

## MORPHOLOGICAL STUDY OF FOUR GENERA OF BEETLES FROM DISTRICT BADIN, SINDH PAKISTAN

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#### Abstract:

The study Based on the extranal Morphology of each species. i.e Body coloration, elytra length shape, legs colour , antennal segments, pronotum size and color as well. And measurement of all body parameters considered as a mm. Present study was conducted as a Morphological Study of Four genera of Beetle from District Badin. A total of 932 speciemens was collected and sort out into 4 genera, 5 species and 3 families. i.e. Chrysomelidea Chrysolina graminis. (Linnaeus, 1758), Carabidea Anthia sexguttata sexguttata (Fabricus, 1775) and Carabus hortansis (Linneus, 1758) Scarabidea Melolontha hippocastine (Fabrics 1801) and Melolontha pictoricus(Megrela 1851). This study will identified accurate species of each genra from District Badin. C. gramins was the most abundant species (30% of the total collected individuals), followed by M. hippocastine (25%), M. pictroicus (20%), A. s. sexguttata (15%) and C. hortansis (10%). From this District is no more work on Coleoptera.

**Keywords:** Scarabidea, Chrysolina graminis, Beetles,Morphology.

#### INTRODUCTION:

Beetles belong to the Coleopteran order and it's about 400,000 species described throughout the world (Hammad 1992). These are based on Morphological appearance and traditional appearance on taxa. Types of beetles are very wide. It comes many shapes as well as colors and length may vary form o.4 mm to 80mm. Many Morphological traits maybe evaluated and used as tool contributing to understand the function of coleopterans in the environment e.g., longer body length and darker coloring related to a higher level of forest cover (Vandewalle et al. 2010). These are considered effect and response traits because insect size is linked to dispersion capacity and coloring to protect against predators and temperature maintenance (Talarico et al.200).

Insect diversity and abundance are associated with body size (Siemann et al. 1996). Body size influences the way organisms perceive the environment (Zinger et al. 2019). Insects significantly disperse with lower body sizes to escape predators during unfavorable circumstances (Talarico et al.2007). The response of beetles to disturbance or habitat structure is associated with the beetle's functional traits. Ground beetle with larger body

size, longer legs, larger eyes, longer antennae, and darker colors dominate the more forested landscapes (Vandewalle et al. 2010).

There is a dearth of knowledge on Coleopterans in Pakistan (Ahmed et al., 2017), notably in Sindh's Badin area. Thus, Purpose of present study research work is to know the identity of each species collected from district Badin because bad in is Costal line areas and beetles are present in it in maxium numbers. That's why our study is beneficial for local people. We easily recognize these species from there physical appearance.

## **MATERIAL AND METHODS:**

The Badin is a district in the Sindh province of Pakistan. Badin is the costal area and there humidity is increase that,s why beetles speciemns found in high numbers . district badin have a 5 taulkas and each taulkas have a different temperature that's the reason their morphological variation were occur .The study was carried out in the district of Badin, stretched over 6858 km<sup>2</sup> with 24° 39' 59.99" N and 69° 00' 0.00" E. Main crops grown in the area include sugarcane, cotton, rice, wheat, and sunflower. And having a big tress.

### **Collection protocol**

The collection of beetles was carried out by frequent visits to the targeted area in the morning (9:00-12:00 AM) and evening (3:00-6:00 PM) hours. To assess the beetle fauna distribution, the study area was divided into four regions: Matli, Tandobhago, Talhar, and Golachi. Each locality was sampled biweekly for beetles using different insect collection techniques (pitfall, light trap, and handpicking).

Collected samples were brought to the Advance Entomology Laboratory of the Department of Zoology at the University Of Sindh Jamshoro Pakistan. All specimens were kept in insect-poison bottles until they died. The dead beetles were pinned scientifically with the help of stainless entomological pins through the forepart of the right elytra and preserved in wooden insect boxes. Specimen Identification

Based on morphological traits, collected specimens were identified using available literature and also measurement of various body Parameters. Like length of antenna, length of pronotum, length of wings, length of legs and total body length. All identified specimens are preserved at the Advance Entomology Laboratory at the University of Sindh Jamshoro's Department of Zoology.

