Decapods

Research · June 2016
DOI: 10.13140/RG.2.1.5064.1524

1 author:

Kezang Dorji
Department of forest and Park Services

2 PUBLICATIONS 2 CITATIONS

Some of the authors of this publication are also working on these related projects:

Diversity of Crabs View project

All content following this page was uploaded by Kezang Dorji on 20 June 2016.

The user has requested enhancement of the downloaded file.
DIVERSITY OF FRESH WATER DECAPODS IN WESTERN BHUTAN

SUBMITTED AS A PARTIAL REQUIREMENT OF TWO YEARS FORESTRY DIPLOMA PROGRAM

KEZANG DORJI, DEPARTMENT OF FOREST, 2014
PLAGIARISM DECLARATION FORM

I declare that this is an original work and I have not committed, to my knowledge, any academic dishonesty or resorted to plagiarism in writing the dissertation. All the sources of information and assistance received during the course of the study are duly acknowledged.

Student’s Signature: ___________________  Date: ______________
Abstract

Worldwide, recently the number of Decapoda species recorded stands at 14,756 species distributed in 2,725 genera, with Brachyura accounting for 6,835 species. However, since the study on freshwater Decapod Crustaceans in Bhutan is not done so far, it is necessary to know its importance from the conservation point of view. I have collected data from several freshwater decapod potential habitats using opportunistic survey. I have done the survey based on information available from different sources like friends and literature. I have also asked friends to collect specimens for the study. The information thus collected were studied in the CNR laboratory and documented.

From the total species of decapods recorded, the freshwater crab Potamidae Ortmann, 1896, is a large, diverse group with some 500 species distributed in 74 genera. This freshwater crab family Potamidae is classified into two subfamilies based on the differences in the structure of the eighth thoracic sternite; Potaminae and Potamiscinae. Their distributions are quite distinct overlapping only in northeastern India and Myanmar which clearly show that these species from both the subfamilies could be present in Bhutan. Through this research, it was found that the Potaminae (Genus: Himalayapotamon and Alcomon) and Potamiscinae (Genus: Potamiscus) are found in Bhutan. This study records 11 species of crabs and 2 species of freshwater shrimps from Bhutan. However, since most of the specimens were collected from western Bhutan, further study is required in this group of freshwater decapod crustaceans.
Acknowledgement

Special thanks are due to Dr. DB Gurung and his collaborators at different countries for the help in the special guidance and species collection. I would also like to acknowledge and thank Mr. Ngawang Namgyal, Cheten La, Chimmi Rinzin, Lobzang and Tshering Norbu (Department of Forestry, CNR) for helping me in the collection of species. I gratefully acknowledge financial support from my dearly Parents and my brother Sonam Rada (Samtse College of Education).
## Contents

### Chapter One .................................................................................................................................................. 1
  Introduction .................................................................................................................................................. 1

### Chapter Two ............................................................................................................................................... 3
  Literature Review ....................................................................................................................................... 3
  Population .................................................................................................................................................. 3
  Meals ......................................................................................................................................................... 3
  Respiration ................................................................................................................................................ 3
  Reproduction ........................................................................................................................................... 3
  Importance ................................................................................................................................................ 4
  Special Abilities ....................................................................................................................................... 4

### Chapter Three .......................................................................................................................................... 5
  Methodology and Materials .......................................................................................................................... 5
  Study Area ................................................................................................................................................ 5
  Data Collection ......................................................................................................................................... 7
  Data Analysis .......................................................................................................................................... 7
  Materials Required .................................................................................................................................. 8
  Time and Duration ..................................................................................................................................... 8

### Chapter Four .......................................................................................................................................... 9
  Results and Discussion ............................................................................................................................... 9
  Diagrammatic sketch of a typical potamonid crab is given below: ............................................................. 9

### Preliminary Checklist of Decapods found in Bhutan ............................................................................. 11

### Brief description of the preliminary checklist ...................................................................................... 12

<table>
<thead>
<tr>
<th>Decapods Found in Bhutan</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Acanthopotamon martensi</em></td>
<td>12</td>
</tr>
<tr>
<td><em>Barytelphusa cunicularis</em></td>
<td>13</td>
</tr>
<tr>
<td><em>Potamiscus sikkimense</em></td>
<td>13</td>
</tr>
</tbody>
</table>

### Recognition! of two subfamilies in the Potamidae ............................................................................. 14
<table>
<thead>
<tr>
<th>Subfamily</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Potaminae</td>
<td>16</td>
</tr>
</tbody>
</table>

