The Process of Variation That Goes on in Common Species

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ABSTRACT

The work is devoted to the study of the faunal spectrum of terrestrial mollusks of Uzbekistan and adjacent territories.

The diversity of land mollusk species of Central Asia and the large number of endemic species sharply differs from other regions, and the process of formation of species continues intensively even now. It should be emphasized that variability is important in the process of formation of species.

In general, we can find two different types of variability in the fauna of Central Asia. First of all, phenotypic variability is the manifestation of adaptation of molluscs to certain conditions to one degree or another.

Keywords: malacofauna, mountain ranges, faunal spectrum, genus, area, Uzbekistan, timing

***Pseudonapaeus albiplicatus* Variability of conchological signs.**

The conchological characteristics of the Pseudonapaeus albiplicatus species are extremely variable, living in biotopes not far from each other, their conchological characteristics can change dramatically. For example, the conchological characteristics of the Ps. albiplicatus species distributed in 3 biotopes not far from the Amir Temur cave in the Sangzor river valley in the Mirzachol natural geographical region have the following variability:

Biotope 1. Shells of molluscs (Fig. 1.A) found on the southern slopes of the hills on the left bank of the Sangzor River and found under kharsans have oval-cylindrical structure and thick shell walls. Shell whorls 5-5.5 convex, suture deep. The last whorl is 1.5 times higher than all the other whorls, and the shell gradually rises up in the mouth. Shell colored dirty discharge. The shell sculpture is composed of coarse wrinkles. The mouth of the shell is wide oval, the junction is not close to each other. The edges are slightly indented, the labial tumor is not well developed.

A B C

Figure 1. Variation of Pseudonapaeus albiplicatus shell: A- 1 biotope; B- 2 biotope; V-3 biotope.

Biotope 2. Shells of molluscs found under piles of stones on the northern slopes of the hills on the right bank of the Sangzor River (Fig. 1.B) are oval-conical, the shell walls are of medium thickness. The rolls are 6-6.5, slightly bulging. The height of the last shell is equal to the height of the rest of the shell and is not raised in the mouth. The upper 3 whorls of the shell are light brown, the base of the rest is light brown, and the coarse wrinkles are dirty white. That is why the shell discharge has a dirty appearance. The mouth of the shell is slightly curved, narrowly oval, its junction is moderately close and joined by a thin convexity. The edge of the shell is impenetrable, and the labial process is well developed.

3rd biotope. Shells of molluscs (Fig. 1.C) found in the lower part of the stems of sparsely scattered shrubs and herbaceous plants on the northern slope of the hill are conical-cylindrical, with 8 coils and are even. The height of the last whorl of the shell is 1.3 times less than the height of the rest of the whorls, and is suddenly raised upwards in the mouth. The base of the shell color is light brown, the rough lines of the sculpture are flowing. The sculpture consists of rough radial lines. The mouth of the shell is oval-curved, connected by a rough convexity near the junction, the edges are slightly sharpened.

In the conchological characteristics of Ps. albiplicatus species by biotopes, in addition to qualitative variability (shell shape, color, sculpture, mouth structure), quantitative variability (shell height, large diameter, shell mouth and last shell heights) is also evident (Table 1).

Table 1

Variation of conchological characters of Pseudonapaeus albiplicatus in different biotopes

Statistical indicator	Hsh	Ld	Hshm	Hlwsh
1st biotope				
$\overline{X}$ ±	12,46±0,14	4,68±0,04	4,71±0,10	7,71±0,03
CV,%	3,3	2,13	6,13	1,12
r^2	0,045	0,043	0,01	0,01
2nd biotope				
$\overline{X}$ ±	12,76±0,24	4,48±0,04	4,39±0,18	6,69±0,07
CV,%	5,28	2,59	3,46	2,82
r^2	0,06	0,01	0,01	0,07
3rd biotope				
$\overline{X}$ ±	14,81±0,08	4,11±0,03	3,42±0,03	6,12±0,09
CV,%	1,45	2,23	2,86	4,11
r^2	0,34	0,04	0,2	0,28
4th biotope				
$\overline{X}$ ±	11,7±0,08	4,34±0,03	3,78±0,04	6,79±0,03
CV,%	2,03	1,07	3,01	1,11
r^2	0,13	0,08	0,07	0,02
In the section of biotopes				
$\overline{X}$	12,93 ±0,14	4,40±0,04	4,07±0,09	6,82±0,07
CV,%	2,19	2,0	3,86	2,79
r^2	0,14	0,04	0,07	0,10

Note: Arithmetic average indicator ($\overline{X}$), coefficient of variation (CV), determination (r^2).