### **Specimen Description**

Morphological and taxonomic descriptions of the beetle specimens were prepared using existing literature; micrometry and photography of collected specimens were conducted using an Olympus SZX16 stereomicroscope fitted with a digital DP2-BSW (CCTV) camera.

### **Statistical analysis:**

Each species measured by minimum and Maximum size range, mean, and standard deviation of all Morphometric characters of five species were recorded. All Statistical analysis were calculated by using M.s Excel (2020).

## **RESULTS AND DISCUSSION**

A total of 932 specimens of beetles were collected from the four selected locations of Badin district. Five species belonging to four genera under three families were identified and described in this study. Through these characters we identified each species.

The Morphometric parameters of each species were calculated by mean with standard deviations. Which are shown in Table no 1, 2 and 3. Each tables are isolated by Families. Because each family have 2 species with different genre so some variation occurs in size, shape and length of antenna, length of pronotum, and total body length of each species is different from one another. Each species male and female have little bit difference in their size. These variation occurs on seasonal temperature changes. Or crops fertilizers. In table no 4. Showing the percentage of 3 families which is most dominated family and then Table no 5 showing the percentage of five species the most abundance species shows in this table.

### **A. *Anthia sexguttata sexguttata* (Fabricius, 1775)**

#### **Morphological features:**

The body Color of this species is black having a Six White spots in their body. Two spots on pronotum while four on elytra. Antenna are filiform in both Male and female. Color of antenna are black with white spurs. Pronotum is wedge shape in male while in female triangular type. Color of pronotum is black and White spots are present on both sides. Elytra are oval shape in both sexes. Coloration of elytra is black and four white spots are present in male as well as female. Legs are spiny and 5 tarsus segments are present in both male and female. Six abdominal segments in both sexes. Identify this species through their pronotum shape and size of species.

#### **Remarks:**

*Anthia sexguttata* species was closely related to *Cicindeline sexguttata*. It is six spotted beetles commonly called tiger beetle. Dube (1986) reported the Circadian rhythms in the compound eyes of the carabid beetle. Later Robert et al. (2009) reported this species from southern India. In 2010, Martin reared six spotted ground beetles. Aland et al. (2012) reported this species from India and Imran et al. (2016) from the Makran division of Pakistan. During the Kharif season, Madhukar et al. (2018) reported this species from the Bhandara district of Maharashtra, India. In our study, we have found this species in the Badin district of Sindh province, Pakistan.

## **B. *Carabus hortansis* (LINNAEUS 1758)**

### **Morphological features:**

Body color of this species is black. Antenna are filiform. Color of antenna is black. Pronotum is black color. In male and narrow while in female is wider. Elytra is black color with golden punctures in both sexes. Legs are spiny and having a 5, 5 tarsus. With black color. Identify this species through punctures which is present in elytra.

### **Remarks:**

This species closely related to *Calosoma chloroticum*. *C. hortansis* has small golden spots on body and generally called ground beetle (Carabidea). Firstly, in Europe, Turin (2003) reported this species. Later Lucija et al. (2004) worked on the taxonomy of Genus *Carabus* from Croatia. Hatteland and Hauge (2007) firstly reported this species from Norway. Then Zelazna et al. (2005) reported this species from Institute of Systematics and Evolution of Animals, Polish Academy of Science. Yarwood et al. (2021) revealed that body size of *C. hortansis* is indicative of movement capacity in both sexes. We found this species first time From District

## **C. *Melolontha hippocastani* (Fabricius, 1801)**

### **Morphological features:**

Body Colour of this species is Brown-red with white rough spures. Antenna are Lemellated shape. Colour of Antenna are brown and seven plates in male while in female have six plates. Pronotum is wider with concave shape colour is brown red. Elytra is brown colour with 4 Scattered parallel lines in both elytra with white spures. The pygidium are shorter and knobbed. Legs are spiny and hairy brown colour. Abdominal segments are six. The 1<sup>st</sup> to 4<sup>th</sup> segments is black. and last 2 segments are light brown. Identify this species through antennal segments and pygidium knobbed.

