

Biodiversity of Earthworms and their Distribution in Different Regions of Uttar Pradesh state of India

Om Prakash

Department of Zoology, HRP Degree college, Barkhera ,Pilibhit (Uttar Pradesh),India.
Corresponding author: Om Prakash

Abstract: Biodiversity of earthworm species in different states of India has been carried out by several workers in various ecosystems. After Stephenson (1923), nobody mentioned total species of earthworms of Uttar Pradesh. Present research article described 50 species with 28 genera and 06 families of earthworms from Uttar Pradesh state of India. In addition, their distribution in this state along with other parts of India and other countries was discussed.

Keywords: Earthworm fauna, Checklist, Distribution, Uttar Pradesh state, India.

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I. INTRODUCTION

In India, many researchers did work on the density and diversity of earthworms Templeton (1844) (1) Rosa (1894) (2) Michaelsen (1907) (3) Stephenson (1914) (4) (1920) (5) (1921) (6) (1923) (7) (1924) (8) (1930) (9) and (1931) (10) Gates (1940) (11) (1945a) (12) (1945b) (13) and (1972) (14) Julka (1976a) (15) (1976b) (16) (1978) (17) (1981) (18) (1986) (19) (1988) (20) (1993) (21) (1996) (22) and (2001) (23) Julka and Haldhar (1977) (24) Julka and Paliwal (1986) (25) (1994) (26) (2000) (27) Julka *et al.* (1997) (28) Chaudhuri *et al.* (2008) (29) Chaudhuri and Bhattacharjee (1999) (30) (2005) (31) Sathianarayanan, and Khan (2006) (32) Tripathi and Bhardwaj (2004) (33) Blanchart and Julka (1997) (34) Singh (1997) (35) Sharma and Gupta (2007) (36) Singh *et al.* (2009a) (37) (2010) (38) and Reynolds and Cook (1976) (39). Recently, Singh and Prakash (2012) (40) have found out species richness and density of earthworm populations in grasslands of western Uttar Pradesh, India and Agrawal and Agrawal (2009) (41) on the biodiversity of earthworms of Gwalior of Madhya Pradesh state. Chaudhuri and Bhattacharjee (1999) (30) have surveyed earthworm population of Tripura State and Julka and Senapati (1987) (42) of Orissa; Ismail (1986) (43) of Chennai (Tamilnadu) and Kale and Krishnamoorthy (1978) (44) of Bangalore (Karnataka). But nobody trying to find out the biodiversity of earthworms in Uttar Pradesh state after Stephenson (1923) (7) except some work done by Singh *et al.* (2009a) (27) Prakash (2011) (45) Singh and Prakash (2012) (40). Stephenson (1923) (7) described 26 species from Uttar Pradesh state thereby Julka and Senapati (1987) (42) reported 10 new species of earthworms from this state and Verma *et al.* (2010) (46) reported 04 new species from Uttar Pradesh state. Finally this checklist is based on these previous records as well as fresh material from the Uttar Pradesh state of India. As a result, 50 species with 28 genera of earthworms from 06 families were found out which are clearly listed (Table-3.). Names of new locality records are italicized in the text. Main aim of this article is to provide the knowledge of earthworm species of Uttar Pradesh state to young researchers for further research work on this field.

II. MATERIALS AND METHODS

Uttar Pradesh state is located between latitude 26.84°N and longitude 80.94°E. It is surrounded by Haryana and Uttarakhand from north; Chattishgarh, Madhya Pradesh and Jharkhand from south; Nepal and Bihar from east; Rajasthan and Delhi from west. The annual average rainfall of the state is 1025 mm and the soil is fertile alluvial ranging from sandy to clayey loamy in general. The information available on the earthworm fauna of the state is scanty and incomplete till now. The present work emphasizes the extensive survey of earthworms from western Uttar Pradesh.

III. SELECTION OF STUDY SITES

This taxonomic work was carried out in western Uttar Pradesh from July, 2012–October, 2014. The agricultural, grassland and orchard land ecosystems of all five regions of western Uttar Pradesh state (Bareilly, Agra, Moradabad, Meerut and Saharanpur) have been selected for the study of earthworm fauna in the state (fig. 1 & 2).

IV. SAMPLING OF EARTHWORMS

Earthworms for the taxonomic studies were collected and hand-sorted as per the techniques of Edwards and Lofty (1977) (47). Collected worms were washed in fresh water and stored in perforated polythene bags and were brought to the laboratory for their identification.

