



E-ISSN: 2320-7078  
P-ISSN: 2349-6800  
JEZS 2018; 6(1): 455-460  
© 2018 JEZS  
Received: 06-11-2017  
Accepted: 07-12-2017

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## Survey, documentation and synoptic classification of Pyraloidea associated with major cereals in Hyderabad-Karnataka region

**Nagaraj SK, Shankara Murthy M, Naganagoud A and Prabhuraj A**

### Abstract

Survey and documentation of Pyraloidea fauna occurring on major cereals like paddy, maize and sorghum collected during August 2014- March 2015 from different regions of Hyderabad-Karnataka was studied for the first time. The survey revealed that a total of 7 identified and 6 unidentified species of Pyraloidea were documented, out of 274 specimens collected and reared on their respective hosts. All the identified and unidentified species were belonged to 4 subfamilies of Crambidae viz., Crambinae, Acentropinae, Schoenobiinae and Spilomelinae. The sub-families viz., Acentropinae and Schoenobiinae were documented with single genus viz., *Paraponyx* and *Scirpophaga*, respectively. While the subfamilies, Crambinae and Spilomelinae were recorded with 2 genera each viz., *Ancylolomia* and *Chilo*, *Cnaphalocrocis* and *Conogethes*, respectively. All surveyed and documented species are compiled as a synoptic classification.

**Keywords:** Cereals, Pyraloidea, Hyderabad-Karnataka, synoptic classification, survey and documentation

### 1. Introduction

Hyderabad-Karnataka region comprises six districts of Karnataka viz., Bidar, Gulbarga, Yadgir, Raichur, Koppal and Bellary. The total geographical area of the region is about 44.96 lakh hectares, occupying 23.02 per cent of Karnataka's geographical area. It represents North and North-Eastern dry regions of the state total geographical area and spreads between 14° 16' to 18° 30' Northern latitude and 75° 60' to 77° 70' Eastern latitude [1, 2]. The major crops grown are cereals (paddy, maize, jowar and bajra), pulses (pigeon pea, chick pea and green gram), oilseeds (groundnut, soybean) and commercial crops like cotton and sugarcane. Among these crops cereals constitute one of the major crops of this region. In recent years, cropping pattern in this region has changed immensely. In view of the changed cropping pattern as well as ecological conditions, the productivity is low in cereals owing to many factors like biotic and abiotic stresses [2]. Among various biotic stresses, the damage and yield loss caused by insect pests are a main contributory factor. Amongst insect pests, the pyraloids has a great economic importance as many of them cause serious damage either internally as borers, root feeders and seed feeders or externally as leaf rollers or webbers [3, 4]. The significant reduction in yield due to Pyraloids has been reported in all the major cereal producing areas in the world including India [5, 6]. The estimated yield loss caused by pyraloids ranged from 10 to 100 per cent [7, 8].

In India, most of the Pyraloidea taxonomists have undertaken a survey and taxonomic studies predominantly by relying on light trap collections and they did not make any efforts to associate Pyraloidea species with their host plants. The authors like Rose [16, 17], Sharma [13] etc., are studied the pyraloids collected through light traps and/or sweep nets. The description of a species reared from actual hosts is the need of the hour for accurate identification and authentication of its host. The investigations pertaining to collection of Pyraloidea associated with cereals through survey and authentication of their hosts did not carry out so far in Hyderabad-Karnataka region. In this context, an attempt has been made to survey and documentation of Pyraloidea fauna associated with major cereals in Hyderabad-Karnataka region.

### 2. Materials and Methods

Intensive collections of Pyraloidea occurring on major cereals like paddy, maize and sorghum

were made by undertaking survey in different localities of Hyderabad-Karnataka viz., Bidar, Kalburgi, Koppal, Raichur and Yadgir except Ballari during August 2014- March 2015 (Fig. 1). A roving survey was carried out in these locations as and when there is a crop in the field. The collected specimens were transferred to rearing plastic containers / wooden cages along with its host. The culture was monitored carefully twice a day and fresh food was provided to the larvae until it reaches the pupal stage. Later, pupae were collected and kept for adult emergence in wooden cages / plastic boxes. The rearing room was disinfected with two per cent formaldehyde at regular interval to maintain the hygiene. The emerged adults were killed immediately by using ethyl acetate. These were pinned, stretched, labeled properly on which identification is based. The specimens were dried properly and preserved in insect cabinet boxes at insect repository, Department of Agricultural Entomology, College of Agriculture, Bheemarayanagudi. The collected specimens were identified to generic and species level based on the keys developed by Hampson (1896) in the Moths volumes of the Fauna of India and adjacent countries series and also using recently available literature [9].