### **Remarks:**

This species closely related to (*Rhizotrogus majalis*). This specie have brown red in color, it is a major pest of forest and crops. Gavrilova (2010) he reported this species from Serbia. After that M. Svestka (2010) he observe the changes in the abundance of this species. Later in 2007 Martinek work on this species to manage content in food. Then Pernas et,al (2017) They observe the bacteria present in the forest cockchafer. And in 2020 Eligio he found this species from strawberry plant. Pedrazzini (2021) he observe this species on the development of SNP-Based tool for identification from Central Europe. we found this species from Badin district.

## **D. *Melolontha pictoricus* (Megerls, 1812)**

### **Morphological features:**

The body colour of this species is Black to red-brown. Antenna are Lemellated form. In both sexes male have seven leaves while female have six leaves. Pronotum are black colour. And brown red margin irregular pale hairy. Elytra is red-brown with four scattered

parallel ridges. Legs are spiny and black color. Pygidium are wider and rounded in both male and female.

### **Remarks**

This species closely related to *Melelontha Phyllophag*. Krell (1864) he work on this species from kraatz. After that P.AS.POPV (1960) he found this species from organization of Sofia. Later in (1999) Rey found this species from Greece. Then T.Giannoulis (2011) his work on the evolution of various species of melolontha. Then Trotus et;al (2013) found this species from Roman. We found this species from District Badin.

### **E. *Chrysoline gramains* (Linnaeus 1758)**

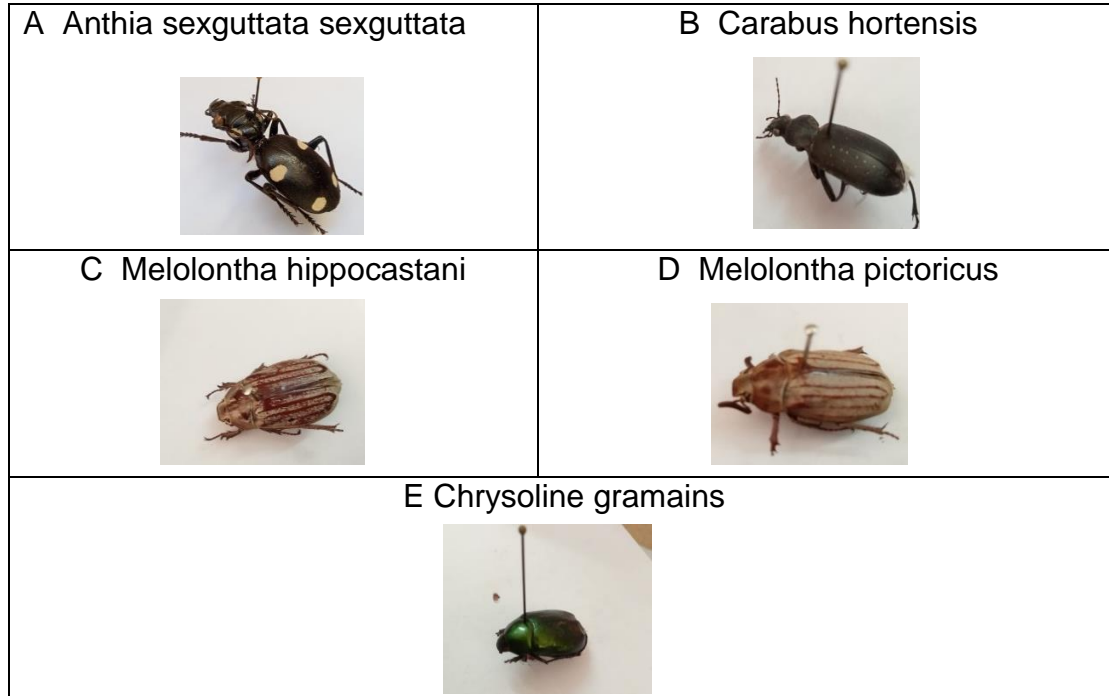
#### **Morphological features:**

Body colour of this species is Mattlic Green. Antenna are clubbed form. Colour is light brown. Pronotum is wider with concave shape. Matllic green colour in both sexes. Elytra colour is green having no any punctures or lines. Legs are spiny and colour is brown. Ventral side is full cover with brown hairs in both male and female. Abdominal segments are 5 visible with green colour. Identify of this species through size of male and female.