V. NACROTIZATION, FIXATION AND PRESERVATION OF EARTHWORMS

The alive worms were placed in an enameled tray half-filled with water, narcotized by gradually adding ethanol to the water. When the worms became motionless and did not respond to probing, they were fixed for 12 hours in straightened position in another enameled tray containing 10 % formalin. The fixed specimens were preserved in 5 % fresh formalin in suitable glass vials. Relaxed and straightened worms were taken for dissection to study their external and internal morphological characteristics. A label indicating collection locality with region and season accompanied in each lot of preserved worms. All preserved specimens examined and reported in the present work are deposited in the Zoology lab of Adarsh Mahavidyalaya, Hardua, Nawabganj (Bareilly), for further reference and study.

VI. IDENTIFICATION OF WORMS

It was carried out by studying external and internal morphological characters of the collected mature worms (see Table 1 & 2).

VII. MORPHOLOGICAL STUDY

i. External Study

To study the number of metameres, setae and their attachment pattern, pro and peristomium, position of clitellum, dorsal pores, spermathecal apertures, male and female genital apertures/markings and dorsal and ventral blood vessels *etc.*, magnifying glass and dissecting microscope were assessed.

ii. Internal study

It was carried out by dissecting worms longitudinally, slightly left to right side of the mid-dorsal line with a sharp shaving blade. Location of internal organs (pharynx, gizzard, last pair of heart, intestine and position of testis, ovaries, prostatic glands and calciferous glands *etc.*), their presence or absence and morphology were studied and recorded. Identification of earthworm species was confirmed by the taxonomic and monographic work of Stephenson, 1923(7); Julka and Senapati, 1987(42); Julka, 1988(20), 2001(23); Julka and Paliwal, 1994(26), Prakash, 2011(45).

On the basis of external and internal morphological characters, four genera with nine species of earthworms from three *Oligochaeta* families were identified. *Metaphire posthuma* (Vaillant, 1868), *Lampito mauritii* (Kinberg, 1866), and *Perionyx excavatus* (Perreir, 1872) from *Megascolecidae* family; *Eutyphoeus waltoni* (Michaelsen, 1907), *E. gigas* (Stephenson, 1917), *E. orientalis* (Beddard, 1883), *E. pharpiangianus* (Michaelsen, 1907), and *E. paivai* (Michaelsen, 1907) from *Octochaetidae* and *Eisenia fetida* (Savigny, 1891) from *Lumbricidae*. Except *E. fetida*, all earthworm species were found and recorded as a native species. Above described species of earthworms were identified by the author during extensive survey work and rest were identified by other workers (Stephenson, 1923(7); Julka and Senapati, 1987(42); Julka, 1988(20), 2001(23); Julka and Paliwal, 1994(26), as described below:

Family-1: Naidae

1. *Aulophorus tonkinensis* (Vejd, 1909)

Distribution: Uttar Pradesh (Lucknow), Calcutta, Bhim Tal, Kumaon Dist., W. Himalayas. Also from Tonkin, China.

2. *Branchiodrilus hortensis* (Stephenson, 1910)

Distribution: Uttar Pradesh (Agra) and Lahore (Pakistan).

3. *Dero limosa* (Leidy, 1914)

Distribution: Uttar Pradesh (Agra), Lahore (Pakistan). Widely distributed, eg. in England, N. America, Philippines.

4. *Dichogaster bolau* (Michaelsen, 1891)

Distribution: Uttar Pradesh, Orissa, Arunachal Pradesh, Meghalaya, West Bengal, Himachal Pradesh, Andhra Pradesh, Karnataka, Tamilnadu, Kerala, Bangladesh, Burma, Malay Peninsula, Vietnam, China, Hainan Island, Indonesia, Philippines, Pacific Islands, Japan, Australia, Africa, Madagascar, and adjacent Islands, Germany, North, Central and South America, West Indies.

5. *Nais communis* (Piguet), **var. *punjabensis*** (Stephenson, 1909)

Distribution: Uttar Pradesh (Agra), Lahore, Peshawar, Kasauli, W.Himalayas, Khandala, W.Ghats, Bheemanagar, Travancore (in *Spongilla carteri*). Also in Seistan, E.Persia. The type form of the species has been found as far apart as Patagonia and Switzerland.