Diagram showing transverse ridge: ........................................................................................................... 16
<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Potamisciniae:</td>
<td>16</td>
</tr>
<tr>
<td>Diagram showing lack of transverse ridge:</td>
<td>17</td>
</tr>
<tr>
<td><strong>Detail Description Collected Species</strong></td>
<td>18</td>
</tr>
<tr>
<td><strong>POTAMINAE Ortmann, 1896</strong></td>
<td>18</td>
</tr>
<tr>
<td><strong>1. Alcomon</strong></td>
<td>18</td>
</tr>
<tr>
<td>Etymology</td>
<td>18</td>
</tr>
<tr>
<td><strong>Alcomon species found at Gelephu</strong></td>
<td>18</td>
</tr>
<tr>
<td>Taxonomy</td>
<td>18</td>
</tr>
<tr>
<td>Diagnosis</td>
<td>19</td>
</tr>
<tr>
<td>Habitat</td>
<td>20</td>
</tr>
<tr>
<td><strong>2. Himalayapotamon</strong></td>
<td>20</td>
</tr>
<tr>
<td>Etymology:</td>
<td>20</td>
</tr>
<tr>
<td><strong>Himalayapotamon species found in Bhutan</strong></td>
<td>20</td>
</tr>
<tr>
<td>Taxonomy</td>
<td>20</td>
</tr>
<tr>
<td>Diagnosis</td>
<td>20</td>
</tr>
<tr>
<td>Limitations</td>
<td>21</td>
</tr>
<tr>
<td><strong>3. Maydelliathelphusa lugubris (Wood-Mason, 1871)</strong></td>
<td>22</td>
</tr>
<tr>
<td>Etymology</td>
<td>22</td>
</tr>
<tr>
<td>Taxonomy</td>
<td>22</td>
</tr>
<tr>
<td>Diagnosis</td>
<td>22</td>
</tr>
<tr>
<td>Distribution</td>
<td>23</td>
</tr>
<tr>
<td>Habitat</td>
<td>23</td>
</tr>
<tr>
<td><strong>POTAMISCINAE Bott, 1970</strong></td>
<td>24</td>
</tr>
<tr>
<td><strong>4. Potamiscus</strong></td>
<td>24</td>
</tr>
<tr>
<td>Etymology</td>
<td>24</td>
</tr>
<tr>
<td>Taxonomy</td>
<td>24</td>
</tr>
<tr>
<td>Diagnosis</td>
<td>24</td>
</tr>
<tr>
<td>Limitation</td>
<td>26</td>
</tr>
<tr>
<td><strong>SHRIMPS</strong></td>
<td>27</td>
</tr>
<tr>
<td><strong>1. Macrobrachium assamense Tiwari, 1958</strong></td>
<td>27</td>
</tr>
<tr>
<td>Taxonomy</td>
<td>27</td>
</tr>
<tr>
<td>Species collected from Gelephu Bhutan</td>
<td>27</td>
</tr>
</tbody>
</table>
Distribution

Habitat

PH: 28
Temperature: 28
Description: 28
Diet: 28
Breeding: 28
Recommended Compatible Species: 28
Fig. 14 External anatomy Bauer R. T., (2004).

2. *Caridina* H. Milne Edwards, 1837

Taxonomy: 29
Description: 30
Cephalon: 30
Thorax: 31
Abdomen: 31

Conclusion

References
Chapter One

Introduction

In general, the decapods or Decapoda literally means “ten footed”. Biologically, decapods or Decapoda are an order of crustaceans which consists of shrimps (swimming crustaceans with long narrow muscular abdomens and long antennae), crayfishes (also called crawfish or crawdads are freshwater crustaceans resembling small lobsters, to which they are related), lobsters (invertebrates with a hard protective exoskeleton), and crabs (decapods crustaceans of the infra order Brachyura, which typically have a very short projecting "tail" (abdomen) usually entirely hidden under the thorax) (Welsh, 1975).

The decapod crustaceans play a critical role in metabolizing and controlling the flow of energy in estuarine ecosystems. Decapods are also important predators themselves, consuming phytoplankton, benthic algae, and macro benthos. The decapods are well-known for their economic importance in the field of fisheries and include many species that are widely used as food items (Coull and Bell, 1983).