The synoptic classification of Pyraloidea associated with cereals in Hyderabad- Karnataka region is based on the Global Information System on Pyraloidea (<http://www.pyraloidea.org>) as well as, the checklist of pyraloids prepared by various authors across the world [10-15]. The synopsis is a skeletal classification of agriculturally important Pyraloidea in India. The families, sub-families and species of Pyraloidea are listed alphabetically. Further, the valid name, type genus, type species, type locality and synonyms are also presented.

### 3. Results and Discussion

Pyraloidea moths constitute an important group of insect pests in the order Lepidoptera and comprises of several well-known pest species. The larvae of Pyraloidea are concealed feeders and feed on a wide variety of crops, stored foodstuffs, forests and ornamental plants cause more economical damage. Hence, roving survey was carried out to collect various stages (eggs, larvae and pupae) of Pyraloidea associated with cereals of Hyderabad-Karnataka region except Bellary (Fig. 1). During the survey, a total of 7 identified and 6 unidentified species of Pyraloidea were recorded out of 274 specimens collected and reared on their respective hosts (Table 1).

These belonged to four subfamilies viz., Crambinae, Acentropinae, Schoenobiinae and Spilomelinae of family Crambidae. The sub-families viz., Acentropinae and Schoenobiinae were documented with single genus viz., *Paraponyx* and *Scirpophaga*, respectively. While the subfamilies, Crambinae and Spilomelinae were recorded with two genera each viz., *Ancylolomia* and *Chilo*, *Cnaphalocrocis* and *Conogethes*, respectively. Of the six genera of Pyraloidea, the genus *Chilo* was represented by two species namely; *Chilo partellus* Swinhoe and *Chilo infuscatellus* Snellen. While, the genus *Cnaphalocrocis* was represented by *Cnaphalocrocis medinalis* Guenee and *Cnaphalocrocis trapezalis* Guenee and also four unidentified species. Similarly, the genus *Conogethes* was represented by *Conogethes punctiferalis* Guenee and also an unidentified species. The genera *Paraponyx* and *Scirpophaga* were represented each by a single species namely; *Paraponyx stagnalis* Zeller and *Scirpophaga incertulas* Walker, respectively. The genus *Ancylolomia* was documented with an

unidentified species. Similarly, Rose (1982) collected ninety three species of pyralid moths belong to 61 genera of sub-family Pyraustinae from North India [16]. In another study, Rose (2001) while investigating moth fauna of Jating in North Cachar hills collected 180 species of Lepidoptera. Of which, 81 species were referable to the sub family Pyraustinae [17]. Similar results were also reported by various authors [18, 19, 29, 14, 13, 21, 22].

Among cereals, on paddy three genera of Pyraloidea were collected and reared viz., *Cnaphalocrocis*, *Paraponyx* and *Scirpophaga*. The genus *Cnaphalocrocis* was documented with *Cnaphalocrocis medinalis* and two unidentified species. While genera *Paraponyx* and *Scirpophaga* were documented with single species namely; *Paraponyx stagnalis* and *Scirpophaga incertulas*, respectively.

In sorghum, four genera namely; *Chilo*, *Cnaphalocrocis*, *Conogethes* and *Ancylolomia* were documented. The genus *Chilo* was documented with two species namely; *Chilo partellus* and *Chilo infuscatellus*. Whereas, the genus *Cnaphalocrocis* was recorded with two species namely; *Cnaphalocrocis medinalis* and *Cnaphalocrocis trapezalis*, respectively and also two unidentified species. The genus *Conogethes* was recorded with single species *Conogethes punctiferalis* and also an unidentified species. Further, the genus *Ancylolomia* was documented with an unidentified species. Likewise, in maize, three genera viz., *Chilo*, *Cnaphalocrocis* and *Ancylolomia* were collected and reared. The genus *Chilo* was represented by two species namely; *Chilo partellus* and *Chilo infuscatellus* whereas, the genus *Cnaphalocrocis* was recorded with *Cnaphalocrocis trapezalis* and one unidentified species. Further, the genus *Ancylolomia* was documented with an unidentified species. No literature available as we reviewed to support above investigation since, the current study is purely host based and the unidentified specimens could be new species.