According to the analysis of the table, all conchological signs are less variable, that is, equal to 1-6.31%. However, the variability of conchological characters varies depending on the habitat. For example, in biotope 1, the variability of the height of shell mouth (Hshm) is high, equal to 6.31%. The variability of this conchological sign depends on external factors.

The height of shell (Hsh) and large diameter (Ld) are strongly determined, and their variability (Fig. 2) changes depending on other characters. The height of the last whorl of the shell (Hlwsh) is the least variable and least determined compared to other conchological signs.

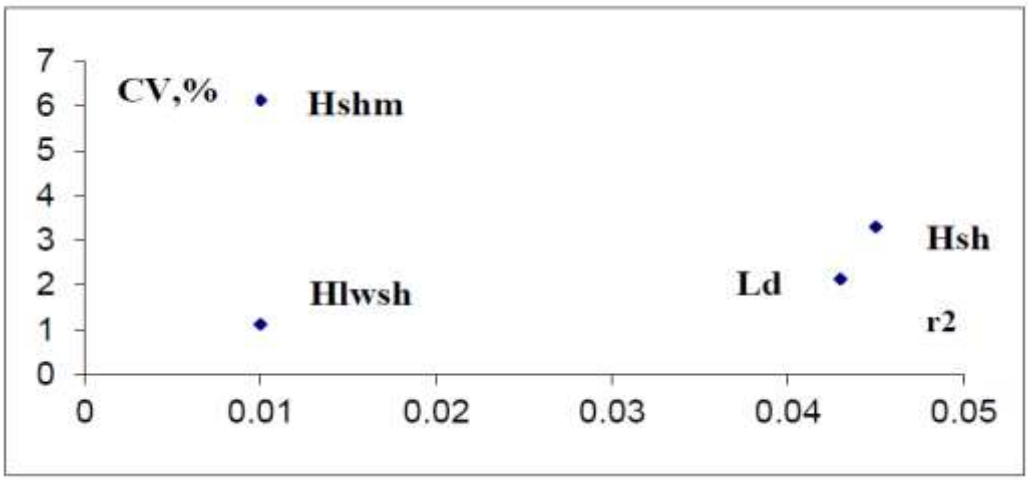

Figure 2. Variability (cv,%) and determination (r2) of conchological characteristics of molluscs living in biotope 1.

Variability of conchological characteristics of molluscs living in biotope 2 (Fig. 3). Compared to biotope 1, the height of the shell is less variable and less determined, and the height of the shell mouth is highly variable.