6. *Nais obtusa* (Gerv, 1909)

Distribution: Uttar Pradesh (Lucknow), Calcutta, from *Plumatella fruticosa* and *P. emarginata* in a tank at the Zoological Gardens. A common European form.

7. *Nais var. inaequalis* (Stephenson, 1911)

Distribution: Uttar Pradesh (Agra), Bheemanagar and Travancore (in *Spongilla carteri*, along with the type-form of the species).

8. *Pristina aequiseta* (Bourne, 1889)

Distribution: Uttar Pradesh (Allahabad), Calcutta (in *Spongilla carteri*) and Lahore. Also found in Europe.

9. *Haemonais laurentii* (Stephenson, 1915)

Distribution: Uttar Pradesh (Agra) and Lahore (Pakistan).

Family-2: Tubificidae

10. *Aulodrilus kashi* (Mehra, 1922)

Distribution: Uttar Pradesh (Varansi), found living in tubes.

11. *Aulodrilus stephensoni* (Mehra, 1922)

Distribution: Uttar Pradesh (Varansi).

12. *Branchiura sowerbyi* (Beddard, 1912)

Distribution: Uttar Pradesh (Agra, Lucknow).

Family-3: Lumbricidae

13. *Allolobophora papillatus* (Eisen, 1909)

Distribution: Uttar Pradesh (Pratapgarh, Lucknow), Srinagar (Kashmir), Ferozpur (Punjab), Nainital (Western Himalaya), Lahore (Pakistan).

14. *Glyphidrilus tuberosus* (Stephenson, 1916)

Distribution: Uttar Pradesh, Orissa, West Bengal, Bangalore.

15. *Glyphidrilus papillatus* (Rosa, 1890)

Distribution: Uttar Pradesh (Lucknow), Burma, Cobapo, Biapo.

16. *Pontoscolex corethrurus* (Michaelsen, 1898)

Distribution: Uttar Pradesh (Ahmedabad), Hyderabad, Bombay, Poona, Colombo, Malabar Coast, Coorg.

17. *Eisenia fetida* (Savigny, 1891)

Collection no. C/1,

Distribution: Uttar Pradesh (Bareilly Dist., Pilibhit Dist., Meerut Dist. Kanpur Dist., Jhansi Dist., Lucknow Dist.) Himachal Pradesh: Chamba Dist. Kangra Dist., Shimla Dist., Sirmour Dist., Solan Dist., Chamoli Dist., Tehri Dist. Madhya Pradesh: Gwalior Dist.

18. *Amyntas morrisi* (Beddard, 1892)

Distribution: Uttar Pradesh (Varansi), H.P: Kangra Dist.-Bhadarwah, Palampur; Poonch and Srinagar districts., Bilaspur Dist.-Nauni; Chamba Dist.-Hardaspur, Rajpura; Shimla Dist.-Suni; Sirmour Dist.-Nahan; Solan Dist.-Dharampur, Solan, Sadhupul, Subathu, Deothal. Uttrakhand: Dehradun Dist.-Rajpur, Dehradun.

Family-4: Megascolecidae

19. *Lampito mauritii* (Kinberg, 1866)

Collection no. A/1,

General habitat: Agricultural land (AL), Grassland (GL) and Orchard land (OL) of western Uttar Pradesh state.

Distribution: Uttar Pradesh state: (Pilibhit Dist., Shahjahanpur Dist., Budaun Dist., Bareilly Dist., Moradabad Dist., Meerut Dist., Saharanpur Dist., Aligarh Dist., Kanpur Dist., Mathura Dist., Jhansi Dist., Basti Dist., Gorakhpur Dist., Agra Dist., Bulandshahar Districts). Orissa, Chandipur, Brajarajpur, Balugaon, Sabolia village, Mirzapur, Balaramgudi, Paradip Port, Konarak, Gopalpur, Baripada, Bisoi, Barkul, Jharsuguda, Sambalpur, Bolangir. Widely distributed in other parts of India including Andaman & Nicobar Islands, Laccadive and Minicoy, Sri Lanka, Maldives, Burma, Bangla Desh, Pakistan, Seychelles, Comoro Islands, Madagascar, Mauritius, Zanzibar, Thailand, Malaysia, Sumatra, Christmas Islands, Nordwachten, Sumba, Kiss Islands, Labuan, British North borneo, Philippines, Nias, Kowloon, China, Hongkong.