#### Synoptic classification of Pyraloidea associated with cereals in Hyderabad-Karnataka

##### Superfamily PYRALOIDEA Latreille, 1809

##### Family CRAMBIDAE Latreille, 1810

##### Subfamily ACENTROPINAE Stephens, 1836; type genus: *Acentropus* Curtis, 1834

= Aquaticae Hübner, 1796; type genus: The family group name Aquaticae is not based on an existing genus group name  
= Argyractini Lange, 1956; type genus: *Argyractis* Hampson, 1897

= Cataclystae Hübner, 1825

= Chloephila Guilding, 1830

= Elophilae Hübner, 1825

= Kamptoptera Guilding, 1830

= Lathrotelidae J. F. G. Clarke, 197; type genus: *Lathroteles* Clarke.

= Nymphulae Hübner, 1825

= Nymphulites Duponchel, 1845; type genus: *Nymphula* Schrank, 1802

= Hydrocampidae Guenee, 1854; type genus: *Hydrocampa* Stephens, 1829

= Parapoynges Hübner, 1825

= Acentridae A. Speyer, 1869; type genus: *Acentria* Stephens, 1829

= Acentropodidae Dunning, 1872

**Genus: PARAPONYX Hubner, 1825; type species: *Phalaena stratiota* Linn.1758**

- = *Paraponyx* Hübner, 1825; type species: *Phalaena stratiotata* Linnaeus, 1758
- = *Nymphula*, Schrank, 1802; type species *N. nymphceata*, Linn, from Europe.
- = *Cosmophylla* Turner, 1908; type species: *Cosmophylla oxygramma* Turner, 1908
- = *Eustales* Clemens, 1860; type species: *Eustales tedyuscongalis* Clemens, 1860
- = *Hydreuretis* Meyrick, 1885; type species: *Hydrocampa tullialis* Walker, 1859
- = *Microdracon* Warren, 1890; type species: *Oligostigma bilinealis* Snellen, 1876
- = *Nymphaeella* Grote, 1880; type species: *Nymphaeella dispar* Grote, 1880
- = *Paraponyx* Guenée, 1854
- = *Sironia* Clemens, 1860; type species: *Sironia maculalis* Clemens, 1860

***Paraponyx stagnalis* (Zeller, 1852)**

- = *Nymphula stagnalis* (Zeller, 1852); type locality: Natal (South Africa)
- = *Cataclysta vestigialis* Snellen, 1880; type locality: Sumatra (Indonesia)
- = *Hydrocampa depunctalis* Guenée, 1854; type locality: Indes orientales
- = *Hydrocampa hilli* Tepper, 1890; type locality: N. W. Victoria (Australia)
- = *Zebonia decussalis* Walker, 1859; type locality: Sri Lanka
- = *Nymphula depunctalis*, Guen.

**Subfamily CRAMBINAE Latreille, 1810; type genus: *Crambus* Fabricius, 1798**

- = Ancylolepididae Ragonot and Ragonot, 1889; type genus: *Ancylolepidia* Hübner, 1825
- = *Crambina* Zeller, 1847: 745; type genus: *Crambus* Fabricius, 1798
- = *Tetrachila* Hübner, 1818

**Genus: ANCYLOLOMIA Hübner, 1825; type species: *Tinea palpella* Denis and Schiffermüller, 1775,**

- = *Jartheza* Walker, 1863; type species: *Chilo chrysographellus* Kollar, 1848
- = *Pseudoctenella* Strand, 1907; type species: *Ctenus malacellus* Mabille, 1906
- = *Ctenus* Mabille, 1906; type species: *Ctenus malacellus* Mabille, 1906
- = *Tollia* Amsel, 1949; type species: *Crambus pectinatellus* Zeller, 1847