All over the world, the order Decapoda is estimated to contain nearly 15,000 species in around 2,700 genera, with approximately 3,300 fossil species. Nearly half of these species are crabs, including the shrimp. In a recent study of freshwater crabs, 500 specimens were collected from southern Indian states. A total of 655 freshwater Decapoda species (just over a quarter of all described carideans) are presently known in Sir Lanka (Bahir et al, 2005).

Since, the study and the research on the diversity of Decapoda in our country Bhutan has not been done before, our understanding of decapod crustacean is limited. As more information is collected on life histories, demography, and species interactions, a better understanding of the role of decapods in ecosystems will emerge.

All the seasons are favorable for data and species collection but I have collected the data and species during the summer mostly because the specimens are mostly available during this time and during winter occasionally. The places for data and specimens collection that I was focusing were in the Western part of Bhutan. But, I have collected some specimens from Lobeysa CNR,
Phuntsholing Bhutan, Samtse and Samdrup Jongkhar. I have requested friends in the field to collect specimens besides my own efforts.

The data was collected (altitude and coordinates) using Global Positioning System (GPS) and specimens were from minimum of two locations of each place cited above. The specimens are preserved in the CNR laboratory. The information has been compiled exclusively from a bibliographic search. The exact origin of each record is indicated as clearly as possible to allow updates after project completion. Some references are included because they are useful to know the origin of a new generic combination, a synonymy, or a geographic distribution.

**Objectives:**
1. Document Decapoda of Bhutan, western region in particular.
2. Describe the taxonomy.
3. Record species habitat.
Chapter Two

Literature Review

Population
In 1951, an estimated Decapoda species in the World was about 8,321 species, distributed among 1,000 genera, with Brachyura accounting for 4,428 species, distributed among 635 genera. More recently an accurate numbers of Decapoda species were recorded that is 14,756 species distributed in 2,725 genera, with Brachyura accounting for 6,835 species (Chace, 1951).

Why called as Decapoda?
The name Decapoda actually means “ten feet.” They have a hard exoskeleton and usually have fairly large claws. They have 6 maxillipeds, which separates them from the other orders. Decapoda can be found in all aquatic environments. This includes muddy areas, sea bottoms, beaches, and corals. They can be found burrowing, errant, or even sedentary in the benthic zone. The Decapods have multiple eating habits.

Meals
They can be predators, herbivores, or sometimes scavengers. The predators will feed on fish, worms, and most meat they can get their claws on (Cantrell, 2012).

Respiration
Decapods have gills that project upward from near the base of the thoracic appendages and are enclosed within a protective gill chamber.

Reproduction
Depending on the species, mating is very brief or may occur only after males and females have spent long periods of time together. In these cases the female can only mate just after she molts, or sheds her external skeleton (exoskeleton). As they prepare to molt, adult females release pheromones to attract males. A male will sometime grasp the female with its legs for several days or weeks until she finally molts. Sperm is transferred to the female as a fluid or inside packets. The sperm is deposited directly into the reproductive organs of the female or into a
special storage sac in her body. In some species the male stands guard over the female to prevent other males from mating with her.

**Importance**
They play an important role in the circulation of energy within their ecosystems since they feed on such a wide variety of organisms.

**Special Abilities**
Lobsters and crabs are capable of learning. They can be trained to find their way through a maze. When some crabs are offered a prey item that they have never seen before, they will quickly learn the most efficient way to eat it. Some species can be taught to act in a certain way in response to a specific situation. Others can even learn to distinguish between different colors.

All decapods have the ability to regenerate. In some invertebrates, autotomy can involve the loss of one or more legs. Crabs, for instance, are famous for sacrificing a claw if attacked by a predator, which they will then re-grow.

Indeed, they are willing to lose several of their limbs if necessary to avoid capture, though this willingness decreases markedly with each successive limb loss (Cantrell, 2012).

In the Decapoda, the grooming is extremely crucial and helps prevent the growth of foreign organisms on their body surfaces, loss of olfaction hairs, clogging of gills and embryo mortality. The most frequently groomed areas of the body include the sensory and respiratory structures that consist of the antennules, antennae, and gills (Bauer, 1981).
Chapter Three

Methodology and Materials

Study Area
Collection of data and the study area of my project covered certain parts/places of the western Bhutan.

The first area that I have studied and collected data is at the Metshina Stream under Punakha Bhutan. It is located at an altitude of 1317 masl with latitude of 27°88’52.44” and longitude of 089°51’57.21”.

Fig. 1 Google Map showing Metshina Stream.
I have also studied and collected data from the stream just behind the CNR staff quarter. It is located at an altitude of 1600 masl with latitude of 27°29’47.54” and longitude of 089°52’38.10”.