20. *Metaphire posthuma* (Vaillant, 1868)

Collection no. A/2,

General habitat: Agricultural land (AL), Grassland (GL) and Orchard land (OL) of western Uttar Pradesh state.

Distribution: Uttar Pradesh: Pilibhit Dist., Shahjahanpur Dist. Budaun Dist. Bareilly Dist. Moradabad Dist. Meerut Dist. and Saharanpur Dist. Orissa: Baleswar, Sundargarh, W.Bengal, Bihar, Punjab, Rajasthan, Madhya

Pradesh, Maharashtra, Andaman & Nicobar Islands, Bangla Desh, Burma, Pakistan, Thailand, Malay Peninsula, S.E.Asia, Formosa, Indonesia, Philippines and U.S.A.

21. *Metaphire houlleti* (Perrier, 1872)

Distribution: Uttar Pradesh (Allahabad), Rawalpindi, Dehradun, Bhimtal, in the united provinces, Calcutta and Raniganj, in Bengal, Cherrapunji in Assam, Pegu Dist.in Burma, Bombay, Mangalore, Trivandrum, Trichur, Chevagun near Calicut, Merkara (Coorg), Shimoga (Mysore),in S.India, Ceylon.It is also widely distributed outside India, in the Philippines, China, Cochin China, Fiji, Sunda Islands, Java, Comoro Islands, Madagascar and Bahamas.

22. *Metaphire anomala* (Michaelsen, 1907)

*Distribution:*Uttar Pradesh (Bulandshahr), Sibpur, near Calcutta.

23. *Metaphire birmanica* (Rosa, 1888)

*Distribution:*Uttar Pradesh (Jaunpur Dist.), Bhamo and Burma.

24. *Metaphire elongata* (Perrier, 1909)

Distribution: Uttar Pradesh (Palia, Indore and Ujjain Dist.), Calcutta, Hyderabad, Mysore, N.Bengal, Bombay, Philippines, Malay Archipelago, Comoro Islands, Madagascar, Dutch Guinana, Venezuela, West Indies, Central America, Indeed is world-wide in the tropics and sub-tropics.

25. *Perionyx excavates* (Perrier, 1872)

Collection no. A/3,

General habitat: GL and OL of western Uttar Pradesh state.

Distribution: Uttar Pradesh: *Pilibhit Dist., Shahjahanpur Dist. Budaun Dist. Bareilly Dist. Moradabad Dist. Meerut Dist. Saharanpur Dist.* Orissa: Sambalpur , Burla, Bargarh, Jyoti Vihar, Rajgangpur, Sundargarh, Assam, Arunchal Pradesh, W.Bengal, Himachal Pradesh, Maharashtra, Andaman & Nicobar Islands. Widely transported, successful colonization restricted to tropical lowlands from Madagascar east to the Hawaiian Islands.

26. *Perionyx sansibaricus* (Michaelsen, 1891)

Distribution: Uttar Pradesh: (Mathura Dist. and Mirzapur Dist). Orissa: Jharsuguda, Maharashtra, Gujarat, Madhya Pradesh, Tamil Nadu, Kerala and Zanzibar.

27. *Polypheretima elongata* (Perrier, 1872)

*Distribution:*Aligarh Dist.of Uttar Pradesh state.

28. *Ocnerodrilus occidentalis* (Eisen, 1878)

Distribution: Uttar Pradesh, Orissa: Titlagarh, Paradip, Bolangir, Kantabanji, Athagarh, Cuttack, Bargarh, Burla, Godbhaga, Ladukhai, Rajasthan, Maharashtra, Kerala, Andaman Islands, Burma, Pakistan, Sri Lanka, U.S.A., Mexico, St.Thomas Is., Denmark, Italy, Greece, Cape Verde Is., Rhodesia, Southwest Africa, Great Comoro Is., Palestine, Lebanon, Central Asia, Singapore, China, Japan, Philippine Islands, New Hebrides and British Solomon Is.

29. *Malabaria sulkata* (Gates, 1945)

Distribution: Uttar Pradesh, Orissa: Sundargarh, Jharsuguda, Sambalpur, Bolangir, Titlagarh and Madhya Pradesh.

Family-5: Octochaetidae

30. *Lenogaster pusillus* (Stephenson, 1920)

Distribution: Uttar Pradesh, Orissa, Barkuda Island, Madhya Pradesh, Himachal Pradesh and Karnataka.

