DOKUZ EYLUL UNIVERSITY

GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES

MORPHOLOGICAL AND TAXONOMICAL INVESTIGATION ON *BUFO VIRIDIS (Anura: Bufonidae)* IN TURKEY

A Dissertation Presented to the
Graduate School of Natural and Applied Sciences
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by

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IZMIR

SUMMARY

In this study, the distribution and taxonomic status of *B. viridis* that lives in our country have been investigated.

495 samples have been examined from 7 different regions with the opinion of the potential isolation, biometric measures have been taken and the comparison of the indexes and ratio among regions have been made. It has been seen that there is not striking taxonomic difference in the end of the statistical analyses that were made by means of computers.

In addition to this the feading biology of *B. viridis* has been searched and it has been found that it can be useful for biological fight.

The morphological differences that is seen in larva during metamorphosis period from embryo till the end of the development of larva have been examined at certain intervals and larval period of this species has also been investigated.

ÖZET

Bu çalışmada Yurdumuz'da yaşamakta olan *Bufo viridis* türünün yayılışı ve taksonomik durumu incelenmiştir.

İzolasyon olabileceği düşünülerek ayrılan 7 bölgeden toplanan 495 örnek incelenmiş, biometrik ölçümler alınarak ortaya çıkan indekslerin ve oranların bölgeler arasında karşılaştırılmaları yapılmıştır. Bilgisayardan faydalanılarak yapılan istatistiki analizler sucunda taksonomik bakımdan önem kaydeden bir fark olmadığı görülmüştür.

Aynı zamanda *B. viridis* türünün beslenme biyolojisi incelenerek biyolojik mücadelede faydalı olabileceği kanaati uyanmıştır.

Embriyodan, larva gelişiminin sonuna kadar olan metamorfoz süresi boyunca larvada görülen morfolojik değişimler de belirli aralıklarla takip edilerek, türün larval dönemi hakkında bilgiler elde edilmiştir.

6. Acknowledgements

I express my gratitudes to my thesis director Doç. Dr. İrfan Yılmaz who recommended me this issue and who spend his valuable time to help.I also give my thanks to Semih Üçüncü who helped for photographing the development of embryo and larvae from E.Ü.Faculty of Science ,Biology Department,and Dr.Vedat Pazarlıoğlu who helped to analyze the indexes of biometric measurements in computer from Dokuz Eylül University,Processing Center.

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Introduction

When the articles about *Bufo viridis*, which has an extensive field in every region of Turkey investigated, we see that the research in this area is very dispersed.

B. viridis has an extensive spreading from the south and middle parts of Europe and the North Africa to the Middle East in the Palearctic region. *B. viridis*, which is polytypic, is seen from Gotland Islands in Sweden to East France and Pyrenees. It has an extensive spread from Mongolia, Tibet and Himalaya in the East (Mertens - Wermuth 1960, Özeti - Yılmaz 1994, Fuhn 1960). However, it is determined that these species are rare in Gotland Islands in Sweden. In this extensive fields the findings of great amount of investigators can be summerized like this:

It is determined that in the researches of ten herpetologists in Kafkas: Erivan, Tiflis, Sotschi, Passanauri, Swartnoz - show that the samples are the some with the ones in the central Europe between the years 1965-1975. But samples from Araks, Armenia resemble to the subspecies, *Bufo viridis arabicus.* (Bischoff - Wolf 1976).

It is stated that these species live in sandy and dry deserts as a typical step animal in South - West Syria (Kinzelbach - Kasparek 1992).

B. viridis is the most common toad species in Iran. It has a wide spread of field. According to color pattern variations and to some biometric measures a lot of subspecies are seen in the country excluding South - East Nevertheless, the validity of these are being arqued (Eiselt - Schmidtler 1973).

At the same time this species lives together with *Bufo arabicus* as sympatric in Arabian Peninsula (Balletto - Cherchi - Gasperetti 1985).

The samples of *Bufo regularis* whose type locality is Egypt in early times are now considered as *B. viridis* (Werner 1987). They are collected from Israel and Jordan.

Researchers working on the *B. viridis* in Cyprus, state that the subspecies the *B. v. arabicus* are mostly seen in the Middle East (Flindt - Hemmer 1968). In addition to this, species found in Arabia is called *B.arabicus*. It is emphasized that the color - pattern variation of the species in Cyprus are more common, and any kind of nomenclatur variation is avoided (Böhme - Wiedl 1994)

When we examine the results of the investigations on the *B. viridis* in Turkey which is the middle of this extensive spread, we see that *B. viridis* is found in every part of Anatolia and Thrace.

The first investigations in Turkey were conducted with 3 juvenils (Vosseler), 4 adults (Herzog) samples from Kaş, and 2 adults samples from Afyon (Vosseler) later on (Werner 1905) from Elbistan (Boulenger), Amasya, İzmir, Trabzon (Boettger), Ankara (Escherich), Efes, Aydın, Alaşehir, Manisa (Werner), Taurus Mountain, Bolkar Mountain, Tarsus (Venzmer 1922), Adana, Gaziantep, Malatya (Bird 1936) are added to the previous samples.

It is stated that samples gathered from Hatay (Amik Plato) in Turkey and from Iran and Iraq (Isfahan and Amara - Bağdat) show only a slight difference from the samples in Europe (Schmidt 1939)

It is informed that *B. viridis* is found in every region of Turkey, excluding Thrace, and in addition to previous materials, there are samples gathered from Ankara, Kastamonu, Niğde, Adana, Antalya, Istanbul, Urfa, Tatvan, Uludâğ (Bodenheimer 1944).

The distribution of *B. viridis* is determined with the help of samples collected from Ahlat, Nemrut, Adilcevaz near Bitlis - Van in the East Anatolia (Başoğlu - Helmich 1970). Additionally, samples from Alanya, Hatay, Hassa, Birecik, Silvan, Erzurum and Kars have been collected (Clark 1973).

It is pointed out that *B.v. arabicus* lives in the southern and western parts of Van lake in the East Anatolia (Schmidler - Schmidler 1969). Also localities from Iran and Iraq are shown. In the same research, it is stated that, for *B.v. arabicus* besides the dorsal - pattern shapes as a distinctive feature, some of the anatomic pecularities can be used.

According to the records, the toads in Turkey are, subspecies *B.v. viridis* and, Adana Region the subspecies *B.v. arabicus* lives (Flint - Hemmer 1968).

A great deal of differences are observed in color - pattern types of *B. viridis* gathered from different localities in Turkey. Thus, according to the results of electrophoresis studies, there are differences in populations in terms of globulin fractions (Flindt - Hemmer - Jaeger 1968).

Yılmaz, (1984) having done biometric measures in morphologic characters of samples gathered from Edirne, Kırklareli, Havza, Uzunköprü, Keşan Enez, Lüleburgaz, Çanakkale, Tekirdağ, Çorlu, Silivri and Küçükçekmece in Thrace, stated that the samples gathered from Borçka, Rize, Trabzon, Maçka, Akçaabat, Aksu (Giresun), Terme, Asmapınar Village (Gerze - Alaçam), Dranas, Düzce, Adapazarı and Izmit didn't show a great difference from the samples of Thrace (Yılmaz 1989). It is also stated that samples from Middle Blacksea remains their complexity in terms of color - pattern up to now (Baran - Yılmaz -Kete - Kumlutaş - Durmuş 1992).

The afore mentioned species has been found in islands such as Büyükada, Karaada (Bodrum) between Izmir and Bodrum, Yassıada (Ildır Village - Çeşme) (Baran 1984).

As it is seen in the records up to now information about the relation between biometric measurements of morphological characters and regular sample recordings and taxonomic relations is not sufficient except the comparison of *B. viridis* between Blacksea - Thrace in Turkey (Yılmaz - Uğurtaş 1990) and İzmir - Adana (Kete 1992). So the material that will be collected from the places where no sample is gathered, should be measured together with the samples collected beforehand and their morphological characters should be measured within the rational establishment.

Thus, the ratios and the graphics will be examined and by comparing these with the forms existing in the middle and Southern Europe, Balcans, Iran and Arabia, their systematic differences, if there are, will be established.

Additionally, by examining the stomach contents of samples collected from all parts of Turkey, It's aimed to expand the knowledge about feeding biology and it is thought that *B. viridis* importance will increase.

Thus, in Turkey which has got different climate conditions, we will try to complete the missing information up to now about the researches of *B. viridis*, it's biological - ecological conditions, it's reproduction period and the development of the larva.

2- MATERIAL AND METHOD

Bufo viridis which is a temporary and continental species, lives by hiding itself in the hollows and under the rocks in daytime for reproduction; they live in water and waterside during the period of spawning, other than reproduction period, they exist in all biotops; moist and sandy places, in cities where people live, at times when crowd and noise lessens.

Adults samples gathered from fields are killed in the killing jar for biometric measurements to be done. Later on by infecting 5% formal, it is kept in shadow between alcoholled cotton for 2 days, having given shape on the aliminium plate, it is now available for the measurements. Two days later, they are taken out of the cotton and kept in jars containing 70% alcohol. Some of the samples that are caught on the fields at nights are directly examined and their stomach contents are taken out and kept for examining the feeding biology.

To be able to compare different localities, variants of morphological characters are measured (Figure 1) whole measuring publications of Terenjev - Chernov (1965), Yılmaz (1984), Yılmaz (1989), Eiselt - Schmidtler (1973), Gasperetti - Cherchi - Balletto (1985), Kete (1992) and Yılmaz - Uğurtaş (1990) are benefited from as main sources.

In the measurements of morphological charecters of samples, a compass which is 0,05 mm sensitive and equipped with an indicator is used, then these characteristics, pecularities, properties are measured with each other. In the comparison of different populations coefficient of difference values are calculated (Mayr 1969).