**Genus: CHILO Zincken, 1817; type species: *Tinea phragmitella* Hübner, 1810**

- = *Borer* Guenée, 1862; type species: *Phalaena saccharalis* Fabricius sensu Guenée, 1862 (= *Proceras sacchariphagus* Bojer et al., 1856) Tams 1942: 67 (syn.)
- = *Chilona* Sodoffsky, 1837
- = *Chilotraea* Kapur, 1950; type species: *Chilo infuscatellus* Snellen, 1890 Bleszynski 1962: (syn.)
- = *Diphryx* Grote, 1881; type species: *Diphryx prolatella* Grote, 1881 Hampson 1896: (syn.)
- = *Hypieta* Hampson, 1919; type species: *Hypieta*

- argyrogramma* Hampson, 1919 Bleszynski 1965: (syn.)
- = *Nephalia* Turner, 1911; type species: *Nephalia crypsimetalla* Turner, 1911 Bleszynski 1966: (syn.)
- = *Silveria* Dyar, 1925; type species: *Silveria hexhex* Dyar, 1925

***Chilo infuscatellus* Snellen, 1890; type locality: Indonesia, Java**

- = *infuscatellus* Snellen, 1890; type locality: Indonesia, Java
- = *Argyria coniora* Hampson, 1919; type locality: Bengal, Bihar Pusa (India)
- = *Argyria sticticraspis* Hampson, 1919; type locality: Coimbatore (India)
- = *Chilo tadhikiellus* Gerasimov, 1949
- = *Diatraea calamina* Hampson, 1919; type locality: India and Burma,
- = *Diatraea shariinensis* Eguchi, 1933

***Chilo partellus* (Swinhoe, 1886); type locality: Poona, Mumbai (India).**

- = *partellus* (Swinhoe, 1886) (Crambus); type locality: Mumbai, Poona (India)
- = *Chilo partellus acutus* Bhattacharjee, 1971; type locality: Skkur, Junagadh, Surendra Nagar; and Kothara (India)
- = *Chilo lutulentalis* Tams, 1932; type locality: Malawi (Nyasaland)
- = *Chilo partellus coimbatorensis* Bhattacharjee, 1971; type locality: Dehli, Coimbatore, Poona and Dharwar (India)
- = *Chilo partellus kanpurensis* Bhattacharjee, 1971; type locality: India, United Provinces and Cawnpore
- = *kaanpurensis* Vári, Kroon and Krüger, 2002
- = *zonellus* (Swinhoe, 1884) (Crambus); type locality: Karachi

**Subfamily SCHOENOBINAE Duponchel, 1846; type genus: *Schoenobius* Duponchel, 1846**

**Genus: SCIRPOPHAGA Treitschke, 1832; type species: *Tinea phantasmata* Hübner, 1796**

- Scirpophaga incertulas* Walker, 1863; Type locality: (Malaysia) Sarawak, Borneo**
- = *Catagela admotella* Walker, 1863; type locality: Sri Lanka (Ceylon)
- = *Chilo gratiosellus* Walker, 1864; type locality: Sri Lanka (Ceylon)
- = *incertellus* (Walker, 1917)
- = *Schoenobius minutellus* Zeller, 1863; type locality: Java (Indonesia)
- = *Schoenobius punctellus* Zeller, 1863; type locality: Java (Indonesia) and Calcutta (India)
- = *Tipanaea bipunctifera* Walker, 1863; type locality: Sarawak (Malaysia)
- = *bipunctifer* (Strand, 1918) (*Schoenobius*)
- = *Schoenobius bipunctifer ab. quadripunctellifera* Strand, 1918; type locality: Formosa and Kankan (Taiwan)

**Subfamily SPILOMELINAE Guenée, 1854; type genus: *Spilomela* Guenée, 1854**

- = *Agroteridi* Acloque, 1897; type genus: *Agrotera* Schrank, 1802
- = *Dichocrociinae* Swinhoe, 1900; type genus: *Dichocrocis* Lederer, 1863
- = *Hapaliadae* Swinhoe, 1890; type genus: *Hapalia* Hübner, 1818

