



OLIGOCHAETE DIVERSITY IN GOBINDSAGAR AND NANGAL DAM WETLANDS (H.P. & P.B.) INDIA

R. PALIWAL

Zoological Survey of India, High Altitude Regional Centre, Solan – 173 211 (H.P.)

E-mail: rpworm@gmail.com

INTRODUCTION

The oligochaetes are elongated, soft bodied, metamerically segmented, invertebrate animals. They are divided into two convenient groups on the basis of their body size: Microdrili (small, mainly aquatic worms including terrestrial pot worms of the family Enchytraeidae), and Megadrili (larger, mostly terrestrial worms, the earthworms, and their aquatic representatives). Oligochaetes are found in all aquatic and terrestrial habitats with sufficient moisture and food.

Wetlands are transitional areas between terrestrial and aquatic environments. These are biologically most productive ecosystems and harbours very rich biodiversity beside their socio-economic usefulness to mankind. Natural wetlands are increasingly facing various anthropogenic pressures resulting in their deterioration and degradation. The man-made wetlands have gained importance in recent times as they are supporting and sustaining considerable biodiversity. Species diversity of Indian wetlands includes 17,853 animal species belonging to 34 groups (Alfred and Nandi, 2001), and more than 1,200 species of aquatic plants (Gopal, 1995). The wet soil in marshes and along the margins of wetland provide suitable habitat for the propagation of both freshwater and terrestrial oligochaetes.

Aquatic oligochaetes are significant component of complex food web of the wetland ecosystem. They improve the quality of detritus deposited at the bottom of freshwater ecosystems. They are

a source of food to some aquatic insect larvae, amphibians, fishes and water birds inhabiting the wetlands.

Famous Greek philosopher Aristotle has described earthworms as “Intestine of Earth”. Earthworms consume the soil and help in disappearance of surface plant litter, its breakdown, redistribution and incorporation in the soil. Organic matter extracted from the soil is pulverized and subjected to digestive enzymes in their alimentary canal. The excreta rich in nutrient are deposited on the soil surface in the form of castings. A considerable quantity of nutrients released during this process is washed into nearby wetlands, thus influencing their productivity.

Earlier important taxonomic monographs by Stephenson (1923), Brinkhurst and Jamieson (1971), Gates (1972), Julka (1988) and Naidu (2005) on Indian oligochaetes provide information on the distribution of oligochaetes in the region. However, study of oligochaete diversity in wetlands has not attracted much attention in our country. Julka and Paliwal (2000) published a detailed account on the Oligochaeta of Renuka wetland in the outer Himalaya of Himachal Pradesh. Paliwal and Julka (2009) explored earthworm diversity of the man-made Pong Dam wetland in district Kangra of Himachal Pradesh and reported 12 species of earthworms. Paliwal and Julka (2005) have listed earthworms of western Himalaya which provides some information on the distribution of oligochaetes in the localities

close to the wetlands and surrounding areas. Oligochaetes of Gobindsagar and Nangal Dam wetlands that spread in the states of Himachal Pradesh and Punjab have not yet been explored.

Present communication lists nine species of oligochaetes from Gobindsagar and Nangal Dam wetlands including one aquatic microdrile oligochaete. The aquatic oligochaete *Branchiura sowerbyi* is a widely distributed species in India and other parts of the world. In the northwest India, the species is reported from neighbouring states of Jammu & Kashmir, Punjab, Chandigarh, Haryana, and Uttarakhand (Naidu, 2005). It is being recorded for the first time from Himachal Pradesh. Present record of *Branchiura sowerbyi* displays its continuous distribution in the northern region of India along western Himalaya. Material examined under each species shows the number of juvenile, a clitellate and clitellate worms separated by hyphen, respectively.

Key to the oligochaetes of Gobindsagar and Nangal Dam Wetlands

1. Setae in bundles, posterior segments with paired gills on dorsal and ventral sides.....
.....*Branchiura sowerbyi*
Setae not in bundles, gills absent 2
2. Male pores in segment 15
.....*Bimastos parvus*
Male pores behind segment 15 3
3. Setae lumbricine..... 4
Setae perichaetine..... 9
4. Male pores paired, in seminal grooves, on segment 18..... 5
Male pores paired, just posterior to prostatic pores, on segment 17, seminal grooves absent 6
5. Spermathecal pores one pair, on segment 8, setae *a* on segment 8 copulatory; typhlosole lamelliform, simple *Lennogaster chittagongensis*
Spermathecal pores two pairs, on segment 8 and 9; typhlosole lemmeliform, bifid
.....*Octochaetona beatrix*
6. Bivestibulate, male pores discharge into, paired, deep, well-like vestibula..... 7
Avestibulate, male pores discharge on body surface in fissures on low, circular, paired porophores *Eutyphoeus incommodus*
7. Spermathecal pores at *ab*, genital markings closely paired, intraclitellar, additional postclitellar genital marking may be present *Eutyphoeus nicholsoni*
Spermathecal pores at *bc*, genital markings paired, postsetal on segment 9, intersegmental on 14/15/16, 18/19, occasionally one of the paired marking may be absent
.....*Eutyphoeus waltoni*
9. Male pores discharge directly onto body surface, spermathecal pores four pairs in furrows 5/6/7/8/9, genital markings present .
..... *Amyntas corticis*
Male pores discharge into copulatory pouches opening onto body surface through secondary male pores, spermathecal pores four pairs in furrows 5/6/7/8/9, genital markings paired on equators of segments 17 and 19
..... *Metaphire posthuma*