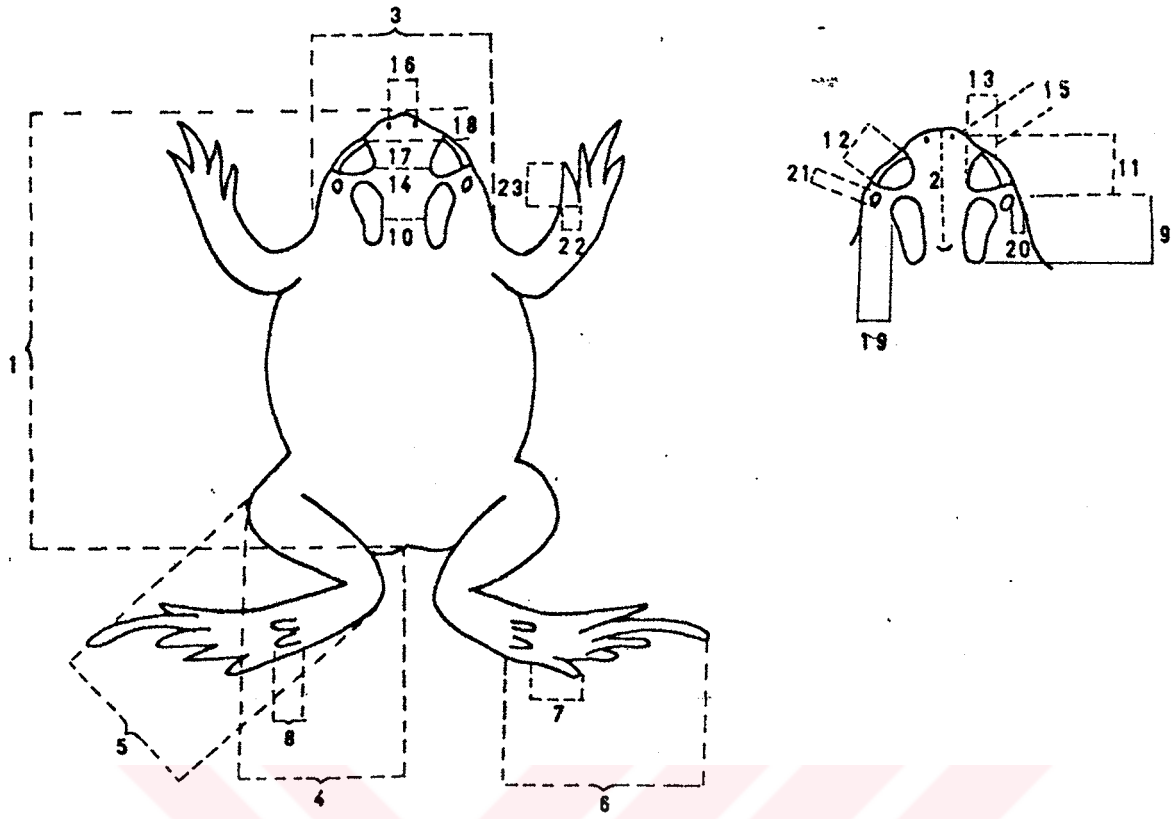


Figure : 1The Biometrical Measurements of *Bufo viridis*

1. Length of head and body.
2. Length of head.
3. With of head.
4. Length of femur.
5. Length of tibia.
6. Length of foot.
7. Length of first finger of foot.
8. Length of finger metatarsal tubercle.
9. Length of parotoid lard.
10. Distance between parotoids gland.
11. Distance between from nostril opening to parotoid pland.
12. Length of upper eye - lid.
13. Width of upper eye - lid.
14. İnterorbital space.
15. Distance between from nostril opening to front eye.
16. Distance of inter dapel.
17. Widht of rostrum.
18. Lenght of rostrum.
19. Parotoid lower edge interdental.
20. Distance between mouth and lover edge of tympanum.
21. Vertical diameter of tympanum.
22. Width of first hand finger.
23. Length of first hand finger.

2.1. MATERIAL LIST

Samples examined in this article : n = 495, 160 ♂♂, 335 ♀♀

1. İstanbul	BEF	1/1993	: 4 ♀♀,	1 ♂	,15.08.1993
2. Tekirdağ	BEF	2/1993	: 3 ♀♀,	1 ♂	,13.08.1993
3. Gelibolu	BEF	3/1993	: 1 ♀		,24.09.1993
4. Eceabat	BEF	4/1993	: 1 ♀		,13.08.1993
5. Lüleburgaz	BEF	5/1991	: 1 ♀,	7 ♂♂	,02.05.1991
6. Enez	BEF	6/1990	: 2 ♀♀		,26.06.1990
7. Karamürsel	ZDEU	68/1964	: 2 ♀♀,	3 ♂♂	,03.10.1964
8. Adapazarı	BEF	7/1989	: 1 ♀		,09.05.1989
9. Bolu	BEF	8/1989	: 8 ♀♀,	1 ♂	,21.05.1989
	BEF	9/1989	: 1 ♀,	6 ♂♂	,22.5.1989
	BEF	10/1989	: 1 ♀,	1 ♂	,22.05.1989
	BEF	11/1989	: 1 ♀		,20.05.1989
	ZDEU	68/1991	: 2 ♀♀		,24.08.1991
10.Bartın	BEF	12/1989	:	1 ♂	,25.05.1989
11.Kastamonu	ZDEU	216/1975	: 1 ♀	1 ♂	,27.07.1975
12." Cide	BEF	13/1990	: 14 ♀♀		,28.07.1990
13." Dranas	BEF	14/1989	: 3 ♀♀		,17.09.1988
14.Amasya	BEF	15/1989	: 12 ♀♀		,02.07.1989
15.Samsun	BEF	16/1989	: 1 ♀	14 ♂♂	,30.06.1989
16.Tokat	BEF	17/1994	: 2 ♀♀	2 ♂♂	,29.06.1994
17.Gümüşhane	BEF	18/1994	: 4 ♀♀		,03.05.1994
"	ZDEU	350/1977	: 1 ♀	1 ♂	,05.09.1977
18.Bayburt	BEF	19/1990	: 2 ♀♀		,10.09.1990
19.Artvin	ZDEU	92/1974	: 2 ♀♀		,12.08.1974
	ZDEU	44/1975	: 1 ♀	1 ♂	,10.08.1975

20.Çanakkale	BEF	20/1993	:	5 ♀♀		,13.08.1993
21.Bursa	BEF	21/1993	:	7 ♀♀	5 ♂♂	,21.08.1993
22.Edremit	BEF	22/1993	:	7 ♀♀	1 ♂	,12.08.1993
23.Kütahya	BEF	23/1993	:	4 ♀♀	4 ♂♂	,22.10.1993
24.Eskişehir	BEF	24/1993	:	12 ♀♀	5 ♂♂	,20/08/1993
25.Afyon	BEF	25/1993	:	1 ♀		,03.10.1993
	BEF	26/1993	:	1 ♀		,23.10.1993
26.Uşak	BEF	27/1991	:	4 ♀♀		,29.09.1991
	BEF	28/1993	:	2 ♀♀		,18.08.1993
	BEF	29/1993	:	1 ♀	2 ♂♂	,30.10.1993
27.Manisa	BEF	30/1993	:	5 ♀♀	2 ♂♂	,11.06.1993
	BEF	31/1994	:	1 ♀		,26.06.1994
28.İzmir	BEF	32/1991	:	2 ♀♀	1 ♂	,17.08.1991
	BEF	33/1994	:		2 ♂♂	,29.04.1994
	BEF	34/1994	:		1 ♂	,13.05.1994
	BEF	35/1994	:	2 ♀♀		,14.04.1994
	BEF	36/1994	:	5 ♀♀	4 ♂♂	,10.08.1994
29.Nazilli	BEF	37/1991	:	7 ♀♀	5 ♂♂	,23.03.1991
30.Denizli	ZDEU	4/1978	:	1 ♀		,15.03.1978
	BEF	38/1992	:		1 ♂	,03.04.1992
31.Isparta	BEF	39/1990	:	10 ♀♀		,19.07.1990
	BEF	40/1992	:	2 ♀♀	5 ♂♂	,25.05.1992
32.Muğla	ZDEU	34/1976	:	4 ♀♀		,17.04.1976
	ZDEU	10/1984	:	5 ♀♀		,24.02.1984
	ZDEU	62/1984	:	3 ♀♀		,09.04.1984
	ZDEU	24/1964	:	2 ♀♀		,25.01.1964
	ZDEU	06/1985	:	4 ♀♀	5 ♂♂	,12.02.1985
33.Konya (Karapınar)	ZDEU	151/1976	:	5 ♀♀		,23.05.1976

34.Akşehir	BEF	41/1990	:	5 ♀		,18.07.1990
35.Aksaray	BEF	42/1994	:	7 ♀	2 ♂	,27.05.1994
36.Ankara	BEF	43/1993	:	7 ♀	5 ♂	,27.08.1993
37.Kırıkkale	BEF	44/1993	:	4 ♀	2 ♂	,28.08.1993
38.Yozgat	BEF	45/1993	:	3 ♀	1 ♂	,29.08.1993
39.Çorum	BEF	46/1989	:	1 ♀		,03.07.1989
	BEF	47/1994	:	9 ♀	3 ♂	,30.06.1994
40.Ürgüp	BEF	48/1992	:	1 ♀	1 ♂	,07.04.1992
	BEF	49/1993	:	1 ♀		,02.06.1993
41.Niğde	ZDEU	32/1981	:	2 ♀		,09.05.1981
42.Kayseri	ZDEU	37/1981	:	1 ♀		,10.05.1981
	ZDEU	183/1982	:	2 ♀		,28.08.1982
	ZDEU	171/1982	:	1 ♀	1 ♂	,28.04.1982
	BEF	50/1994	:	5 ♀	5 ♂	,27.06.1994
43.Malatya	ZDEU	127/1977	:	1 ♀		,05.05.1977
	BEF	51/1994	:	4 ♀		,20.09.1994
44.Elazığ	BEF	52/1993	:	4 ♀		,28.08.1994
45.Erzincan	BEF	53/1993	:	2 ♀		,22.07.1993
46.Sivas	BEF	54/1994	:	9 ♀	3 ♂	,28.06.1994
47.Bitlis (Ahlat)	ZDEU	86/1957	:		2 ♂	,08.06.1957
"	ZDEU	25/1957	:	1 ♀	1 ♂	,09.06.1957
(Nemrut)	ZDEU	26/1957	:	1 ♀	2 ♂	,13.06.1957
48.Van	ZDEU	114/1977	:	2 ♀		,03.05.1977
49.Kars	BEF	55/1990	:	1 ♀		,09.09.1990
50.Ardahan	ZDEU	254/1975	:	3 ♀		,16.08.1975
	ZDEU	255/1975	:		2 ♂	,17.08.1975
51.Erzurum	BEF	56/1990	:	11 ♀	2 ♂	,08.09.1990