- = Hydririni Minet, 1982; type genus: *Hydriris* Meyrick, 1885
- = Hymeniinae Swinhoe, 1900; type genus: *Hymenia* Hübner, 1825
- = Lineodini Amsel, 1956; type genus: *Lineodes* Guenée, 1854
- = Margarodidae Guenée, 1854; type genus: *Margarodes* Guenée, 1854
- = Margaroniidae Swinhoe and Cotes, 1889; type genus: *Margaronia* Hübner, (1825)
- = Nomophilini Kuznetsov and Stekolnikov, 1979; type genus: *Nomophila* Hübner, 1825
- = Siginæ Hampson, 1918; type genus: *Siga* Hübner, 1820
- = Steniadae Guenée, 1854; type genus: *Stenia* Guenée, (1845)
- = Syleptinae Swinhoe, 1900; type genus: *Syllepte* Hübner, 1825
- = Udeini P. Leraut, 1997; type genus: *Udea* Guenée in Duponchel, 1845
- = Wurthiinae Roepke, 1916; type genus: *Wurthia* Roepke, 1916

**Genus: CNAPHALOCROCIS Lederer, 1863 ; type species: *Botys iolealis* Walker, 1859,**

- = *Cnaphalocrocis* Lederer, 1863; type species: *Botys iolealis* Walker, 1859
- = *Bradynomorpha* Matsumura, 1920; type species: *Bradynomorpha nawae* Matsumura, 1920.
- = *Dolichosticha* Meyrick, 1884; type species: *Asopia venialis* Walker, 1859
- = *Epimima* Meyrick, 1886; type species: *Epimima stereogona* Meyrick, 1886
- = *Lasiacme* Warren, 1896; type species: *Lasiacme pilosa* Warren, 1896
- = *Marasmia* Lederer, 1863; type species: *Marasmia cicatricosa* Lederer, 1863
- = *Neomarasmia* Kalra, David and Banerji, 1967
- = *Prodotaula* Meyrick, 1934; type species: *Prodotaula conformis* Meyrick, 1934
- = *Susumia* Marumo, 1930; type species: *Samea exigua* Butler, 1879

***Cnaphalocrocis medinalis* Guenée, 1854; type locality: East India**

- = *Salbia medinalis* Guenée, 1854
- = *Botys nurscialis* Walker, 1859; type locality: Moreton Bay and Sydney (Australia)

***Cnaphalocrocis trapezalis* Guenée, 1854; type locality: Sierra Leone**

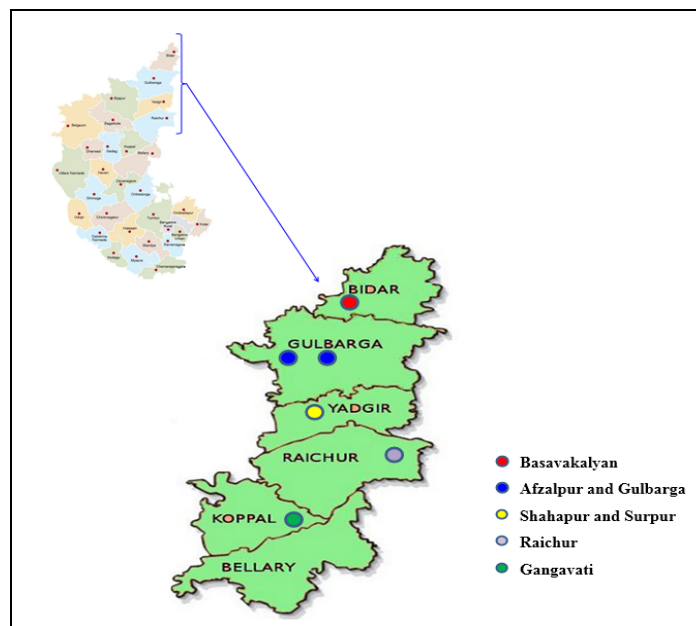
- = *trapezalis* (Guenée, 1854) (*Salbia*); type locality: Sierra Leone
- = *Botys convectalis* Walker, 1866; type locality: India
- = *Botys creonalis* Walker, 1859; type locality: Dominican Republic, Santo Domingo
- = *Botys neoclesalis* Walker, 1859; type locality: Cape (South Africa)
- = *Botys suspicalis* Walker, 1859; type locality: Sri Lanka (Ceylon)
- = *Bradina andresi* Rebel, 1912
- = *Cnaphalocrocis bifurcalis* Snellen, 1880; type locality: Indonesia, Celebes (Sulawesi)
- = *Dolichosticha perinephes* Meyrick, 1886; type locality: Fiji