#### **Remarks:**

This species closely related to the *C. herbacea* because *C. harbacea* are almost same size and color. Chapmen in 2006 he reported this species from river bank of York. Then in 2007 Chapmen again worked out on land scape and fine scale movement of leaf beetle from UK. Later Michael Schmitt (2011) he reported distribution of leaf beetle in central Europe. Then in 2017 Julian Hodgson work on *Chrysoline graminis* species and sub species from Cambridge shire. After that in 2020 O,Bienkoski work on *Chrysoline* Taxonomic review.

There is no work in Pakistan and Sindh level. We have found this species from first time in District Badin lower Sindh Pakistan.



**Figure 1. Beetles collected and identified from different localities of the district Badin.**

**Table 1: Morphological Parameter of family Carabidea.**

Family Carabidea Mean± SD(mm)				
Body parameters	<i>Anthia sexguttata sexguttata</i>		<i>Carabus hortensis</i>	
	Female (05)	Male(05)	Female (05)	Male(05)
Length of Antenna	16.20 ± 0.389	15.70±0.364	6.14±0.191	5.631±0.397
Length of head	14.49±0.2011	14.65±0.263	6.053±0.023	6.077±0.026
Length of Pronotum	6.46 ± 0.10	6.23 ±0.08	4.46± 0.048	4.433±0.593
Length of abdomen	23.07±0.08	22.90 ± 0.95	16.01±0.154	15.99±0.021
Total body length	41.81 ±0.11	40.92± 1.11	22.27 ±3.89	20.35± 1.95

**Table No 2: Body parameter of family Scarabidea.**

Family Scarabidea Mean± SD(mm)				
Body parameters	<i>Melolontha hippocastani</i>		<i>Melolontha pictoricus</i>	
	Female(05)	Male(05)	Female (05)	Male(05)
Length of Antenna	5.02±0.024	5.04 ± 0.23	5.80±0.021	5.70±0.023
Length of head	4.09±0.052	4.08±0.028	6.20±0.092	6.17±0.088
Length of Pronotum	5.65±0.431	5.70±0.496	4.08± 0.24	4.06±0.26
Length of abdomen	18.70±2.49	18.73±2.57	15.82±2.19	15.80±2.08
Total body length	29.42±2.09	28.92±1.95	22.42±2.35	24.02±1.95

**Table No 3: Body Parameter of Family Chrysomiladea.**

Family Chysomiledea Mean± SD(mm)		
Body parameters	Chrysoline gramains	
	Female (05)	Male(05)
Length of Antenna	3.77 ±0.137	3.68 ± 0.15
Length of head	6.17 ± 0.11	6.10 ±0.10
Lengthof abdomen	14.82± 0.82	14.62±0.84
Total body length	18.33 ±2.83	18.53± 2.84

**Table no 4: percentage of various families of beetles from District Badin.**

s. no	Families	Total no. of individual	Percentage%
1.	Scarabidea	429	46.03%
2.	Carabidea	235	25.21%
3.	Chrysomelidea	268	28.75%
	Total	932	100

**Table no 5: precentage of various species of beetles from Distict Badin.**

s.no	Total no of Species	Total no. of individual	Percentage%
1.	Melelontha hippocastine	236	25.32%
2.	Melelontha pictorius	193	20.70%
3.	Anthia sexguttata sexguttata	136	14.59%
4.	Carabus hortansis	99	10.62%
5.	Chrysoline gramins	268	28.75%

### Conclusion:

This Study was based on Morphological study of four genra of Beetle. A total collected specimens was 932 from District Badin Lower Sindh Pakistan. 4 genra, 5 species and 3 families were sort out during the year 2021. All the Specimens were collected from different methods like pitfall trap, light traps and hand picking to workout morphological features of all species and measurement of each species through M.s excel and calculated mean with standard deviation. Our study are helpful to measure of all species because of their habitat their behaviour. All families are different from each other their Remarks. Difference of all species in male and female size of antenna, pronotum and total body length. However the most abundance species is Chrysoline gramins 30% of all individual. Collected speciemens were observed first time from District Badin Pakistan.

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