31. *Pellogaster bengalensis* (Michaelsen, 1910)

Distribution: Uttar Pradesh (Kanpur Dist.,Unnav Dist., Etah Dist., Budaun Dist., Varansi Dist., Jaunpur Dist. Azamgarh Dist., Mirzapur Dist). Orissa: Kendupatna, Cuttack, Sundargarh, Jharsuguda, Sambalpur, Bisoi, Athgarh, Balugaon, Jaipur, Jagatsinghpur, Bhawanipatna, Bargarh, W.Bengal and Madhya Pradesh.

32. *Eutyphoeus incommodus* (Beddard, 1901)

Distribution: Uttar Pradesh, Orissa, Deogarh and Padhanpat water fall in Sambalpur district. W.Bengal, Rajasthan, Haryana, Punjab, Himachal Pradesh and Pakistan.

33. *Eutyphoeus mohammedi* (Stephenson, 1914)

Distribution: Uttar Pradesh (Allahabad) and Pakistan (Rawalpindi).

34. *Eutyphoeus waltoni* (Michaelsen, 1907)

Collection no. B/1,

General habitat: AL, GL and OL of western Uttar Pradesh state.

Distribution: Uttar Pradesh (*Pilibhit Dist., Shahjahanpur Dist., Budaun Dist., Bareilly Dist., Moradabad Dist., Meerut Dist., Saharanpur Dist., Lucknow Dist., Agra Dist., Manipur Dist., Fyzabad Dist.*), Hoshiarpur District, Dehli (Punjab), Dehradun, Pusa, Siripur (Bihar), Saraghat, Rajmehal, Calcutta (W.Bengal), Baroda, Ahmedabad, Navli (W.India), Gwalior (Central India-Madhya Pradesh).

35. *Eutyphoeus masoni* (Bourne, 1889)

Distribution: Uttar Pradesh (Basti & Barabanki Dist.) , Dehradun, Sirsiah (Muzaffarpur Dist.) and Bihar.

36. *Eutyphoeus pharpius* (Michaelsen, 1907)

Collection no. B/2,

General habitat: AL, GL and OL of western Uttar Pradesh state.

Distribution: Uttar Pradesh: Pilibhit Dist., Bareilly Dist., Shahjahanpur Dist., Budaun Dist., Meerut Dist., Saharanpur Dist., Muzaffarnagar Dist., Bulandshahar Dist., Hapur Dist., Kanpur Dist., Aligarh Dist., Santkabirnagar Dist., Varansi Dist., Jaunpur Dist., Mirzapur Dist., and Sonbhadra Dist.

37. *Eutyphoeus orientalis* (Beddard, 1883)

Collection no. B/3,

General habitat: GL and OL of western Uttar Pradesh state.

Distribution: Uttar Pradesh (Santkabirnagar Dist., Pilibhit Dist., Shahjahanpur Dist. Budaun Dist. Bareilly Dist. Moradabad Dist. Meerut Dist. Saharanpur Dist.) and Utrakkhand (Dehradun).

38. *Eutyphoeus paivai* (Michaelsen, 1907)

Collection no. B/4,

General habitat: OL of western Uttar Pradesh state.

Distribution: Uttar Pradesh (Pilibhit Dist., Bareilly, Budaun Dist., Shahjahanpur Dist., Meerut Dist., Saharanpur Dist., Muzaffarnagar Dist., Lucknow Dist.), Pusa and Bihar.

39. *Eutyphoeus nicholsoni* (Beddard, 1901)

Distribution: Uttar Pradesh (Saharanpur Dist., Lucknow Dist., Barabanki Dist., Varansi Dist., and Basti Dist.). United provinces: Rajmahal and Calcutta, Bengal.

40. *Eutyphoeus gigas* (Stephenson, 1917)

Collection no. B/5,

General habitat: AL and GL of western Uttar Pradesh state.

Distribution: Uttar Pradesh state (Pilibhit Dist., Bareilly Dist., Shahjahanpur Dist., Budaun Dist., Meerut Dist., Saharanpur Dist., Muzaffarnagar Dist., Agra Dist., Lucknow Dist., Aligarh Dist.

41. *Eudichogaster ashworthi* (Michaelsen, 1902)

Distribution: Uttar Pradesh (Indore Dist. and Pratapgarh Dist.) Madhya Pradesh (Bina), S.Rajputana. Nagpur and Saugor.