**Genus: CONOGETHES Meyrick, 1884; type species:**

- Astura punctiferalis* Guenée, 1854
- = *Dichocrocis*; Lederer, 1863; type species: *Dichocrocis frenatalis* Lederer, 1863.
- = *Conogethes*; Meyrick, 1884; type Species: *Astura punctiferalis* Guenée.
- = *Dadessa*; Moore, 1886; type Species: *Botys evaxalis* Walker.
- = *Dichocrocis*; Hampson, 1898

***Conogethes punctiferalis* (Guenée, 1854); type locality: India**

- = *punctiferalis* (Guenée, 1854: 320); type locality: India Meyrick 1884
- = *Astura guttatalis* Walker, 1866; type locality: Moluccas and Mysol (Indonesia) Batchian. Aru. Seram
- = *Botys nicippealis* Walker, 1859; type locality: Moluccas and Seram (Indonesia)
- = *Deiopeia detracta*, 1859; type locality: Singapore



**Fig 1:** Locations from where Pyraloidea were collected for taxonomic studies

**Table 1:** Species of Pyraloidea collected through survey and reared on major cereals from Hyderabad- Karnataka region

Crops	Common name	Scientific name	Sub-family	Family
Paddy	Leaf folder	<i>Cnaphalocrocis medinalis</i> Guenée	Spilomelinae	Crambidae
	Caseworm	<i>Parapoynx stagnalis</i> Zeller	Acentropinae	Crambidae
	Yellow stem borer	<i>Scirpophaga incertulas</i> Walker	Schoenobiinae	Crambidae
	Leaf rollers	<i>Cnaphalocrocis</i> sp. #1	Spilomelinae	Crambidae
		<i>Cnaphalocrocis</i> sp. #2	Spilomelinae	Crambidae
Sorghum	Spotted stem borer	<i>Chilo partellus</i> Swinhoe	Crambinae	Crambidae
	Sugarcane seedling borer	<i>Chilo infuscatellus</i> Snellen	Crambinae	Crambidae
	Stem borer	<i>Ancylolomia</i> sp. #1	Crambinae	Crambidae
	Earhead webbers	<i>Conogethes punctiferalis</i> Guenée,	Spilomelinae	Crambidae
		<i>Conogethes</i> sp. #1	Spilomelinae	Crambidae
	Leaf rollers	<i>Cnaphalocrocis trapezalis</i> Guenée	Spilomelinae	Crambidae
		<i>Cnaphalocrocis</i> sp. #1	Spilomelinae	Crambidae
<i>Cnaphalocrocis</i> sp. #2		Spilomelinae	Crambidae	
Maize	Spotted stem borer	<i>Chilo partellus</i> Swinhoe	Crambinae	Crambidae
	Sugarcane seedling borer	<i>Chilo infuscatellus</i> Snellen	Crambinae	Crambidae
	Stem borer	<i>Ancylolomia</i> sp. #1	Crambinae	Crambidae
	Leaf rollers	<i>Cnaphalocrocis trapezalis</i> Guenée	Spilomelinae	Crambidae
		<i>Cnaphalocrocis</i> sp. #1	Spilomelinae	Crambidae

#### 4. Conclusion

In India, most of the Pyraloidea taxonomists have undertaken a survey and taxonomic studies predominantly by relying on light trap collections and they did not make any efforts to associate Pyraloidea species with their host plants. The current study was the first of its kind that attempted to survey and study the Pyraloidea taxa purely based on their hosts from Hyderabad- Karnataka region. During the survey, a total of seven identified up to species level and remaining six were identified up to generic level out of 274 specimens collected and reared on their respective hosts. All the identified and unidentified species were belonged to four subfamilies of family Crambidae viz., Crambinae, Acentropinae, Schoenobiinae and Spilomelinae. Six unidentified species could be new, since these are morphologically and genetically differ from already described species. The checklist was provided for all the collected specimens from different parts of Hyderabad-Karnataka, as it provides a synopsis of the species occurring in a certain region.

#### 5. Acknowledgment

Authors are grateful to Dr. C. A. Viraktamath, Principal Investigator, ICAR Network Project on Insect Biosystematics, Department of Entomology, University Agricultural Sciences, Bengaluru 560 065, for his constant encouragement, constructive suggestions and motivation to carry out work on Pyraloidea.

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