52.Iğdır	ZDEU	366/1977	:	2 ♀♀		,09.09.1977
53.Antalya						
(Manavgat)	ZDEU	12/1977	:	2 ♀♀		,09.02.1977
(Akseki)	ZDEU	67/1976	:	1 ♀	5 ♂♂	,24.04.1976
(Gökdere)	ZDEU	3/1976	:	1 ♀		,07.02.1976
(Küçükgöl)	ZDEU	3/1971	:		1 ♂	,13.02.1971
54.Kaş	ZDEU	30/1985	:	2 ♀♀	4 ♂♂	,08.03.198
(Patara)	BEF	57/1993	:	8 ♀♀		,25.07.1993
55.Mersin						
(Anamur)	ZDEU	5/1977	:	5 ♀♀	2 ♂♂	,06.02.1977
(Mezitli)	ZDEU	17/1968	:		3 ♂♂	,21.01.1968
	BEF	58/1989	:	1 ♀	1 ♂	,02.07.1989
	BEF	59/1990	:	8 ♀♀		,05.09.1990
	BEF	60/1993	:	5 ♀♀		,12.07.1993
56.Adana	BEF	61/1993	:	2 ♀♀	1 ♂	,22.03.1993
(Yumurtalık)	ZDEU	141/1976	:	9 ♀♀		,22.05.1976
(Karataş)	ZDEU	145/1976	:	1 ♀	4 ♂♂	,23.05.1976
57.Alanya	ZDEU	14/1966	:	1 ♀		,08.02.1966
	ZDEU	15/1970	:		1 ♂	,09.04.1970
58.Kahramanmaraş						
	ZDEU	154/1977	:	1 ♀		,07.05.1977
59.Gaziantep	ZDEU	77/1977	:	1 ♀		,27.04.1977
	BEF	62/1991	:		1 ♂	,20.04.1991
	BEF	63/1993	:	7 ♀♀	2 ♂♂	,01.10.1993
(Kilis)	ZDEU	68/1977	:	5 ♀♀		,26.04.1977
60.Hatay	BEF	64/1993	:	1 ♀	2 ♂♂	,25.09.1993
"	BEF	65/1994	:	3 ♀♀	1 ♂	,14.03.1994
"	BEF	66/1994	:	1 ♀		,05.07.1994

(İskenderun)	BEF	67/1994	:	1 ♀		,03.07.199
"	ZDEU	4/1968	:		1 ♂	,18.01.1968
(Belen)	ZDEU	45/1977	:	2 ♀♀		,24.04.1977
(Harbiye)	ZDEU	2/1968	:	1 ♀		,16.01.1968
(Kırıkhan)	BEF	68/1991	:	1 ♀	11 ♂♂	,22.02.1991
(Dörtyol)	BEF	69/1992	:	6 ♀♀		,05.10.1992

121 of the samples given in the list above have been collected beforehand and they are samples from the Zoology Department of Aegean University and the international code of this university is symbolized with the abbrevation ZDEU.

52 and 126 of other samples were taken from two projects which were made by D.E.U and our department 195 of the samples were collected in different excursions. These samples are kept in the Buca Faculty of Education, Zoology collections (under the abb. B.E.F.).

These samples from different localities show the expansion of *B. viridis* in all regions of Turkey. The spread of these samples are seen in the map given in Figure.2. Regions on the map were prepared considering the geographical formations that can form isolations and the population order is stated with numbers on the map according to the pecularities of the region.

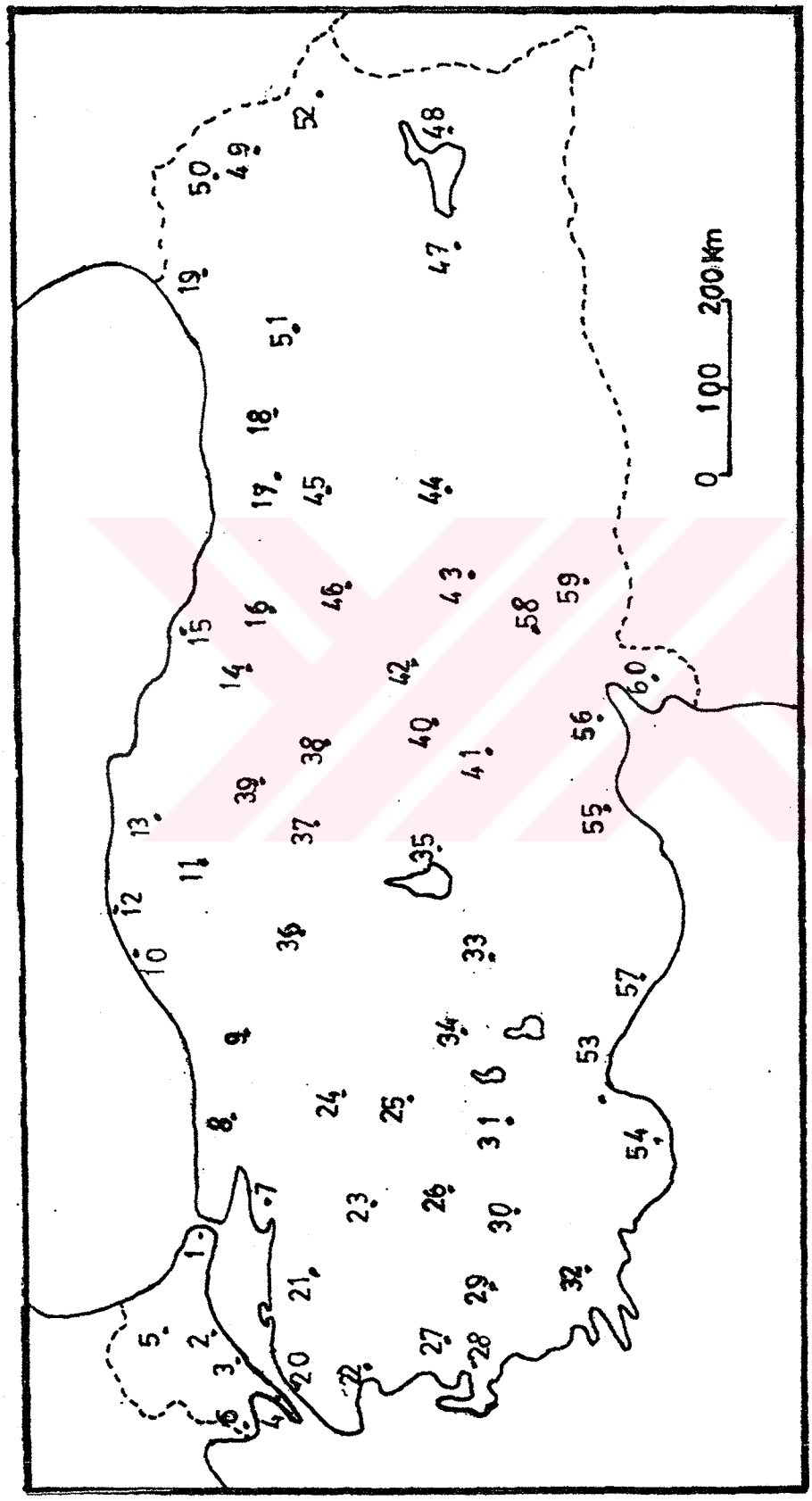


Figure : 2 Distribution list of examined *B. viridis* material of Turkey.

The name of provinces that were warked on the map by the numbers are given in the material list.

3. Findings

The measurements (Fig. 1) of several characters that belong to the samples of the 7 regions in which we separate them in terms of geographic conditions and we examine the expansion of the *B. viridis* in Turkey are compared with each other.

The populations when comparing are grouped as follows :

1. Thrace Region
2. Blacksea Region
3. Aegean Region
4. Central Anatolian Region
5. Eastern Anatolian Region
6. Mediterranean Region
7. Hatay - Gaziantep - Kahramanmaraş Region

3.1. Biometric Measurements

The minimums, maximums, means standard deviations and standard error of mean values of body measurements which we found out are given as 14 tables separately for each male and female.

Moreover, several indexes that belong to body measurements were found to make a comparison between populations. These values were determined (from table 15 to 28) as males and females of each population. Being different from other tables the mode and median values are also added to this.

In the indexes, that are obtained in terms of biometric measures, the comparison of differences of populations if there is any were made by the method of variance analysis in computers.

At the end of the variance analyses for the values that are obtained when comparing the populations, hypotheses are established as follows in the importance levels of 0,05 and 0,10:

Prob > 0,05 → H_o O.K (no difference between the 2 mean population)

Prob < 0.05 → H_a O.K (difference between the 2 mean population)

Prob > 0,10 → H_o O.K (no difference between the 2 mean population)

Prob < 0,10 → H_a O.K (difference between the 2 mean population)

Moreover when the regional differences are being searched to see whether there is any difference between the means, or not the ' student-t ' test has been used.

If ' t ' critical rate at the level of 5% is more than the table value, alternative hypothesis (H_a) is accepted (H_a = the 2 means are different). On the other hand if ' t ' critical rate is less than the table value, the hypothesis (H_o) is accepted (H_o = no difference between the 2 means). In study the differences of all the population means. If there is any, are searched as it is mentioned above.

It is not stated any remarkable and distinctive difference in the comparisons of the indexes which belong to the populations in terms of CD and t analyses and in the research of mean safe spaces when comparing of the populations which are obtained with the studies about the variance analyses.

After the indexes that are between the biometric measures are obtained, the correlation matrixes were made. But as the correlation coefficients come out rather weak ($10 \leq r \leq 0,101$), we had on opinion that there is no relationship between the indexes. So we haven't thought it is appropriate to give the regression analyses here.