SYSTEMATIC LIST

Family TUBIFICIDAE

Genus *Branchiura* Beddard, 1892

1. *Branchiura sowerbyi* Beddard, 1892

Material examined: 0-0-1 Kodra, district Una (H.P.), 17 April 2005, R. Paliwal.

Distribution: Andhra Pradesh, Assam, Bihar, Chandigarh, Delhi, Haryana, Himachal Pradesh, Jammu & Kashmir, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Odisha, Punjab, Tamil Nadu, Uttaranchal, Uttar Pradesh, West Bengal. *Elsewhere:* Cosmopolitan.

Remarks: It is found in mud. This aquatic oligochaete species is being reported for the first time from Himachal Pradesh.

Family LUMBRICIDAE

Genus *Bimastos* Moore, 1893

2. *Bimastos parvus* (Eisen, 1874)

Material examined: 0-0-2 Barnla, district

Ropar (Punjab), 12 Jan 2002, R. Paliwal; 0-0-1 Tarkhanka, district Una (H.P.), 18 Jan 2002, R. Paliwal; 2-2-13 Kodra, district Una (H.P.), 17 April 2005, R. Paliwal.

Distribution: India: Himalayan states, Uttar Pradesh, Bihar, Rajasthan, Tamil Nadu, West Bengal. *Elsewhere:* Endemic in North America, distributed worldwide in temperate climate areas.

Remarks: It is a very small worm of reddish colour, generally found in decaying wood and forest litter.

Family OCTOCHAETIDAE

Genus *Eutyphoeus* Michaelsen, 1900

3. *Eutyphoeus incommodus* (Beddard, 1901)

Material examined: 0-0-3 Nanaksar, district Ropar (Punjab), 11 Sep 2003, R. Paliwal.

Distribution: India: Gangetic Plains, foot hills of the Himalaya, Madhya Pradesh. *Elsewhere:* Pakistan.

Remarks: It is a geophagous species and lives in deeper soil layers.

4. *Eutyphoeus nicholsoni* (Beddard, 1901)

Material examined: 0-0-1 Lakhanpur, district Bilaspur (H.P.), 17 Sep 2003, R. Paliwal.

Distribution: India: Gangetic Plains, foot hills of the Himalaya, Madhya Pradesh. *Elsewhere:* Not recorded.

Remarks: It is a geophagous species and lives in deeper alluvial soil layers.

5. *Eutyphoeus waltoni* Michaelsen, 1907

Material examined: 3-3-1 Jeori Pattan, district Bilaspur (H.P.), 26 June 2001, L.P. Dubey; 0-0-1 Nanaksar, district Ropar (Punjab), 11 Sep 2003, R. Paliwal; 0-0-2 Kodra, district Una (H.P.), 13 Sep 2003, R. Paliwal.

Distribution: India: Gangetic Plains, foot hills of the Himalaya, Gujarat, Madhya Pradesh. *Elsewhere:* Pakistan.

Remarks: *Eutyphoeus waltoni* inhabits deeper soil layers and deposits large-sized tower-like casts

on the soil surface. It is generally found under trees and bushes.

Genus *Lennogaster* Gates, 1939

6. *Lennogaster chittagongensis* (Stephenson, 1917)

Material examined: 0-0-5 Lathiani, district Una (H.P.), 24 Sep 1991, A.S. Mahabal.

Distribution: India: Jammu & Kashmir, Himachal Pradesh. *Elsewhere:* Bangladesh, Myanmar.

Remarks: It is found within top 5 cm sandy loam soil layer with rich organic matter in grasslands, under stones and decaying leaves.

Genus *Octochaetona* Gates, 1962

7. *Octochaetona beatrix* (Beddard, 1902)

Material examined: 0-0-1 Babkhal Pul, district Bilaspur (H.P.), 28 June 2001, L.P. Dubey; 0-0-1 Nanaksar, district Ropar (Punjab), 11 Sep 2003, R. Paliwal.