Fig. 2 Google Map showing stream behind CNR staff quarter.
During summer vacation, I went Phuentsholing for data collection. The place of studies and data collection is located at an altitude of 285 masl with latitude of 26°51’28.83” and longitude of 089°23’16.69”.

![Google Map Showing Phuentsholing](image)

**Fig. 3 Google Map Showing Phuentsholing.**

**Data Collection**

I have collected data from any location wherever the data is existing or available. This kind of data collection is called **Opportunistic Survey**. I have gone for survey for data collection wherever possible based on the information available and also asked friends to collect specimens using this method.

**Data Analysis**

The information thus collected were studied in the lab and documented.
**Materials Required**

a. Pen and Pencils  
b. Papers  
c. GPS (Global Positioning System)  
d. Alcohol 70%  
e. Formalin  
f. Microscope  
g. Microscopic Camera  
h. Laboratory instruments.

**Time and Duration**

The data was collected mostly during summer (June-August, 2013) because of the abundance of the species using *Opportunistic Survey*.
Chapter Four

Results and Discussion

Diagrammatic sketch of a typical potamonid crab is given below:

Dorsal view

Cheliped
Fig. 4 Diagrammatic sketch of a typical potamonid crab (Source: Srivastava; *Freshwater crabs in the collection of the Chennai*, 2005).

1. Post-orbital crest  
2. External orbital angle  
3. Mesogastric groove  
4. Cervical groove  
5. Front  
6. Epigastric Crest  
7. External orbital tooth  
8. Lateral Epibranchial tooth  
9. Antero-lateral border  
10. Postero-lateral border  
11. Carapace  
12. Palm  
13. Carpus  
14. Merus  
15. Ichium  
16. Coxa  
17. Dactylus  
18. Pollex  
19. Basis  
20. Cheliped  
21. Abdominal segments  
22. Exopodite  
23. External maxilliped
## Preliminary Checklist of Decapods found in Bhutan:

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Species</th>
<th>Synonym</th>
<th>Distribution</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><em>Acanthopotamon martensi</em></td>
<td><em>Paratelphusa martensi,</em></td>
<td>Northeastern India</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>Spinopotamon martensi</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td><em>Acanthopotamon panningi</em></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td><em>Acanthopotamon fungosum</em></td>
<td><em>Lobothelphusa</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td><em>Alcomon lophocarpus</em></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td><em>Alcomon superciliosum</em></td>
<td><em>Potamon superciliosum,</em></td>
<td>Northeastern India</td>
<td>(Arunachal Pradesh)</td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>Geothelphusa superciliosum</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td><em>Himalayapotamon atkinsonianum</em></td>
<td><em>Potamon atkinsonianum,</em></td>
<td>Phuentsholing, Balu Jhura, Darjeeling, Sikkim, Nepal</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>Telphusa atkinsonianum</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td><em>Potamiscus sikkimense</em></td>
<td><em>Potamon sikkimense</em></td>
<td>Phuentsholing, Chima Kothi</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td><em>Barythelphusa lugubris</em></td>
<td><em>Gecarcinucus lugubris</em></td>
<td>Phuentsholing</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td><em>Liothelphusa laevis</em></td>
<td><em>Gecarcinucus laevis</em></td>
<td>Phuentsholing, Kamiee, Samch</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td><em>Barytelphusa cunicularis</em></td>
<td></td>
<td>West Bengal, Andhra Pradesh, Bihar, Karnataka, Kerala, Tamil Nadu, Maharashtra</td>
<td>Recorded at Sir Lanka.</td>
</tr>
<tr>
<td>11</td>
<td><em>Maydelliathelphusa lugubris</em></td>
<td></td>
<td>Bhutan (Bangtar), Darjeeling, Sikkim, Nepal, Assam.</td>
<td></td>
</tr>
</tbody>
</table>
Brief description of the preliminary checklist:

*Acanthopotamon martensi*

**Taxonomy**

<table>
<thead>
<tr>
<th>Kingdom</th>
<th>Phylum</th>
<th>Class</th>
<th>Order</th>
<th>Family</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANIMALIA</td>
<td>ARTHROPODA</td>
<td>MALACOSTRACA</td>
<td>DECAPODA</td>
<td>POTAMIDAE</td>
</tr>
</tbody>
</table>

**Species Authority:** (Wood-Mason, 1875)

**Diagnosis:** Squarish carapace convex, H-shaped gastric grooves on carapace. Antero-lateral sides of carapace equal to the well-defined posterolateral sides and armed with three spines, other than the blunt, angular, outer orbital angle (Deb, 1999). Eyes are stock moderate, outer margin of the carpus with two lobes. Pereiopod long, thin, and laterally compressed. Colour: dorsal surface of carapace and cheliped greenish to grey; ventral surface of cheliped, periopod, and carapace light brown; abdomen lighter.