42. *Eudichogaster parvus* (Fedarb, 1898)

Distribution: Uttar Pradesh and Uttarakhand (Dehradun).

43. *Eudichogaster prashadi* (Stephenson, 1920)

Distribution: Uttar Pradesh (Palia, Indore Dist.), Poona, Surat, Khandwa, Saugor and near Jubbulpore in the central provinces.

44. *Ramiella bishambari* (Stephenson, 1914)

Distribution: Uttar Pradesh, Orissa, Balugaon, Sundargarh, Titlagarh, Ushakothi, Madhya Pradesh, Andaman & Nicobar Islands. Pakistan, Burma, Christmas Islands, Philippines and China.

45. *Octochaetus fermori* (Michaelsen, 1907)

Distribution: Uttar Pradesh (Saharanpur Dist.), Kasauli and Hoshiarpur in the Punjab, Raniganj (Bengal), Karakulam (Cochin), Gwalior (Madhya Pradesh), Dhanu, Surat (Rajasthan), Ahmedabad and Baroda in W.India.

46. *Octochaetus paliensis* (Stephenson, 1920)

Distribution: Uttar Pradesh (Palia and Indore Dist.), Poona, Bina, and Central India.

47. *Octochaetona beatrix* (Beddard, 1902)

Distribution: Uttar Pradesh, Orissa, Baripada, Bisoi, Balugaon, Sundargarh, Jharsuguda, Khejuri Poda, Cuttack, Jagatsinghpur, Kendrapada, Pattamundai, Bhawanipatna, Kesinga, Bargarh, Burla, Godabaga, W.Bengal, Madhya Pradesh, Himachal Pradesh, Punjab, Maharashtra, Gujarat, Karnataka, Kerala, Burma, Nepal, Pakistan, Malay Peninsula and Philippine Islands.

48. *Octochaetona surensis* (Michaelsen, 1910)

Distribution: Uttar Pradesh, Orissa, Sur Lake, Sambalpur, Cuttack, Barkul, Brajarajpur and Balugaon nr. Chilka Lake Gopalpur, Puri, Baripada, Bisoi, Antrakyari nr. Balugaon, Sundargarh, Sankara vill.nr. Sundargarh, Bolangir, Jagatsinghpur, Kencrapara, Pattamundai, Bhawanipatna, Kesinga, Bargarh, Barpali, Burla, Jharsuguda, Godbhaga, Kharmunda, Rajgangpur, Surda, Madhya Pradesh, Assam and Burma.

Family-6: Moniligastridae

49. *Drawida calebi* (Gates, 1945)

Distribution: Uttar Pradesh, Orissa: Baripada, Bisoi, Athgarh, Sundargarh, Khazuri Bada, Cuttack, Kendrapara, Bhawanipatna, Kesinga, Bargarh, Barpali, Burla, Deogarh, Godbhaga, Ladukhai, Rourkela, Surda, Madhya Pradesh and Karnataka.

50. *Drawida willsi* (Michaelsen, 1907)

Distribution: Uttar Pradesh, Orissa: Brajarajpur, Bolangir, Balugaon, Konark, Gopalpur, Baripada, Barkul, Sundargarh, Jharsuguda, Sambalpur, Titlagarh, Puri Kantabanji, Banki, Cuttack, Jagatsinghpur, Kendrapara, Baragarh, Barpali, Burla, Surda, Rourkela, Madhya Pradesh and Andhra Pradesh.

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Table-1: Showing checklist of earthworm fauna of Uttar Pradesh state of India

Serial No.	Earthworm species	Family
1.	<i>Aulophorus tonkinensis</i> (Vejd,1909)	<i>Naidae</i>