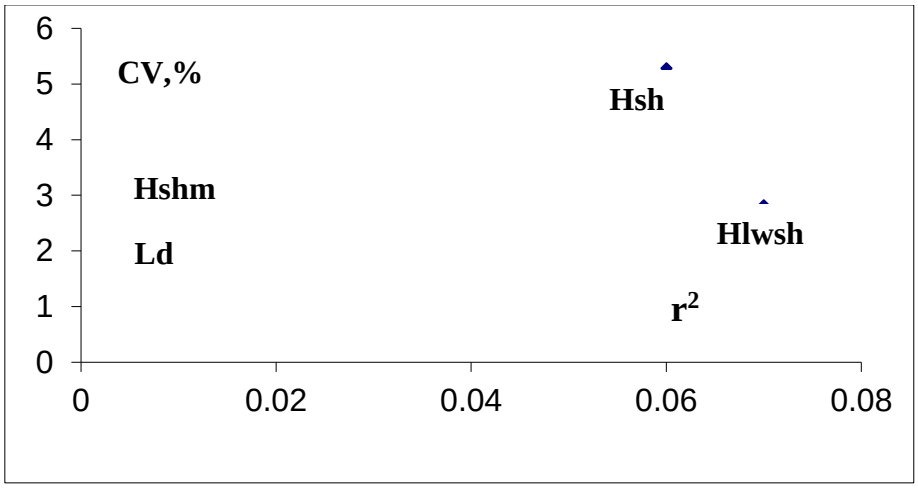

Figure 3. Variability (cv,%) and determination (r2) of conchological characteristics of molluscs living in biotope 2.

The variability of conchological characteristics in biotope 3 molluscs (Fig. 4) was more pronounced in the height of the shell and the height of the end of the shell. According to the results of the research, this variability was

realized mostly under the influence of external factors.

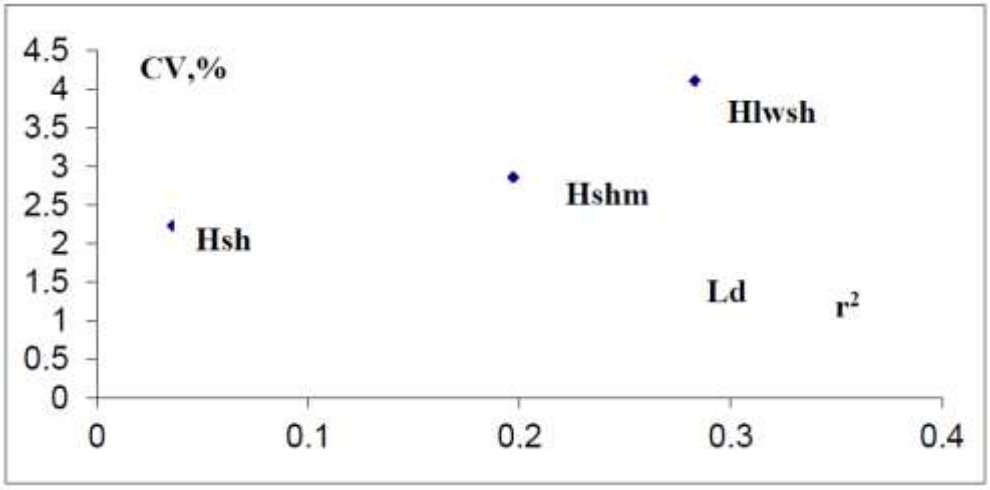

Figure 4. Variability (cv,%) and determination (r2) of conchological characteristics of molluscs living in biotope 3.

In biotope 4 molluscs, the height of the shell mouth is variable compared to other characters, while the height of the shell is strongly determined. The large diameter of the shell is less variable and less determined. (Figure 5)