**Habits:** Nocturnal and omnivorous and feed on remains of other crabs, molluscs, insects, vegetation and detritus materials.

**Habitat:** They live on the bottom of a water body and abundant in shallow water bodies, such as beels, canals, etc. during the summer. To escape from the dry season they construct burrows in clay soil, which they seal with mud. They create burrow closer to water level. The humid air trapped inside the burrows give crabs enough moisture to survive until the wet weather returns.

**Distribution:** Widely distributed in Bangladesh. Found in some freshwater habitats, such as rivers, beels, canals, lakes, etc. Besides it also found in different freshwater habitats in India, Myanmar. This species also commonly found in estuaries of Chakaria Sundarban area (Siddiqui and Zafar, 2002).

**Note:** Related species; *Acanthopotamon panning* and *Acanthopotamon fungosum.*
**Barytelphusa cunicularis**

**Diagnosis:** Carapace flat; cervical groove very prominent and deep, broadly v-shaped, runs towards lateral epibranchial tooth, epigastric and post orbital crests form a bold ridge from mesogastric region to the lateral epibranchial tooth. The exopodite of the external maxillipeds is much longer than ischium and carries the hairy flagellum (West-Wood, 1836).

**Distribution:** INDIA: West Bengal (Burger), Andhra Pradesh, Bihar, Karnataka, Kerala, Maharashtra, Tamil Nadu, Uttar Pradesh.

---

**Potamiscus sikkimense**

In the male, the 6\textsuperscript{th} abdominal segment is a little shorter than the last one, which is broader than long. The first abdominal appendage of the male is faintly curved; it’s anterior part straight and pointed
Recognition of two subfamilies in the Potamidae:

- **Potamidae**
  - **Potaminae**
    - *Parathelphusa* (Alcock, 1909)
    - *Lobothelphusa* (Bouvier, 1917)
    - *Acanthopotamon* (Kemp, 1918)
    - *Himalayapotamon* (Pretzmann, 1966)
    - *Alcomon*
    - *Socotrapotamon* (Apel & Brandis, 2000)
    - *Potamon*
  - **Potamiscinae**
    - *Potamiscus* (Alcock, 1909)
    - *Indochinamon*
    - *Stelomon*
    - *Pudaengon*
The family Potamidae is divided into two distinct groups on the basis of differences in the structure of the eighth thoracic sternite. The subfamilies names, Potamiscinae and Potaminae, which remain available, are here applied to these two groups (Yeo, 1997).

The transverse ridge on the eighth thoracic sternite is a very significant and consistent character and like other aspects of the thoracic sternum of crabs, is not likely to be influenced by external environmental factors. Such characters have been used to good effect in suprageneric brachyuran taxonomy (Guinot, 1977, 1979). Therefore, on this evidence, two separate groupings are recognized here within the Potamidae;

Fig. 5 Terminology used for posterior thoracic sternum (Source: Darren C. J and Peter K. L. NG).

- Sternite 4
- Sternite 5
- Sternite 6
- Sternite 7
- Sternite 8
- Sternal button
- Longitudinal median line
- Transverse ridge
**Potaminae:** In this sub family, the eighth thoracic sternite is incompletely separated by a longitudinal median line, fused anteriorly at the suture between sternites 7 and 8 by a narrow transverse ridge interrupting the longitudinal line (Ortmann, 1896).

**Diagram showing transverse ridge:**

![Diagram](image)

Fig. 6 Examples of posterior thoracic sternum of potaminae crabs (Source: *Fig. A, Herbst, 1785 and Fig. B, Bott, 1967*).

**Potamiscinae:** In this sub family, the eighth thoracic sternite is without any trace of transverse ridge at suture between 7 and 8, completely separated by uninterrupted longitudinal median line in posterior sternum (Bott, 1970).
Diagram showing lack of transverse ridge:

Fig. 7 Examples of posterior thoracic sternum of potmiscalinae crabs (Source: Fig. Alcock, 1909 and Fig. Kemp, 1785).