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2.	<i>Branchiodrilus hortensis</i> (Stephenson,1910)	<i>Naidae</i>
3.	<i>Dero limosa</i> (Leidy,1914)	<i>Naidae</i>
4.	<i>Dichogaster bolau</i> i (Michaelsen,1891)	<i>Naidae</i>
5.	<i>Nais communis</i> (Piguet.),var. <i>Punjabensis</i> (Stephenson,1909)	<i>Naidae</i>
6.	<i>Nais obtuse</i> (Gerv,1909)	<i>Naidae</i>
7.	<i>Nais var.inaequalis</i> (Stephenson, 1911)	<i>Naidae</i>
8.	<i>Pristina aequiseta</i> (A.G.Bourne,1889)	<i>Naidae</i>
9.	<i>Haemonais laurentii</i> (Stephenson,1915)	<i>Naidae</i>
10.	<i>Aulodrilus kashi</i> (Mehra, 1922)	<i>Tubificidae</i>
11.	<i>Aulodrilus stephensoni</i> (Mehra, 1922)	<i>Tubificidae</i>
12.	<i>Branchiura sowebyi</i> (Beddard, 1912)	<i>Tubificidae</i>
13.	<i>Allolobophora papillatus</i> (Eisen, 1909)	<i>Lumbricidae</i>
14.	<i>Glyphidrilus tuberosus</i> (Stephenson, 1916)	<i>Lumbricidae</i>
15.	<i>Glyphidrilus papillatus</i> (Rosa,1890)	<i>Lumbricidae</i>
16.	<i>Pontoscolex corethrurus</i> (Michaelsen, 1898)	<i>Lumbricidae</i>
17.	<i>Eisenia fetida</i> (Savigny, 1891)	<i>Lumbricidae</i>
18.	<i>Amyntas morrisi</i> (Beddard,1892)	<i>Megascolecidae</i>
19.	<i>Lampito mauritii</i> (Kinberg,1866)	<i>Megascolecidae</i>
20.	<i>Metaphire posthuma</i> (Vaillant,1868)	<i>Megascolecidae</i>
21.	<i>Metaphire houlleti</i> (Perrier, 1872)	<i>Megascolecidae</i>
22.	<i>Metaphire anomala</i> (Michaelsen, 1907)	<i>Megascolecidae</i>
23.	<i>Metaphire birmanica</i> (Rosa,1888)	<i>Megascolecidae</i>
24.	<i>Metaphire elongata</i> (Perrier, 1909)	<i>Megascolecidae</i>
25.	<i>Perionyx excavates</i> (Perrier, 1872)	<i>Megascolecidae</i>
26.	<i>Perionyx sansibaricus</i> (Michaelsen, 1891)	<i>Megascolecidae</i>
27.	<i>Polypheretima elongate</i> (Perrier, 1872)	<i>Megascolecidae</i>
28.	<i>Ocnerodrilus occidentalis</i> (Eisen,1878)	<i>Megascolecidae</i>
29.	<i>Malabaria sulkata</i> (Gates,1945)	<i>Megascolecidae</i>
30.	<i>Lenogaster pusillus</i> (Stephenson, 1920)	<i>Octochaetidae</i>
31.	<i>Pellogaster bengalensis</i> (Michaelsen, 1910)	<i>Octochaetidae</i>
32.	<i>Eutyphoeus incommodus</i> (Beddard,1901))	<i>Octochaetidae</i>
33.	<i>Eutyphoeus mohammedi</i> (Stephenson, 1914)	<i>Octochaetidae</i>
34.	<i>Eutyphoeus waltoni</i> (Michaelsen, 1907)	<i>Octochaetidae</i>
35.	<i>Eutyphoeus masoni</i> (Bourne,1889)	<i>Octochaetidae</i>
36.	<i>Eutyphoeus pharpi</i> gianus (Michaelsen,1907)	<i>Octochaetidae</i>
37.	<i>Eutyphoeus orientalis</i> (Beddaard,1883)	<i>Octochaetidae</i>
38.	<i>Eutyphoeus paivai</i> (Michaelsen, 1907))	<i>Octochaetidae</i>
39.	<i>Eutyphoeus nicholsoni</i> (Beddard,1901)	<i>Octochaetidae</i>
40.	<i>Eutyphoeus gigas</i> (Stephenson, 1917)	<i>Octochaetidae</i>
41.	<i>Eudichogaster ashworthi</i> (Michaelsen, 1902)	<i>Octochaetidae</i>
42.	<i>Eudichogaster parvus</i> (Fedarb, 1898)	<i>Octochaetidae</i>
43.	<i>Eudichogaster prashadi</i> (Stephenson, 1920)	<i>Octochaetidae</i>
44.	<i>Ramiella bishambari</i> (Stephenson, 1914)	<i>Octochaetidae</i>
45.	<i>Octochaetus fermori</i> (Michaelsen, 1907)	<i>Octochaetidae</i>
46.	<i>Octochaetus paliensis</i> (Stephenson, 1920)	<i>Octochaetidae</i>
47.	<i>Octochaetona Beatrix</i> (Beddard, 1902)	<i>Octochaetidae</i>
48.	<i>Octochaetona surensis</i> (Michaelsen, 1910)	<i>Octochaetidae</i>
49.	<i>Drawida calebi</i> (Gates, 1945)	<i>Moniligasteridae</i>
50.	<i>Drawida willsi</i> (Michaelsen, 1907)	<i>Moniligasteridae</i>