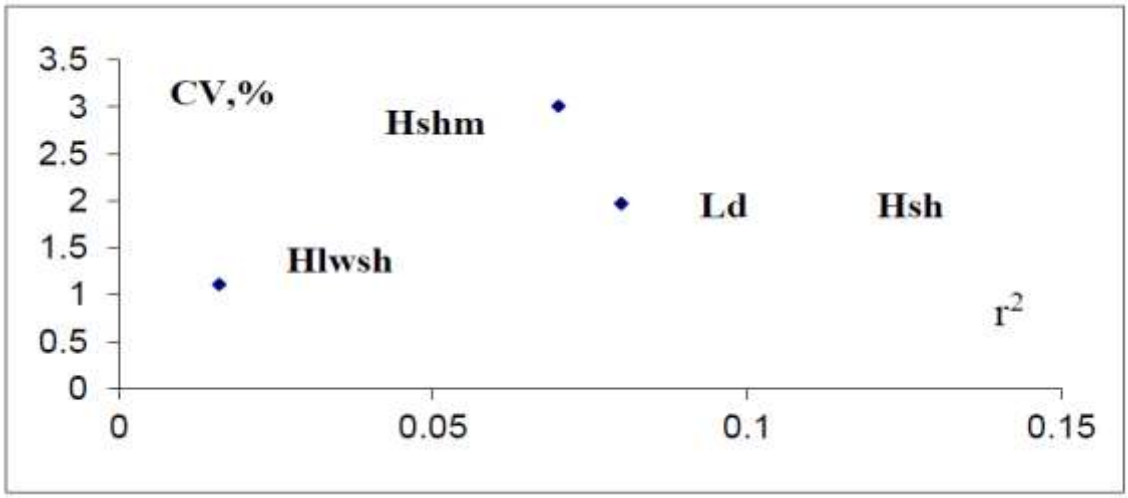

Figure 5. Variability (cv,%) and determination (r2) of conchological characteristics of molluscs living in biotope 4.

The analysis of statistical data showed that the nature of variability of conchological signs of molluscs mainly depends on external factors, and in each biotope conchological signs showed variability at a level specific to this biotope. In all studied biotopes, the height of the shell mouth showed a stronger variability compared to other conchological characters, and the shell height showed a strong deterministic feature.

We can observe population and geographical variation in conchological and anatomical features of *Pseudonapaeus albiplicatus* species.

In order to compare the variability of the reproductive organs of the Ps. albiplicatus species distributed in the Mirzachol natural geographical area, the molluscs distributed in Zarafshan and Chotkal mountains were also studied and they have the following variability.

Genital organ of the Ps. albiplicatus species distributed in the territory of the Kitab Geological Reserve of the Zarafshan mountain range has the following structure (Fig. 6, A, B).

The white gland is flat, the lower part of the vagina is 1.5 times shorter than the upper part.

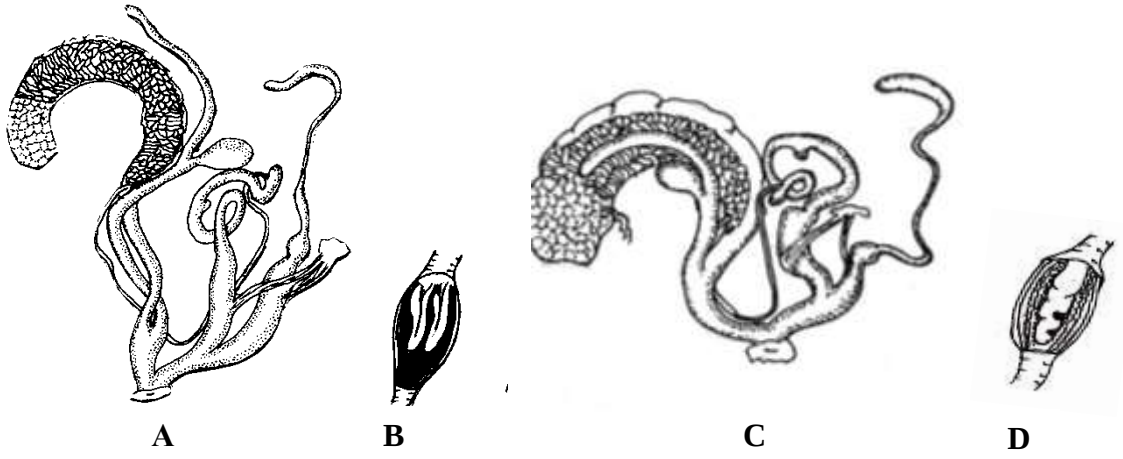

Figure 6. Genital variability of Pseudonapaeus albiplicatus. A, B - Kitab geological reserve (Zarafshan mountain range) C,D - Bakhmal village surroundings (Turkistan mountain range).

The seed path is slightly displaced from the tip of the epiphallus, due to which a short "beech" similar to the tip of a whip is formed. A well-developed cecum is located between the epiphallus. The penis has a cylindrical structure, inside which there are two V-shaped folds.

All parts of the penile appendix are well developed. Retractor of the genital organ approached the diaphragm to different degrees, one of its branches was attached to the middle of A1, and the other to the middle of the penis.

The seed receptor is well developed and always has its own short seed path. The diverticulum is well developed, and sometimes reaches the protein gland.