1. **List of Potaminae found in Bhutan**
   - *Alcomon*
   - *Himalayapotamon*

2. **List of Potamiscinae found in Bhutan**
   - *Potamiscus*
Detail Description Collected Species:

POTAMINAE Ortmann, 1896

1. *Alcomon*

**Etymology:** The genus is named after Alfred Alcock, arbitrarily combined with the genus name *Potamon*, in recognition of his immense contributions to freshwater crab taxonomy. Gender is neuter.

*Alcomon* species found at Gelephu:

**Taxonomy:**

<table>
<thead>
<tr>
<th>Taxonomic Level</th>
<th>Taxon</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kingdom</td>
<td>Animalia</td>
</tr>
<tr>
<td>Phylum</td>
<td>Arthropoda</td>
</tr>
<tr>
<td>Class</td>
<td>Malacostraca</td>
</tr>
<tr>
<td>Order</td>
<td>Decapoda</td>
</tr>
<tr>
<td>Family</td>
<td>Potamidae</td>
</tr>
<tr>
<td>Genus</td>
<td><em>Alcomon</em></td>
</tr>
<tr>
<td>Species</td>
<td><em>Alcomon superciliosum</em></td>
</tr>
<tr>
<td>Species Authority</td>
<td>Kemp, 1913</td>
</tr>
</tbody>
</table>
Fig. 8 *Alcomon superciliosum* (Kemp, 1913). Male; A, dorsal view; B, frontal view of carapace; C, ventral view of carapace; D, Gonopod (G1 and G2).

**Diagnosis:** Carapace rather quadrilateral, with weakly convex anterolateral margins; length about five sevenths breadth; dorsal surface nearly flattened, or weakly convex anteriorly for its frontal region, its depth being just half as wide as carapace; dorsal surface of carapace smooth to naked eye, but under magnification uniformly and sparsely covered with fine pits for its most part.
Third maxillipeds wide, completely close buccal flame, smooth only with sparse, microscopical setae and pits; ischium with an oblique distinct furrow, only slightly becoming wider distally; merus quadrilateral, about half length of ischium; exopod slender, attaining to half of merus, with a long flagellum. Abdomen is smooth, moderate in width, regularly narrowing distally. Ambulatory legs stout, not long, strongly depressed (Kemp, 1913).

**Habitat:** Wetlands- Permanent Rivers/Streams/Creeks (Includes waterfalls).

2. *Himalayapotamon*

**Etymology:** This genus was named by Pretzmann in the year 1966.

*Himalayapotamon* species found in Bhutan:

**Taxonomy:**
- Kingdom: Animalia
- Phylum: Arthropoda
- Class: Malacostraca
- Order: Decapoda
- Family: Potamidae
- Genus: *Himalayapotamon*
- Species: *Himalayapotamon atkinsonianum*

**Diagnosis:** The carapace is fused to all thoracic segments. They have stalked eyes. Terminal joint of first male gonopod S-shaped, terminal tip dorsally elongated, crossing over ventral part, forming spoon like structure, flexible zone distinctly asymmetric, mesially strongly elongated; sub terminal joint sinuous, mesial margin well developed (Wood-Mason, 1871).
Fig. 9 *Himalayapotamon atkinsonianum* (Wood-Mason, 1871). Female; A, dorsal view; B, frontal view of carapace.

**Limitations:** Lack of Male *Himalayapotamon atkinsonianum* species in the CNR Laboratory.
3. *Maydelliathelphusa lugubris* (Wood-Mason, 1871)

**Etymology:** The genus was named as *Maydelliathelphusa* by Bott in the year 1969.

**Taxonomy:**

<table>
<thead>
<tr>
<th>Kingdom</th>
<th>Animalia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phylum</td>
<td>Arthropoda</td>
</tr>
<tr>
<td>Class</td>
<td>Malacostraca</td>
</tr>
<tr>
<td>Order</td>
<td>Decapoda</td>
</tr>
<tr>
<td>Family</td>
<td>Gecarcinucidae</td>
</tr>
<tr>
<td>Genus</td>
<td><em>Maydelliathelphusa</em></td>
</tr>
<tr>
<td>Species</td>
<td><em>Maydelliathelphusa lugubris</em></td>
</tr>
</tbody>
</table>

**Diagnosis:** This species is characteristic in having the wide elliptical carapace, its proportion generally becoming wider according to the size; the dorsal surface is rather flattened, areolated and shining, but covered with minute pits; the cervical groove is broad and deep at both sides of the gastric region, running obliquely from each mesogastric posterolateral furrow to the epibranhial tooth; the protogastric and branchial regions are weakly convex dorsally; the frontal and postorbital regions are narrowly sunken; the epigastric regions of both sides are weakly convex dorsally and forward, separated from each other by the median longitudinal furrow, separated laterally from each postorbital gastric region by a shallow depression, and confluent posteriorly with each protogastric region.

