980), the latter by implication, returned *watsoni* to *Otodesmus* where it remained until material of related cryptodesmids required Golovatch et al. (2010) to place *Otodesmus* in synonymy under *Trichopeltis*.

Acknowledgments

I thank C.E. Griswold, for loan of the CAS material; the person who advised me of Bangladesh records in Attems (1936), whose name I have forgotten; and T.A. Wesener, for permission to cite the Bangladeshi sphaerotheriidan locality. S.I. Golovatch was particularly helpful in providing references, pointing out species I had missed, identifying the CAS samples of *Kaschmiriosoma loebli* and *Trachyjulus calvus*, and providing guidance based on his superior overall knowledge of these general Asian regions. He and W.A. Shear conducted pre-submission reviews.

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Received March 5, 2014; Accepted May 29, 2014.