The features such as femur length / tibia length, parotid length / head + body length, tibia length / head + body length, internal tubercul (lung) length / tibia length, front foot first finger thickness that are used in comparisons of populations are considered separately as male and females and range - diagrams are drawn in terms of these values (Fig. 3-8).

Table :1 The Biometrical measurements on *Bufo viridis* of Thrace region (♂♂)

BIOMETRICAL MEASUREMENTS	Min.	Mean	Max.	SD	SE
1.Length of head and body	60.00	67.20	72.50	4.38	1.46
2.Length of head	15.50	17.57	18.80	1.07	0.36
3.Width of head	20.10	23.36	25.60	1.71	0.57
4.Length of femur	21.40	25.44	28.50	2.40	0.80
5.Length of tibia	21.40	25.60	28.50	2.41	0.80
6.Length of foot	27.20	37.87	35.20	2.53	0.84
7.Length of first finger of foot	4.50	4.36	5.80	0.40	0.13
8.Length of finger matatarsaltubercle	3.70	4.42	5.10	0.49	0.16
9.Length of parotoid gland	10.80	14.88	17.20	1.99	0.66
10. Distance between parotoids gland	9.00	10.26	12.00	0.82	0.27
11. Distance between from nostril opening to parotoid pland	13.70	14.89	16.60	1.07	0.36
12. Length of upper eye-lid	7.20	8.19	9.40	0.80	0.27
13. Width of upper eye-lid	5.80	6.26	6.80	0.34	0.11
14. Interorbital space	4.60	5.22	5.70	0.43	0.14
15. Distance between from nostril opening to front eye	4.90	5.12	5.20	0.11	0.04
16. Distance of inter nostril	4.30	4.64	4.80	0.20	0.07
17. Width of rostrum	7.50	8.99	10.00	0.72	0.24
18. Length of rostrum	5.20	6.41	6.80	0.55	0.18
19. Parotoid lower edge interdental	6.10	7.13	8.00	0.70	0.23
20. Distance between mouth and lover edge of tympanum	3.50	4.10	4.70	0.44	0.15
21. Vertical diameter of tympanum	2.60	2.96	3.60	0.42	0.14
22. Width of first hand finger	3.50	3.92	4.50	0.32	0.11
23. Length of first hand finger	6.40	7.70	8.70	0.85	0.28

Table :2 The Biometrical measurements on *Bufo viridis* of Thrace region (♀)

BIOMETRICAL MEASUREMENTS	Min.	Mean	Max.	SD	SE
1.Length of head and body	48.80	70.20	89.10	11.05	3.19
2.Length of head	13.80	18.20	22.50	2.54	0.73
3.Width of head	17.50	23.81	29.90	3.83	1.11
4.Length of femur	18.60	25.74	30.20	3.46	1.00
5.Length of tibia	18.70	25.78	30.50	3.40	0.98
6.Length of foot	22.00	30.70	35.80	4.18	1.21
7.Length of first finger of foot	3.80	5.08	5.90	0.59	0.17
8.Length of finger matatarsaltubercle	3.10	4.64	5.50	0.83	0.24
9.Length of parotoid gland	11.00	15.27	19.60	2.66	0.77
10. Distance between parotoids gland	7.40	10.74	13.80	1.53	0.44
11. Distance between from nostril opening to parotoid pland	11.50	14.67	16.90	1.54	0.44
12. Length of upper eye-lid	7.00	8.44	9.90	0.87	0.25
13. Width of upper eye-lid	5.10	6.28	7.80	0.95	0.27
14. Interorbital space	4.40	4.96	5.50	0.36	0.10
15. Distance between from nostril opening to front eye	4.00	5.08	5.80	0.47	0.13
16. Distance of inter nostril	3.70	4.52	5.80	0.48	0.14
17. Width of rostrum	7.00	9.24	11.80	1.26	0.36
18. Length of rostrum	4.80	6.42	8.30	0.97	0.28
19. Parotoid lower edge interdental	5.60	7.67	9.80	1.41	0.41
20. Distance between mouth and lover edge of tympanum	3.00	4.38	5.50	0.86	0.25
21. Vertical diameter of tympanum	2.60	3.49	4.40	0.64	0.18
22. Width of first hand finger	2.50	3.58	4.40	0.53	0.15
23. Length of first hand finger	5.50	7.82	9.90	1.13	0.33

Table :3 The Biometrical measurements on *Eufo viridis* of Blacksea region (♂)

BIOMETRICAL MEASUREMENTS	Min.	Mean	Max.	SD	SE
1.Length of head and body	52.30	66.53	79.20	6.46	1.09
2.Length of head	13.30	17.74	20.00	1.76	0.30
3.Width of head	17.10	24.30	28.10	2.73	0.46
4.Length of femur	20.50	25.72	30.50	2.29	0.39
5.Length of tibia	21.80	25.95	30.30	2.18	0.37
6.Length of foot	23.80	30.77	38.40	3.08	0.52
7.Length of first finger of foot	4.00	5.01	6.20	0.47	0.08
8.Length of finger matatarsaltubercle	3.20	4.19	5.00	0.55	0.09
9.Length of parotoid gland	12.00	15.14	19.00	1.77	0.30
10. Distance between parotoids gland	8.60	10.34	12.20	1.07	0.18
11. Distance between from nostril opening to parotoid pland	12.00	15.20	17.20	1.19	0.20
12. Length of upper eye-lid	6.80	8.37	10.30	0.91	0.15
13. Width of upper eye-lid	4.80	6.20	7.50	0.70	0.20
14. Interorbital space	3.90	5.42	10.20	1.25	0.21
15. Distance between from nostril opening to front eye	4.00	4.91	5.70	0.38	0.06
16. Distance of inter nostril	3.90	4.59	5.40	0.42	0.07
17. Width of rostrum	6.90	9.13	11.00	0.75	0.13
18. Length of rostrum	5.80	6.74	7.60	0.42	0.07
19. Parotoid lower edge interdental	5.80	7.60	9.50	0.81	0.14
20. Distance between mouth and lover edge of tympanum	3.40	4.40	5.40	0.52	0.09
21. Vertical diameter of tympanum	2.40	3.21	4.10	0.49	0.08
22. Width of first hand finger	3.10	3.94	5.00	0.43	0.07
23. Length of first hand finger	6.60	7.68	9.50	0.66	0.11

..Table :4 The Biometrical measurements on *Bufo viridis* of Blacksea region (♀)

BIOMETRICAL MEASUREMENTS	Min.	Mean	Max.	SD	SE
1.Length of head and body	45.20	61.62	78.70	8.51	1.15
2.Length of head	13.10	16.30	20.20	1.85	0.25
3.Width of head	17.20	22.39	29.00	3.05	0.41
4.Length of femur	15.00	23.08	29.90	3.27	0.44
5.Length of tibia	15.60	23.33	30.10	3.28	0.45
6.Length of foot	19.70	26.76	34.30	3.57	0.48
7.Length of first finger of foot	3.20	4.51	5.90	0.60	0.08
8.Length of finger matatarsaltubercle	2.70	3.86	5.00	0.60	0.08
9.Length of parotoid gland	9.30	13.99	19.60	2.27	0.31
10. Distance between parotoids gland	7.00	8.99	12.00	1.18	0.16
11. Distance between from nostril opening to parotoid pland	11.50	13.80	17.50	1.35	0.18
12. Length of upper eye-lid	6.00	7.65	10.00	0.80	0.11
13. Width of upper eye-lid	4.50	5.86	7.00	0.63	0.09
14. Interorbital space	3.50	5.61	10.40	1.73	0.23
15. Distance between from nostril opening to front eye	4.00	4.81	6.00	0.49	0.07
16. Distance of inter nostril	3.10	4.31	5.80	0.55	0.07
17. Width of rostrum	7.10	8.64	11.70	0.93	0.13
18. Length of rostrum	5.00	6.19	7.90	0.70	0.09
19. Parotoid lower edge interdental	5.40	7.23	9.20	1.07	0.14
20. Distance between mouth and lover edge of tympanum	2.90	4.29	5.60	0.68	0.09
21. Vertical diameter of tympanum	2.10	2.99	4.20	0.50	0.07
22. Width of first hand finger	2.00	3.31	4.40	0.52	0.07
23. Length of first hand finger	5.70	7.20	9.30	0.85	0.11

Table :5 The Biometrical measurements on *Bufo viridis* of Aegean region (♂)

BIOMETRICAL MEASUREMENTS	Min.	Mean	Max.	SD	SE
1.Length of head and body	52.90	66.78	77.30	6.94	1.05
2.Length of head	15.00	18.26	25.20	2.11	0.32
3.Width of head	19.50	24.41	31.90	3.55	0.54
4.Length of femur	19.60	25.76	32.50	3.22	0.49
5.Length of tibia	19.60	25.79	32.20	3.01	0.45
6.Length of foot	22.20	29.88	36.20	3.58	0.54
7.Length of first finger of foot	3.70	4.92	6.20	0.65	0.10
8.Length of finger matatarsaltubercle	3.40	4.56	6.00	0.61	0.09
9.Length of parotoid gland	11.60	14.84	18.60	1.88	0.28
10. Distance between parotoids gland	8.10	10.52	13.00	1.26	0.19
11. Distance between from nostril opening to parotoid pland	11.70	14.77	18.00	1.44	0.22
12. Length of upper eye-lid	7.00	8.47	10.20	0.78	0.12
13. Width of upper eye-lid	5.40	6.41	7.50	0.69	0.10
14. Interorbital space	4.10	5.39	7.90	0.89	0.13
15. Distance between from nostril opening to front eye	4.20	5.03	7.80	0.69	0.10
16. Distance of inter nostril	4.10	4.68	5.70	0.47	0.07
17. Width of rostrum	7.00	9.65	13.40	1.42	0.21
18. Length of rostrum	5.30	7.17	9.90	0.90	0.14
19. Parotoid lower edge interdental	5.80	7.49	9.00	0.77	0.12
20. Distance between mouth and lover edge of tympanum	3.40	4.29	5.50	0.54	0.08
21. Vertical diameter of tympanum	2.50	3.35	4.40	0.41	0.06
22. Width of first hand finger	2.70	3.87	4.80	0.55	0.08
23. Length of first hand finger	6.40	7.74	9.60	0.72	0.17