The frontal margin is thin, shallowly concave in the middle, twice as wide as the orbital breadth. The anterolateral margin of the carapace is beaded with granules, nearly straight for its anterior one third before the epibranhial small tooth, and weakly convex outward behind the epibranhial tooth. The posterolateral margin of the carapace is weakly concave laterally and dorsally, as long as the main part of the anterolateral margin behind the epibranhial tooth.

The third maxilliped is elongated, almost smooth, with a longitudinal linear furrow at inner one third of the ischium; the merus is about half as long as the ischium; the exopod is narrow and
tapering, attaining to about basal one third of the merus, with well-developed flagellum. Both chelipeds are heavy and unequal (Source: Takeda, M., Sugiyama, H., & T. Shanti kumar Singh: Some Freshwater Crabs from Northeast India).

**Distribution:** Darjeeling, Sikkim, Nepal, Assam, Phuentsholing Bhutan.

**Habitat:** Rivers and stream.

This is the species collected from Samdrupcholing (Samdrup Jongkhar Bhutan):

Fig. 10 *Maydellia thalphusa lugubris* (Wood-Mason, 1871). Male; A, dorsal view; B, frontal view of carapace; C, ventral view of carapace; D, Gonopod (G1 and G2).
POTAMISCINAE Bott, 1970

4. *Potamiscus*

**Etymology:** This genus was named by Alcock in the year 1909.

**Taxonomy**

<table>
<thead>
<tr>
<th>Kingdom</th>
<th>Animalia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phylum</td>
<td>Arthropoda</td>
</tr>
<tr>
<td>Class</td>
<td>Malacostraca</td>
</tr>
<tr>
<td>Order</td>
<td>Decapoda</td>
</tr>
<tr>
<td>Family</td>
<td>Potamidae</td>
</tr>
<tr>
<td>Genus</td>
<td><em>Potamiscus</em></td>
</tr>
<tr>
<td>Species</td>
<td>?</td>
</tr>
</tbody>
</table>

**Diagnosis:** The eighth thoracic sternite is without trace of transverse ridge at suture between sternites 7 and 8, completely separated by uninterrupted longitudinal median line in posterior sternum (Alcock, 1909).

*Potamiscus* species collected from CNR (behind staff quarter):

![A]

![B]
Fig. 11 *Potamiscus* species (Alcock, 1909); Male; A, dorsal view; B, frontal view of carapace; C, ventral view of carapace; D, Gonopods (G1 and G2).

*Potamiscus* species collected from Metshina stream:

Fig. 12 *Potamiscus* species (Alcock, 1909); Female; A, dorsal view; B, frontal view of carapace.
Note: By undergoing some observations in the laboratory and some literature, I found that the species collected from the stream behind CNR staff quarter and the Metshina stream shares the same characters. The genus is tentatively kept as Potamiscus and requires further study.

Limitation: Male Potamiscus species from Metshina stream is not found.
SHRIMPS

Since shrimps are also one of the Decapoda species, I have listed the details of few of them below:


**Taxonomy**

Kingdom : Animalia
Phylum : Arthropoda
Class : Malacostraca
Order : Decapoda
Family : Palaemonidae
Genus : *Macrobrachium*
Species : *Macrobrachium assamense*

**Species collected from Gelephu Bhutan**

Fig. 13 Images of *Macrobrachium assamense* (Red Claw Shrimp) Photograph by Ryan.
**Distribution:** *Macrobrachium assamense* (Red Claw Shrimp) originates from East Himalayan waters, Chota Nagpur and Satpura, and mountainous parts of Burma.

**Habitat:** The species inhabits larger rivers

**PH:** They live in the water of PH 7.0 – 7.5.

**Temperature:** 20 – 30°C (68 – 86°F)

**Description:** The male Red Claw Shrimp can reach 8 cm in length; females are shorter at 6 cm. This species has a brownish appearance – but can vary from a light yellow-brown colour to a dark brown and a transparent carapace; males have huge red tongs with black stripes. Females are usually light green; eggs are a dark green colour.