Distribution: India: Gangetic Plains, foot hills of the Himalaya, Odisha, Madhya Pradesh, Gujarat, Maharashtra, Goa, Karnataka, Kerala. *Elsewhere:* Pakistan, Nepal, Myanmar, Malay Peninsula, Philippines.

Remarks: It commonly occurs in sandy loam and clay loam soils with low organic matter usually in grassy patches.

Family MEGASCOLECIDAE

Genus *Amyntas* Kinberg, 1867

8. *Amyntas corticis* (Kinberg, 1867)

Material examined: 0-0-1 Barmla, district Ropar (Punjab), 12 Jan 2002, R. Paliwal.

Distribution: India: Himalaya, NE Hill Ranges, hilly parts of Tamil Nadu and Karnataka. *Elsewhere:* South and Southeast Asia, Australia, New Zealand, South Africa, Madagascar, Europe, North and South America.

Remarks: It is a widely distributed anthropochorous species with endemism believed to be in east and south-east Asia. It is a very agile earthworm and when disturbed responds in serpentine manner. This species can be utilized for vermi-composting.

Genus *Metaphire* Sims & Easton, 1972

9. *Metaphire posthuma* (Vaillant, 1868)

Material examined: 0-1-8 Nanaksar, district Ropar (Punjab), 11 Sep 2003, R. Paliwal.

Distribution: India: West Himalayan foothills, Gangetic Plains, Odisha, Madhya Pradesh, Gujarat, Maharashtra, Andaman & Nicobar Islands. *Elsewhere:* Pakistan, Bangladesh, Myanmar, Southeast Asia.

Remarks: It inhabits subsoil at 10-20 cm depth in sandy loam soil. Its casts are in the form of loose spherical pellets. It prefers poor soils on the banks of water bodies and semi-dried up beds of watercourses.

SUMMARY

Nine species of oligochaetes belonging to four families *i.e.* Tubificidae (*Branchiura sowerbyi*),

Lumbricidae (*Bimastos parvus*), Octochaetidae (*Eutyphoeus incommodus*, *Eutyphoeus nicholsoni*, *Eutyphoeus waltoni*, *Lennogaster chittagongensis*, *Octochaetona beatrix*) and Megascolecidae (*Amyntas corticis*, *Metaphire posthuma*) are recorded from Gobindsagar and Nangal Dam wetlands of Himachal Pradesh and Punjab with distribution of six species in each wetland. Three species *viz.*, *Bimastos parvus*, *Eutyphoeus waltoni* and *Octochaetona beatrix* were common to both the wetlands. *Branchiura sowerbyi* is recorded for the first time from Himachal Pradesh.

ACKNOWLEDGEMENTS

Author is grateful to the Director, Zoological Survey of India, Kolkata for his keen interest and facilities during these studies. He is also thankful to the Officer-in-Charge, High Altitude Regional Centre, ZSI, Solan for providing necessary facilities during the project.

REFERENCES

- Alfred, J.R.B. and Nandi, N.C. 2001. Wetlands: Freshwater: 165-193. In: Alfred, J.R.B., Das, A.K. and Sanyal, A.K. (eds.) *Ecosystems of India and their biodiversity*. Published by ENVIS Centre, Zool. Surv. India.
- Brinkhurst, R.O. and Jamieson, B.G.M. 1971. *Aquatic Oligochaeta of the world*. University of Toronto Press, Toronto and Buffalo, xii+860 pp.
- Gates, G.E. 1972. Burmese earthworms. An introduction to the systematics and biology of megadrile oligochaetes with special reference to southeast Asia. *Trans. Am. phil. Soc.*, **67**(7): 1-326.
- Gopal, B. 1995. Handbook of Wetland Management. WWF-India, New Delhi, 305pp.
- Julka, J.M. 1988. *The Fauna of India and the adjacent countries, Megadrile Oligochaeta, Octochaetidae*. Zoological Survey of India, Calcutta, 392 pp.
- Julka, J.M. and Paliwal R. 2000. Oligochaeta: 21-25. In: *Fauna of Renuka Wetland: Wetland Ecosystem Series, 2*. Published by Zool. Surv. India.
- Naidu, K. Vanamala. 2005. *The Fauna of India and adjacent countries- Aquatic Oligochaeta*. Zoological Survey of India, Kolkata, 294 pp.
- Paliwal, R. and Julka, J.M. 2005. Checklist of earthworms of western Himalaya, India. *Zoos' Print journal*, **20**(9): 1972-1976.
- Paliwal, R. and Julka, J.M. 2009. Earthworm (Oligochaeta): 7-12. In: *Faunal Diversity of Pong Dam, Wetland Ecosystem Series, 12*. Published by Zool. Surv. India.
- Stephenson, J. 1923. *Oligochaeta. The Fauna of British India, including Ceylon and Burma*. Taylor and Francis Ltd., London, 518 pp.