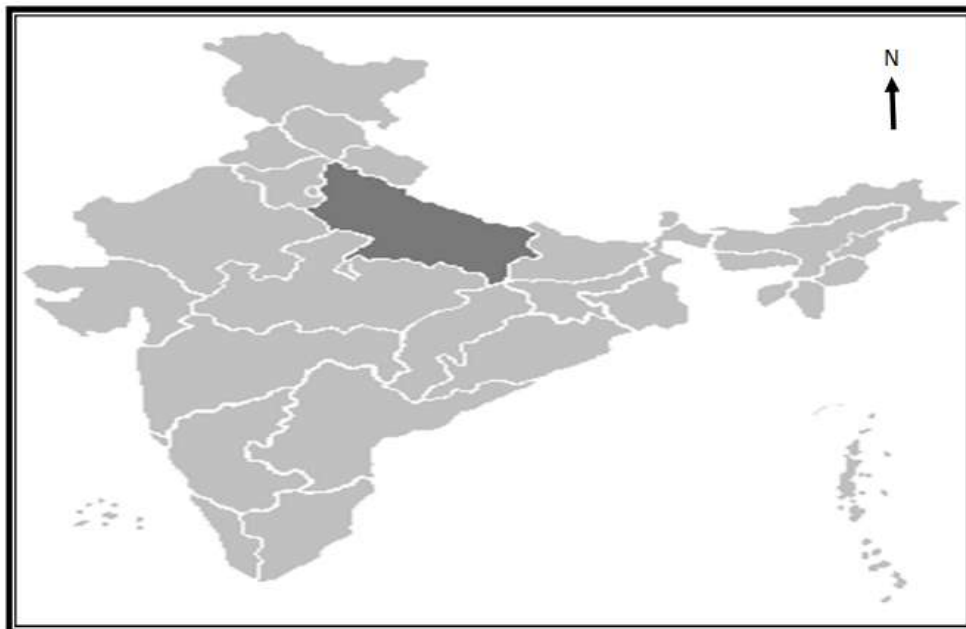


Fig.1).Showing map of India with Uttar Pradesh State.

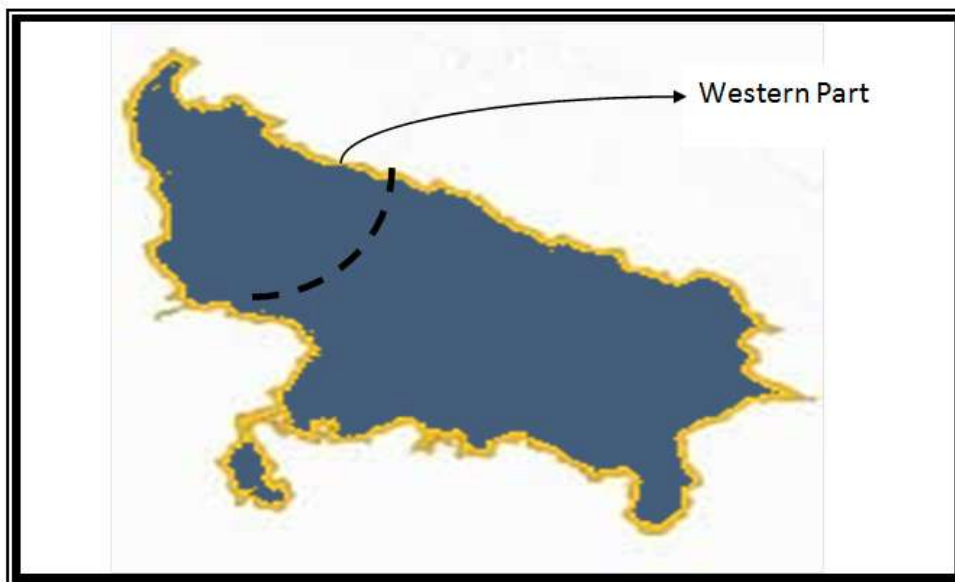


Fig.2).Showing Map of Uttar Pradesh with marked western part (the study site).

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