Table :6 The Biometrical measurements on *Bufo viridis* of Aegan region (♀)

BIOMETRICAL MEASUREMENTS	Min.	Mean	Max.	SD	SE
1.Length of head and body	42.60	65.28	87.90	11.57	1.17
2.Length of head	11.40	17.54	24.90	2.97	0.30
3.Width of head	13.20	23.45	35.30	4.76	0.48
4.Length of femur	15.50	23.82	31.90	4.01	0.41
5.Length of tibia	15.70	23.75	31.10	3.83	0.39
6.Length of foot	17.70	27.55	36.40	4.48	0.45
7.Length of first finger of foot	3.00	4.75	6.70	0.79	0.08
8.Length of finger matatarsaltubercle	2.70	4.31	6.00	0.73	0.07
9.Length of parotoid gland	9.20	14.48	19.70	2.60	0.26
10. Distance between parotoids gland	6.10	8.99	10.10	2.40	0.35
11. Distance between from nostril opening to parotoid pland	9.00	14.10	18.40	1.99	0.20
12. Length of upper eye-lid	5.50	8.17	10.00	1.12	0.11
13. Width of upper eye-lid	4.20	6.16	9.30	0.90	0.09
14. Interorbital space	3.40	5.08	7.00	0.78	0.08
15. Distance between from nostril opening to front eye	3.40	4.89	6.30	0.68	0.07
16. Distance of inter nostril	3.20	4.52	5.70	0.56	0.06
17. Width of rostrum	6.10	9.20	14.30	1.53	0.16
18. Length of rostrum	3.90	6.67	9.30	1.02	0.10
19. Parotoid lower edge interdental	4.70	7.29	9.70	1.22	0.12
20. Distance between mouth and lover edge of tympanum	2.60	4.41	6.10	0.82	0.08
21. Vertical diameter of tympanum	2.00	3.26	4.50	0.63	0.06
22. Width of first hand finger	1.80	3.45	5.10	0.69	0.07
23. Length of first hand finger	4.80	6.20	8.60	0.85	0.24

Table :7 The Biometrical measurements on *Bufo viridis* of Central Anatolia region (♂♂)

BIOMETRICAL MEASUREMENTS	Min.	Mean	Max.	SD	SE
1.Length of head and body	60.30	68.73	77.50	4.63	0.97
2.Length of head	15.50	18.26	20.40	1.21	0.25
3.Width of head	20.00	23.69	26.10	1.92	0.40
4.Length of femur	15.20	21.90	31.20	3.98	0.42
5.Length of tibia	21.70	25.18	29.10	1.98	0.41
6.Length of foot	17.50	29.98	34.20	3.59	0.75
7.Length of first finger of foot	4.00	4.72	5.40	0.38	0.08
8.Length of finger matatarsaltubercle	3.40	4.63	5.40	0.18	0.10
9.Length of parotoid gland	13.60	16.10	18.20	1.45	0.30
10. Distance between parotoids gland	8.00	10.20	12.10	0.96	0.20
11. Distance between from nostril opening to parotoid pland	10.10	14.34	18.00	1.47	0.31
12. Length of upper eye-lid	7.50	8.67	9.80	0.64	0.13
13. Width of upper eye-lid	5.30	6.51	7.60	0.62	0.13
14. Interorbital space	4.00	4.80	5.30	0.34	0.07
15. Distance between from nostril opening to front eye	3.90	4.83	5.50	0.43	0.09
16. Distance of inter nostril	4.00	4.63	5.50	0.36	0.07
17. Width of rostrum	7.40	9.49	11.60	0.91	0.19
18. Length of rostrum	5.80	6.86	8.00	0.53	0.11
19. Parotoid lower edge interdental	6.40	7.88	9.20	0.75	0.16
20. Distance between mouth and lover edge of tympanum	3.80	4.67	5.40	0.47	0.25
21. Vertical diameter of tympanum	2.80	3.42	4.70	0.46	0.10
22. Width of first hand finger	2.70	3.85	4.50	0.53	0.10
23. Length of first hand finger	5.70	7.44	8.80	0.76	0.11

Table :8 The Biometrical measurements on *Bufo viridis* of Central Anatolia region (♀)

BIOMETRICAL MEASUREMENTS	Min.	Mean	Max.	SD	SE
1.Length of head and body	44.70	60.22	89.90	10.71	1.24
2.Length of head	11.80	16.10	23.40	2.80	0.33
3.Width of head	14.80	20.96	32.50	4.28	0.50
4.Length of femur	21.50	25.11	29.00	2.01	0.46
5.Length of tibia	15.50	21.86	31.20	4.00	0.46
6.Length of foot	18.00	25.74	36.70	4.81	0.56
7.Length of first finger of foot	2.60	4.21	5.80	0.77	0.09
8.Length of finger matatarsaltubercle	2.60	3.99	5.80	0.74	0.09
9.Length of parotoid gland	9.30	13.87	20.00	1.99	0.32
10.Distance between parotoids gland	6.00	8.83	13.50	1.99	0.23
11. Distance between from nostril opening to parotoid pland	9.90	13.52	18.00	2.00	0.23
12. Length of upper eye-lid	5.70	7.84	10.50	1.20	0.14
13. Width of upper eye-lid	4.00	5.76	8.30	0.39	0.14
14. Interorbital space	3.00	4.54	6.40	0.81	0.09
15. Distance between from nostril opening to front eye	3.00	4.39	5.80	0.67	0.08
16. Distance of inter nostril	3.00	4.27	5.60	0.63	0.07
17. Width of rostrum	6.10	8.51	12.10	1.42	0.17
18. Length of rostrum	4.40	6.03	8.30	0.98	0.11
19. Parotoid lower edge interdental	5.00	6.81	10.40	1.24	0.14
20. Distance between mouth and lover edge of tympanum	2.70	4.05	6.70	0.82	0.09
21. Vertical diameter of tympanum	2.00	2.96	4.70	0.51	0.06
22. Width of first hand finger	2.20	3.20	4.50	0.64	0.07
23. Length of first hand finger	5.00	6.85	9.30	1.24	0.14

Table :9 The Biometrical measurements on *Bufo viridis* of Eastern Anatolia region (♂♂)

BIOMETRICAL MEASUREMENTS	Min.	Mean	Max.	SD	SE
1.Length of head and body	52.30	66.53	79.20	6.46	1.25
2.Length of head	16.50	18.53	19.70	1.03	0.63
3.Width of head	23.80	25.50	26.60	0.93	0.31
4.Length of femur	25.30	27.13	30.00	1.56	0.52
5.Length of tibia	25.30	27.31	30.00	1.39	0.46
6.Length of foot	28.60	31.58	34.80	2.10	0.70
7.Length of first finger of foot	4.10	4.87	5.90	0.54	0.18
8.Length of finger matatarsaltubercle	3.90	4.31	4.70	0.29	0.10
9.Length of parotoid gland	15.00	16.32	17.60	1.04	0.35
10. Distance between parotoids gland	8.30	10.41	12.50	1.29	0.43
11. Distance between from nostril opening to parotoid pland	15.20	16.00	17.50	0.78	0.26
12. Length of upper eye-lid	8.00	8.68	10.20	0.67	0.22
13. Width of upper eye-lid	5.80	6.40	7.20	0.45	0.15
14. Interorbital space	4.90	5.30	5.60	0.27	0.09
15. Distance between from nostril opening to front eye	4.50	4.94	5.40	0.33	0.11
16. Distance of inter nostril	4.50	4.77	5.10	0.25	0.08
17. Width of rostrum	8.60	9.38	9.70	0.42	0.14
18. Length of rostrum	6.00	6.73	7.50	0.49	0.16
19. Parotoid lower edge interdental	7.00	8.12	9.10	0.71	0.24
20. Distance between mouth and lover edge of tympanum	4.00	4.72	5.40	0.57	0.19
21. Vertical diameter of tympanum	3.00	3.40	4.10	0.39	0.13
22. Width of first hand finger	3.90	4.24	4.70	0.26	0.09
23. Length of first hand finger	7.00	7.83	8.30	0.46	0.15

Table :10 The Biometrical measurements on *Bufo viridis* of Eastern Anatolia region (♀)

BIOMETRICAL MEASUREMENTS	Min.	Mean	Max.	SD	SE
1.Length of head and body	46.10	65.35	80.60	11.54	2.52
2.Length of head	12.00	16.78	19.80	2.43	0.53
3.Width of head	16.00	22.89	27.80	4.01	0.88
4.Length of femur	17.00	23.53	29.40	3.71	0.81
5.Length of tibia	16.70	23.37	28.20	3.76	0.82
6.Length of foot	15.80	27.21	34.00	5.07	1.11
7.Length of first finger of foot	3.00	4.37	5.30	0.73	0.16
8.Length of finger matatarsaltubercle	2.80	4.00	5.00	0.62	0.14
9.Length of parotoid gland	9.60	14.60	18.50	2.48	0.54
10. Distance between parotoids gland	6.50	9.89	11.70	1.61	0.35
11. Distance between from nostril opening to parotoid pland	10.30	14.16	17.10	1.90	0.41
12. Length of upper eye-lid	6.00	7.77	9.00	0.94	0.21
13. Width of upper eye-lid	4.30	5.88	6.90	0.86	0.19
14. Interorbital space	3.50	4.80	6.00	0.86	0.17
15. Distance between from nostril opening to front eye	3.40	4.57	5.40	0.72	0.16
16. Distance of inter nostril	3.40	4.30	5.10	0.58	0.13
17. Width of rostrum	6.80	8.73	9.80	1.25	0.27
18. Length of rostrum	4.70	6.21	7.60	0.77	0.17
19. Parotoid lower edge interdental	5.30	7.52	9.10	1.22	0.27
20. Distance between mouth and lover edge of tympanum	3.10	4.59	6.10	0.89	0.20
21. Vertical diameter of tympanum	2.10	3.03	5.20	0.66	0.14
22. Width of first hand finger	2.00	3.45	4.50	0.80	0.17
23. Length of first hand finger	4.80	7.46	10.20	1.43	0.31