The genital structure of molluscs found around the village of Bakhmalsoy, Turkestan mountain range, has the following variability compared to the previous population (Fig. 6, C,D). The protein gland was cut in the apical position; lower and upper vagina have the same length; penis is short; there is one transverse fold inside the penis; one branch of the sexual retractor connects to the upper part of A1, and the other to the lower part of the penis.

The structure of the genital organ of the molluscs living in the Dokantisoy gorge of the Chotkal mountain range has the following variability compared to the Zarafshan and Turkestan mountain ranges (Fig. 7, A, B): epiphallus is 4 times longer than the cylindrical penis; there is one V-shaped fold inside the penis; the seed path is extremely short; diverticula does not reach the protein gland.

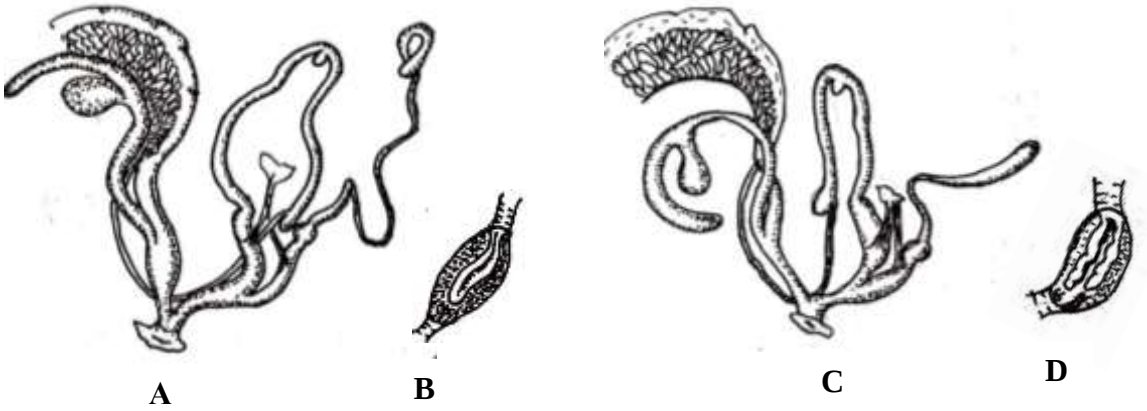

Figure 7. Genital variability of Pseudonapaeus albiplicatus. A, B – Dokantisoy gorge; C, D - Bildirsoy gorge (Chotkal mountain range).

The reproductive organ of molluscs living in the Chotkal mountain range, Bildirsoy gorge (Fig. 7, C, D) has the following variability compared to other populations. The lower vagina is longer than the upper one; A4 of the penial appendage is short; Inside the penis there are two transverse folds.

As a result of the research, the characteristics of the genital organ of the Ps.albiplicatus species were found to be qualitatively variable as well as quantitatively (Table 2).

Table 2

Variation (in mm) of genital characters of the species Ps.albiplicatus

Population	N	Genital parameters (мм)									Height of the shell (мм)
		A1+ A2	A3	A4	A5	P	EP	LPV	UPV	D	
Kitab geological reserve (Zarafshan mountain range)	15	2	1.2	4.5	3	3	4	2.3	1.5	4	13
Surroundings of Bakhmalsoy village (Turkistan mountain range)	15	3	1.3	4	3	3.5	4.5	1.2	3	5	12
Dukantisoy gorge (Chotkol mountain range)	15	2.5	1	5	2.5	3	8	2.1	1.7	3	11
Bildirsoy (Chotkol mountain range)	15	2	1	2.5	2.5	2.7	6	2.2	4	4	10

From the data in Table 2, it can be seen that the variability of some character dimensions of Ps.albiplicatus genital organ is different in different populations. For example, the length of the A4 part of the penial appendix is 4 mm in molluscs distributed in the Turkestan mountain range, while in the Chotkal mountain range this indicator is equal to 2.5 mm.

According to the results of the conducted research, it was found that the variability of some signs of the genital organ is correlatively related to the variability of the shell. This variability is mainly characteristic of the parts of the Penial appendix.

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