**Diet:** The Red Claw Shrimp will eat anything – snails, live or frozen food, dead animals, and more. You might consider feeding it fish food pellets, flake, algae and bio-film. It will even enjoy fresh vegetables from time to time.

**Breeding:** *Macrobrachium assamense* have an interesting style of courtship in which the male uses his tongs to hug the female. The female Red Claw Shrimp will carry 20 – 60 fertilized eggs for a couple of weeks before hatching. This species is relatively easy to breed.

**Recommended Compatible Species:** *Macrobrachium assamense* will eat small shrimp, snails and fish. This is an aggressive species which should probably be housed in a one-species tank if we are going to keep it.

(Source: *AQUARIUM FISH EXPERTS*, Tiwari, 1958)
Fig. 14 External anatomy Bauer R. T., (2004)

2. *Caridina* H. Milne Edwards, 1837

**Taxonomy:**

Kingdom : Animalia

Phylum : Arthropoda

Class : Malacostraca

Order : Decapoda

Family : Atyidae

Genus : *Caridina*

Species: : ?
Description:

Crustacean bodies are segmented, and a pair of appendages can be found on each segment. Generally, the body of a Caridina species can be divided into two major parts called tagmata, the cephalothorax and the abdomen, consisting of 5 and 8 segments respectively, forming one large tagma of 13 segments. The cephalothorax is covered by a helmet-like plate of exoskeleton called the carapace, which is smooth and hydrodynamic, reducing drag in the water and so allowing for better swimming. The carapace protrudes forward to form a beak-like structure called the rostrum. Behind, at either side of the rostrum, is a pair of stalked, compound eyes.

The appendages of the 13 cephalothoracic segments are as follows:

Cephalon

The first antennae are biramous of two whip-like flagella and are concerned with chemoreception and spatial orientation. The second antennae have a single flagellum each and are concerned with chemoreception and tactile reception. The mandibles are muscular and are used to cut and/or grind food. The first and second maxillae are used for food handling.
Thorax

The three pairs of maxillipeds are used for food handling, although the third pair is often modified for other functions. The first and second pereiopods are chelated (have claws) and are concerned with food gathering, grooming and signaling, whereas the posterior third, fourth and fifth pereiopods are involved with locomotion.

The abdomen consists of 6 segments, each covered in a band-like plate of exoskeleton, allowing the abdomen to flex. This is important for shrimp survival as it allows for what is known as the Cardioid escape reaction, where the shrimp flexes its abdomen powerfully and quickly to propel itself at great speed through the water to escape danger. The regions on either side of the abdomen where the band-like plates end are termed the pleura. In Caridean shrimp the second pleura overlap the adjacent first and third pleura, whereas in prawns the pleura overlap sequentially. The abdomen terminates with the telson of the tail fan which bears the anus.

Abdomen

The pleopods are used to power swimming and for the incubation of embryos. The uropods are splayed, flanking the telson (together making up the tail fan), and are involved in steering during swimming and Cardioid escape reaction.
Conclusion

The order Decapoda consists of shrimps, crayfishes, lobsters, and crabs. The members of this group have ten legs and are distinguished from other crustaceans by a well-developed carapace that covers the head and thorax. This study records 11 species of crabs and 2 species of freshwater shrimps from Bhutan.

The decapod crustaceans of the western Bhutan study area are ecologically, recreationally and commercially important, but what I have observed on the reaction given by the Bhutanese people is very upsetting. They consider Decapoda species dirty, stinky and diseased spreading insects, but through the research and information I have collected through the literature, I found it to be a very important role playing species.

It appears that decapod crustaceans play a critical role in metabolizing and controlling the flow of energy in estuarine ecosystems. Decapods are preyed upon by a variety of predators from alligators to fishes. Depending on its intensity, predation is a factor in controlling population density, as well as structuring species assemblages within a habitat.

Decapods are also important predators themselves, consuming phytoplankton, benthic algae, and macro benthos (Coull and Bell, 1983).

While there is some information on the role of specific decapod species in aquatic systems, our understanding of decapod crustacean populations and communities is limited.

The main aim that I am going to fulfill by doing this research is to document and spread knowledge and information regarding the importance of Decapoda species so that we can preserve and conserve them from extinction.
References


Siddiqui M.Z. H. and Zafor, M. 2002. Crabs in the Chakaria Sundarban are of Bangladesh. The Journal of NOAMI.


West-Wood, 1836. Freshwater Crabs (Potamonids) in the collection of the southern regional station, zoological survey of India, Chennai.