Table :11 The Biometrical measurements on *Bufo viridis* of Mediterranean region (♂)

BIOMETRICAL MEASUREMENTS	Min.	Mean	Max.	SD	SE
1.Length of head and body	41.50	53.09	78.90	9.97	1.47
2.Length of head	10.80	14.07	19.00	2.29	0.43
3.Width of head	14.00	18.55	26.10	3.07	0.45
4.Length of femur	15.00	19.62	28.40	3.46	0.51
5.Length of tibia	15.30	19.61	27.50	3.19	0.47
6.Length of foot	17.10	22.40	32.40	3.74	0.55
7.Length of first finger of foot	2.50	3.79	5.20	0.77	0.11
8.Length of finger matatarsaltubercle	2.00	3.45	5.30	0.78	0.12
9.Length of parotoid gland	8.00	12.02	16.70	2.35	0.35
10. Distance between parotoids gland	6.00	8.60	13.40	1.68	0.25
11. Distance between from nostril opening to parotoid pland	9.40	12.60	17.10	1.91	0.28
12. Length of upper eye-lid	5.40	7.03	9.80	1.13	0.17
13. Width of upper eye-lid	3.70	5.23	6.80	0.79	0.12
14. Interorbital space	3.00	4.23	5.80	0.60	0.09
15. Distance between from nostril opening to front eye	3.20	4.05	5.60	0.54	0.08
16. Distance of inter nostril	3.00	3.91	5.40	0.57	0.08
17. Width of rostrum	5.60	7.64	10.70	1.14	0.17
18. Length of rostrum	4.40	5.67	8.00	0.84	0.12
19. Parotoid lower edge interdental	4.60	5.92	8.10	1.02	0.15
20. Distance between mouth and lover edge of tympanum	2.60	3.43	5.20	0.65	0.10
21. Vertical diameter of tympanum	1.90	2.59	3.70	0.50	0.07
22. Width of first hand finger	1.80	2.54	3.80	0.52	0.08
23. Length of first hand finger	4.50	5.94	8.80	1.16	0.17

Table :12 The Biometrical measurements on *Bufo viridis* of Mediterranean region (♀♀)

BIOMETRICAL MEASUREMENTS	Min.	Mean	Max.	SD	SE
1.Length of head and body	53.70	66.79	79.20	7.60	1.62
2.Length of head	14.60	17.12	19.50	1.75	0.37
3.Width of head	17.90	22.70	28.70	3.14	0.67
4.Length of femur	18.20	25.43	33.20	3.55	0.76
5.Length of tibia	18.60	25.42	30.70	3.37	0.72
6.Length of foot	22.20	29.66	36.00	4.14	0.88
7.Length of first finger of foot	3.50	4.74	6.00	0.76	0.16
8.Length of finger matatarsaltubercle	3.40	4.29	5.30	0.61	0.13
9.Length of parotoid gland	11.50	14.42	17.80	1.83	0.39
10. Distance between parotoids gland	7.50	10.65	13.00	1.42	0.30
11. Distance between from nostril opening to parotoid pland	12.40	15.09	17.10	1.45	0.31
12. Length of upper eye-lid	6.40	8.20	10.00	0.98	0.21
13. Width of upper eye-lid	4.80	6.05	7.70	0.73	0.16
14. Interorbital space	3.90	4.93	6.00	0.57	0.12
15. Distance between from nostril opening to front eye	4.00	4.66	5.70	0.53	0.11
16. Distance of inter nostril	4.00	4.62	5.70	0.51	0.11
17. Width of rostrum	7.20	8.93	10.60	0.97	0.21
18. Length of rostrum	5.70	6.79	8.20	0.76	0.16
19. Parotoid lower edge interdental	6.00	7.33	8.60	0.83	0.18
20. Distance between mouth and lover edge of tympanum	3.40	4.17	5.50	0.59	0.13
21. Vertical diameter of tympanum	2.20	3.14	3.80	0.43	0.09
22. Width of first hand finger	2.50	3.75	4.50	0.51	0.11
23. Length of first hand finger	5.60	7.41	9.00	1.01	0.22

Table :13 The Biometrical measurements on *Bufo viridis* of Hatay - Gaziantep - Kahramanmaraş region (♂♂)

BIOMETRICAL MEASUREMENTS	Min.	Mean	Max.	SD	SE
1.Length of head and body	55.60	68.02	75.20	4.79	1.13
2.Length of head	14.50	17.56	20.30	1.35	0.32
3.Width of head	19.30	25.22	29.10	2.46	0.58
4.Length of femur	20.90	26.63	30.30	2.20	0.52
5.Length of tibia	20.90	27.00	30.40	2.08	0.49
6.Length of foot	26.20	31.06	34.00	1.85	0.44
7.Length of first finger of foot	4.20	4.81	6.00	0.45	0.11
8.Length of finger matatarsaltubercle	3.70	4.31	5.00	0.37	0.09
9.Length of parotoid gland	13.40	15.49	17.90	1.37	0.32
10. Distance between parotoids gland	7.90	10.31	12.50	1.08	0.25
11. Distance between from nostril opening to parotoid pland	12.90	15.72	17.50	1.04	0.25
12. Length of upper eye-lid	7.40	8.64	10.30	0.68	0.16
13. Width of upper eye-lid	5.00	6.39	7.20	0.58	0.14
14. Interorbital space	4.00	5.32	6.10	0.63	0.15
15. Distance between from nostril opening to front eye	4.20	5.17	5.80	0.39	0.09
16. Distance of inter nostril	4.40	4.76	5.50	0.31	0.07
17. Width of rostrum	8.30	9.18	11.20	0.85	0.20
18. Length of rostrum	5.50	6.72	8.00	0.49	0.12
19. Parotoid lower edge interdental	6.60	6.72	8.00	0.47	0.11
20. Distance between mouth and lover edge of tympanum	3.70	4.45	4.70	0.30	0.07
21. Vertical diameter of tympanum	2.50	3.44	3.70	0.27	0.06
22. Width of first hand finger	3.50	4.10	4.60	0.26	0.06
23. Length of first hand finger	6.30	7.61	8.90	0.51	0.12

Table :14 The Biometrical measurements on *Bufo viridis* of Hatay - Gaziantep - Kahramanmaraş region (♀♀)

BIOMETRICAL MEASUREMENTS	Min.	Mean	Max.	SD	SE
1.Length of head and body	43.20	61.25	89.60	12.52	2.29
2.Length of head	11.60	16.39	21.00	2.82	0.52
3.Width of head	15.10	21.31	37.50	4.83	0.88
4.Length of femur	15.50	22.61	34.40	4.25	0.78
5.Length of tibia	15.50	22.82	34.60	4.32	0.79
6.Length of foot	16.90	26.44	38.00	5.13	0.94
7.Length of first finger of foot	3.00	4.47	6.10	0.70	0.13
8.Length of finger matatarsaltubercle	2.80	3.99	5.80	0.75	0.14
9.Length of parotoid gland	9.10	13.52	20.40	2.51	0.46
10. Distance between parotoids gland	7.20	9.07	14.30	1.37	0.33
11. Distance between from nostril opening to parotoid pland	10.30	13.92	19.60	2.37	0.43
12. Length of upper eye-lid	5.00	7.78	11.20	1.53	0.28
13. Width of upper eye-lid	4.00	5.79	8.50	1.07	0.19
14. Interorbital space	3.50	4.79	8.00	1.00	0.18
15. Distance between from nostril opening to front eye	3.50	4.57	6.00	0.73	0.13
16. Distance of inter nostril	3.20	4.39	6.40	0.72	0.13
17. Width of rostrum	6.20	8.57	11.20	1.35	0.25
18. Length of rostrum	4.30	6.13	8.40	1.00	0.18
19. Parotoid lower edge interdental	4.60	7.01	12.00	1.56	0.29
20. Distance between mouth and lover edge of tympanum	2.80	4.09	6.90	0.95	0.17
21. Vertical diameter of tympanum	1.80	3.08	3.80	0.27	0.06
22. Width of first hand finger	2.00	3.31	5.60	0.80	0.16
23. Length of first hand finger	4.50	7.20	10.10	1.36	0.25

Table :15 The Indexes of Thrace region on *Bufo viridis* (♂)

PROPORTIONS	Min.	Mean	Max.	SD	SE	Mode	Median
1. Length of head and body X 100 / Length of head	364.36	382:58	397.25	9.86	3.29	364.36	384.66
2. Length of femur X 100 / Length of tibia	97.15	99.40	100.00	1.05	0.35	100.00	100.00
3. Length of head and body X 100 / Length of femur	240.35	265.04	293.07	15.02	5.01	240.35	261.73
4. Length of first finger of foot X 100 / Length of finger matatarsal tubercle	100.00	112.61	122.50	7.68	2.56	100.00	113.73
5. Length of parotoid gland X 100 / Length of head and body	18.00	22.09	25.19	2.12	0.71	18.00	22.01
6. Width of rostrum X 100 / Length of rostrum	132.35	140.52	154.69	8.71	2.90	130.35	139.68
7. Paratoid lower edge interdental X 100 / Distance between mouth and lover edge of tympanum	166.67	174.17	181.82	4.86	1.62	174.29	174.29
8. Length of parotoid gland X 100 / Length of upper eye-lid	147.95	181.66	195.83	17.08	5.69	147.95	189.19
9. Length of rostrum X 100 / Distance of internasel	120.93	137.88	148.89	8.11	2.70	141.67	141.67
10. Width of upper eye-lid X 100 / Interorbital space	110.53	120.18	132.61	6.99	2.33	120.00	120:00
11. Distance between from nostril opening to front eye X 100 / Distance between parotoids gland	106.25	110.40	115.91	3.26	1.09	108.33	108.33
12. Length of head X 100 / Length of head and body	25.17	26.15	27.45	0.68	0.23	25.17	26.00
13. Width of head X 100 / Length of head	125.29	132.97	143.53	6.01	2.00	125.29	131.82
14. Length of tibia X 100 / Length of head and body	32.12	38.07	41.61	2.16	0.72	34.12	38.28
15. Length of finger matatarsal tubercle X 100 / Length of tibia	14.04	17.30	18.38	1.37	0.46	14.04	17.69
16. Length of head X 100 / Width of head	69.67	75.34	79.81	3.37	1.12	69.67	75.86
17. Distance of internasel X 100 / Interorbital space	83.64	89.25	96.00	4.77	1.59	87.27	87.27
18. Interorbital space X 100 / Width of upper eye-lid	75.41	83.45	90.48	4.75	1.58	83.33	83.33
19. Length of foot X 100 / Length of finge matatarsal tubercle	650.98	725.41	872.50	69.88	23.29	650.98	723.81
20. Width of first hand finger X 100 / Length of first hand finger	45.88	51.13	54.69	2.65	0.88	45.66	51.95

Table :16 The Indexes of Thrace region on *Bufo viridis* (♀)

PROPORTIONS	Min.	Mean	Max.	SD	SE	Mode	Median
1. Length of head and body X 100 / Length of head	353.62	383:03	396.97	12.18	3.52	353.62	384.85
2. Length of femur X 100 / Length of tibia	97.42	99.85	101.68	1.17	0.34	100.00	100.00
3. Length of head and body X 100 / Length of femur	244.44	272.19	296.01	14.15	4.08	244.44	272.43
4. Length of first finger of foot X 100 / Length of finger matatarsal tubercle	100.00	111.20	138.39	14.80	4.27	100.00	106.36
5. Length of parotoid gland X 100 / Length of head and body	19.21	21.72	23.51	1.12	0.32	19.21	22.06
6. Width of rostrum X 100 / Length of rostrum	136.76	144.41	155.93	5.69	1.64	146.15	144.64
7. Paratoid lower edge interdental X 100 / Distance between mouth and lover edge of tympanum	156.52	176.07	190.00	10.79	3.12	156.52	177.98
8. Length of parotoid gland X 100 / Length of upper eye-lid	143.53	180.16	200.00	19.20	5.54	143.53	187.84
9. Length of rostrum X 100 / Distance of internasel	120.93	141.86	168.89	13.60	3.92	120.93	142.98
10. Width of upper eye-lid X 100 / Interorbital space	108.16	126.19	150.00	11.74	3.39	108.16	126.92
11. Distance between from nostril opening to front eye X 100 / Distance between parotoids gland	100.00	112.61	120.00	6.05	1.75	106.82	113.64
12. Length of head X 100 / Length of head and body	25.17	26.13	28.28	0.87	0.25	25.19	25.98
13. Width of head X 100 / Length of head	119.50	129.94	139.47	5.92	1.71	119.50	129.03
14. Length of tibia X 100 / Length of head and body	34.23	36.88	40.91	1.78	0.51	34.23	36.61
15. Length of finger matatarsal tubercle X 100 / Length of tibia	13.60	17.97	20.40	1.91	0.55	13.60	18.38
16. Length of head X 100 / Width of head	71.70	77.11	83.68	3.88	1.01	71.70	77.50
17. Distance of internasel X 100 / Interorbital space	84.09	91.02	95.45	5.71	1.65	86.54	89.90
18. Interorbital space X 100 / Width of upper eye-lid	66.67	79.87	92.45	7.34	2.12	66.67	78.86
19. Length of foot X 100 / Length of finge matatarsal tubercle	577.78	672.21	951.61	102.17	29.49	577.78	644.09
20. Width of first hand finger X 100 / Length of first hand finger	39.77	45.97	51.76	3.57	1.03	39.77	46.08

Table :17 The Indexes of Black sea region on *Bufo viridis* (♂)

	PROPORTIONS	Min.	Mean	Max.	SD	SE	Mode	Median
1.	Length of head and body X 100 / Length of head	345.00	375.51	410.53	16.45	2.78	345.00	375.93
2.	Length of femur X 100 / Length of tibia	92.34	99.14	108.93	3.84	0.65	100.00	100.00
3.	Length of head and body X 100 / Length of femur	186.79	259.31	300.98	20.21	3.42	186.79	259.77
4.	Length of first finger of foot X 100 / Length of finger matatarsal tubercle	100.00	121.05	150.00	15.59	2.64	100.00	125.00
5.	Length of parotoid gland X 100 / Length of head and body	19.40	22.76	26.20	1.50	0.25	19.40	22.70
6.	Width of rostrum X 100 / Length of rostrum	116.13	135.40	146.67	6.70	1.13	132.39	136.51
7.	Paratoid lower edge interdental X 100 / Distance between mouth and lover edge of tympanum	148.15	173.31	194.87	11.89	2.01	166.67	170.73
8.	Length of parotoid gland X 100 / Length of upper eye-lid	154.22	181.22	204.30	12.33	2.08	185.00	183.75
9.	Length of rostrum X 100 / Distance of internasel	131.48	147.52	177.50	12.00	2.03	140.00	144.44
10.	Width of upper eye-lid X 100 / Interorbital space	60.78	118.95	153.49	23.24	3.98	81.43	127.45
11.	Distance between from nostril opening to front eye X 100 / Distance between parotoids gland	90.00	107.52	142.50	12.03	2.03	100.00	106.67
12.	Length of head X 100 / Length of head and body	24.36	26.68	28.99	1.17	0.20	24.36	26.60
13.	Width of head X 100 / Length of head	123.20	136.94	154.61	7.32	1.24	123.20	137.06
14.	Length of tibia X 100 / Length of head and body	35.48	39.15	53.54	3.06	0.52	35.48	38.86
15.	Length of finger matatarsal tubercle X 100 / Length of tibia	13.21	16.16	20.45	1.77	0.30	13.21	16.00
16.	Length of head X 100 / Width of head	64.68	73.23	81.17	3.93	0.66	64.68	72.96
17.	Distance of internasel X 100 / Interorbital space	50.00	88.45	116.28	18.01	3.04	57.14	92.16
18.	Interorbital space X 100 / Width of upper eye-lid	65.15	88.40	164.52	23.09	3.90	122.81	78.46
19.	Length of foot X 100 / Length of finge matatarsal tubercle	595.00	740.30	897.06	73.15	12.37	726.19	732.00
20.	Width of first hand finger X 100 / Length of first hand finger	44.87	51.27	61.11	3.89	0.66	50.00	50.63

Table :18 The Indexes of Black sea region on *Bufo viridis* (♀♀)

PROPORTIONS	Min.	Mean	Max.	SD	SE	Mode	Median
1. Length of head and body X 100 / Length of head	337.59	377.54	425.83	21.13	2.85	393.74	380.75
2. Length of femur X 100 / Length of tibia	88.00	99.10	106.00	3.80	0.51	100.00	100.00
3. Length of head and body X 100 / Length of femur	216.61	267.70	301.33	14.99	2.02	216.61	267.86
4. Length of first finger of foot X 100 / Length of finger matatarsal tubercle	100.00	117.84	148.65	10.98	1.48	100.00	116.67
5. Length of parotoid gland X 100 / Length of head and body	19.31	22.65	25.61	1.39	0.19	19.31	22.71
6. Width of rostrum X 100 / Length of rostrum	120.00	139.93	173.21	9.96	1.34	129.51	138.81
7. Paratoid lower edge interdental X 100 / Distance between mouth and lover edge of tympanum	153.85	169.35	190.00	9.20	1.24	171.43	170.00
8. Length of parotoid gland X 100 / Length of upper eye-lid	144.29	182.17	223.53	16.44	2.22	183.78	182.19
9. Length of rostrum X 100 / Distance of internasel	129.27	144.45	177.42	10.68	1.44	148.78	142.86
10. Width of upper eye-lid X 100 / Interorbital space	58.89	111.72	155.26	27.02	3.64	83.64	120.00
11. Distance between from nostril opening to front eye X 100 / Distance between parotoids gland	100.00	112.62	142.86	12.93	1.74	100.00	107.32
12. Length of head X 100 / Length of head and body	23.48	26.57	29.62	1.50	0.20	25.33	26.26
13. Width of head X 100 / Length of head	123.16	137.27	158.62	5.55	1.17	124.11	136.59
14. Length of tibia X 100 / Length of head and body	31.97	37.94	53.31	2.87	0.39	36.67	37.83
15. Length of finger matatarsal tubercle X 100 / Length of tibia	11.90	16.59	20.45	1.80	0.24	17.54	16.74
16. Length of head X 100 / Width of head	63.04	73.13	81.20	4.51	0.61	74.15	73.21
17. Distance of internasel X 100 / Interorbital space	39.89	81.85	120.00	19.29	2.60	100.00	89.80
18. Interorbital space X 100 / Width of upper eye-lid	64.41	96.20	169.81	29.03	3.91	75.38	83.33
19. Length of foot X 100 / Length of finge matatarsal tubercle	490.24	699.95	933.33	76.02	10.25	615.56	693.02
20. Width of first hand finger X 100 / Length of first hand finger	35.00	46.04	62.50	5.17	0.70	45.33	45.33

Table :19 The Indexes of Aegean region on *Bufo viridis* (♂)

PROPORTIONS	Min.	Mean	Max.	SD	SE	Mode	Median
1. Length of head and body X 100 / Length of head	299.60	366.53	396.18	18.12	2.73	299.60	365.49
2. Length of femur X 100 / Length of tibia	93.17	99.82	106.56	2.41	0.36	100.00	100.00
3. Length of head and body X 100 / Length of femur	227.67	260.26	289.30	16.14	2.43	227.67	259.79
4. Length of first finger of foot X 100 / Length of finger matatarsal tubercle	100.00	108.11	123.26	7.12	1.07	100.00	107.36
5. Length of parotoid gland X 100 / Length of head and body	19.71	22.20	25.34	1.23	0.19	21.89	22.05
6. Width of rostrum X 100 / Length of rostrum	117.30	134.72	174.03	11.94	1.80	133.33	133.06
7. Paratoid lower edge interdental X 100 / Distance between mouth and lover edge of tympanum	148.89	175.81	217.65	15.94	2.40	167.50	173.36
8. Length of parotoid gland X 100 / Length of upper eye-lid	145.83	175.34	211.36	17.46	2.63	200.00	171.36
9. Length of rostrum X 100 / Distance of internasel	126.19	153.43	198.00	15.44	2.33	173.17	150.96
10. Width of upper eye-lid X 100 / Interorbital space	92.41	120.52	144.23	13.25	2.00	100.00	122.53
11. Distance between from nostril opening to front eye X 100 / Distance between parotoids gland	91.30	107.67	156.00	11.31	1.70	100.00	104.44
12. Length of head X 100 / Length of head and body	25.24	27.35	33.38	1.45	0.22	25.24	27.36
13. Width of head X 100 / Length of head	111.51	133.89	161.93	13.49	2.03	111.51	129.31
14. Length of tibia X 100 / Length of head and body	35.31	38.63	42.65	2.03	0.31	35.31	38.83
15. Length of finger matatarsal tubercle X 100 / Length of tibia	14.59	17.71	20.98	1.60	0.24	16.67	17.82
16. Length of head X 100 / Width of head	61.76	75.40	89.68	7.28	1.10	61.76	77.34
17. Distance of internasel X 100 / Interorbital space	63.29	88.26	109.76	11.00	1.66	100.00	88.00
18. Interorbital space X 100 / Width of upper eye-lid	69.33	84.02	108.22	9.83	1.48	81.82	81.61
19. Length of foot X 100 / Length of finge matatarsal tubercle	435.00	659.78	838.24	65.43	9.86	596.36	655.51
20. Width of first hand finger X 100 / Length of first hand finger	41.54	50.71	63.23	4.35	0.41	50.00	49.74

Table :20 The Indexes of Aegean region on *Bufo viridis* (♀)

PROPORTIONS	Min.	Mean	Max.	SD	SE	Mode	Median
1. Length of head and body X 100 / Length of head	303.33	372.21	414.78	24.86	2.52	303.33	378.33
2. Length of femur X 100 / Length of tibia	90.05	100.25	111.02	3.14	0.32	100.00	100.00
3. Length of head and body X 100 / Length of femur	223.53	274.05	336.65	18.01	1.83	275.00	272.14
4. Length of first finger of foot X 100 / Length of finger matatarsal tubercle	84.21	110.87	135.00	10.46	1.06	100.00	110.00
5. Length of parotoid gland X 100 / Length of head and body	17.41	22.24	25.44	1.61	0.16	17.41	22.41
6. Width of rostrum X 100 / Length of rostrum	110.91	138.28	201.41	1.61	1.30	138.46	136.76
7. Paratoid lower edge interdental X 100 / Distance between mouth and lover edge of tympanum	140.00	166.20	194.59	11.03	1.12	160.00	165.71
8. Length of parotoid gland X 100 / Length of upper eye-lid	135.00	176.89	217.27	17.71	1.80	150.00	177.42
9. Length of rostrum X 100 / Distance of internasel	111.43	147.72	186.05	13.93	1.41	144.44	145.83
10. Width of upper eye-lid X 100 / Interorbital space	92.86	121.96	147.62	12.01	1.22	125.00	122.22
11. Distance between from nostril opening to front eye X 100 / Distance between parotoids gland	89.59	108.33	134.37	9.45	0.96	100.00	106.52
12. Length of head X 100 / Length of head and body	24.11	26.99	32.97	1.95	0.20	24.11	26.43
13. Width of head X 100 / Length of head	108.20	133.38	168.14	13.36	1.36	113.33	131.52
14. Length of tibia X 100 / Length of head and body	31.59	36.55	42.54	2.08	0.21	36.36	36.47
15. Length of finger matatarsal tubercle X 100 / Length of tibia	14.66	18.20	26.23	1.82	0.18	20.00	18.02
16. Length of head X 100 / Width of head	59.48	75.70	92.42	7.37	0.75	76.00	76.03
17. Distance of internasel X 100 / Interorbital space	69.23	89.71	105.00	9.02	0.92	100.00	91.11
18. Interorbital space X 100 / Width of upper eye-lid	67.74	82.82	107.69	8.52	0.87	80.00	81.82
19. Length of foot X 100 / Length of finge matatarsal tubercle	509.09	645.50	788.89	57.22	5.81	590.00	635.56
20. Width of first hand finger X 100 / Length of first hand finger	32.86	45.56	60.00	5.45	0.55	40.00	45.45

Table :21 The Indexes of Central Anatolian region on *Bufo viridis* (♂)

PROPORTIONS	Min.	Mean	Max.	SD	SE	Mode	Median
1. Length of head and body X 100 / Length of head	321.05	376.89	400.68	20.01	4.17	375.00	380.22
2. Length of femur X 100 / Length of tibia	96.94	99.73	105.58	1.93	0.40	100.00	100.00
3. Length of head and body X 100 / Length of femur	244.80	274.35	315.32	14.92	3.11	244.80	270.87
4. Length of first finger of foot X 100 / Length of finger matatarsal tubercle	100.00	102.28	129.41	6.33	1.32	100.00	100.00
5. Length of parotoid gland X 100 / Length of head and body	21.37	23.42	25.82	1.27	0.27	22.93	23.28
6. Width of rostrum X 100 / Length of rostrum	125.00	138.40	158.90	8.64	1.80	132.86	139.71
7. Paratoid lower edge interdental X 100 / Distance between mouth and lover edge of tympanum	170.00	150.00	169.03	187.50	9.89	2.06	158.82
8. Length of parotoid gland X 100 / Length of upper eye-lid	190.67	156.04	186.21	215.00	15.55	3.24	160.00
9. Length of rostrum X 100 / Distance of internasel	130.00	148.17	165.91	8.67	1.81	148.94	147.83
10. Width of upper eye-lid X 100 / Interorbital space	117.65	135.73	161.70	10.78	2.25	120.00	134.62
11. Distance between from nostril opening to front eye X 100 / Distance between parotoids gland	95.74	104.38	125.00	7.94	1.66	100.00	100.00
12. Length of head X 100 / Length of head and body	24.41	26.61	31.35	1.51	0.32	26.76	26.30
13. Width of head X 100 / Length of head	117.82	129.66	136.26	5.14	1.07	135.11	130.50
14. Length of tibia X 100 / Length of head and body	32.00	36.64	39.89	1.71	0.36	36.17	36.92
15. Length of finger matatarsal tubercle X 100 / Length of tibia	18.10	14.17	18.45	22.32	1.79	0.37	14.17
16. Length of head X 100 / Width of head	73.39	77.24	84.88	3.15	0.66	74.02	76.63
17. Distance of internasel X 100 / Interorbital space	82.00	96.70	111.11	7.17	1.49	100.00	95.74
18. Interorbital space X 100 / Width of upper eye-lid	61.84	74.12	85.00	5.87	1.22	83.33	74.29
19. Length of foot X 100 / Length of finge matatarsal tubercle	514.71	646.78	739.53	48.57	10.13	514.71	633.33
20. Width of first hand finger X 100 / Length of first hand finger	44.00	51.68	61.69	4.76	0.99	46.67	50.00

Table :22 The Indexes of Central Anatolian region on *Bufo viridis* (♀)

PROPORTIONS	Min.	Mean	Max.	SD	SE	Mode	Median
1. Length of head and body X 100 / Length of head	319.08	374.21	400.82	19.26	2.24	398.86	377.45
2. Length of femur X 100 / Length of tibia	94.69	100.00	107.69	1.91	0.22	100.00	100.00
3. Length of head and body X 100 / Length of femur	232.14	275.60	307.26	14.53	1.69	232.14	274.56
4. Length of first finger of foot X 100 / Length of finger matatarsal tubercle	87.23	105.96	129.27	7.99	0.93	100.00	104.18
5. Length of parotoid gland X 100 / Length of head and body	19.52	22.99	27.13	1.58	0.18	25.00	23.11
6. Width of rostrum X 100 / Length of rostrum	123.64	141.33	173.47	11.32	1.32	140.00	140.90
7. Paratoid lower edge interdental X 100 / Distance between mouth and lover edge of tympanum	140.00	169.51	195.00	13.97	1.62	171.43	170.00
8. Length of parotoid gland X 100 / Length of upper eye-lid	137.66	176.15	213.41	15.80	1.84	166.67	173.12
9. Length of rostrum X 100 / Distance of internasel	100.00	142.04	147.37	17.31	2.01	166.67	142.86
10. Width of upper eye-lid X 100 / Interorbital space	100.00	127.49	157.45	11.40	1.32	125.00	127.06
11. Distance between from nostril opening to front eye X 100 / Distance between parotoids gland	75.00	103.36	140.00	11.60	1.35	100.00	100.00
12. Length of head X 100 / Length of head and body	24.95	26.80	31.34	1.43	0.17	25.07	26.49
13. Width of head X 100 / Length of head	107.24	129.87	162.87	11.98	1.39	115.38	127.94
14. Length of tibia X 100 / Length of head and body	32.55	36.32	40.55	1.80	0.21	32.55	36.34
15. Length of finger matatarsal tubercle X 100 / Length of tibia	15.38	18.28	22.35	1.50	0.17	18.18	18.05
16. Length of head X 100 / Width of head	57.85	77.59	93.25	6.57	0.76	68.24	78.16
17. Distance of internasel X 100 / Interorbital space	73.21	94.99	121.62	10.16	1.18	100.00	94.44
18. Interorbital space X 100 / Width of upper eye-lid	63.51	79.09	100.00	7.52	0.87	80.00	78.71
19. Length of foot X 100 / Length of finge matatarsal tubercle	527.78	647.04	761.90	47.12	5.48	616.00	647.53
20. Width of first hand finger X 100 / Length of first hand finger	35.71	46.83	71.70	5.83	0.68	50.00	47.16

Table :23 The Indexes of Eastern Anatolian region on *Bufo viridis* (♂♂)

	PROPORTIONS	Min.	Mean	Max.	SD	SE	Mode	Median
1.	Length of head and body X 100 / Length of head	346.19	387.91	414.44	19.17	6.39	346.19	394.55
2.	Length of femur X 100 / Length of tibia	94.12	99.34	101.06	2.03	0.68	100.00	100.00
3.	Length of head and body X 100 / Length of femur	245.32	264.89	281.54	11.25	3.75	245.32	267.58
4.	Length of first finger of foot X 100 / Length of finger matatarsal tubercle	100.00	112.95	128.26	10.46	3.49	100.00	112.20
5.	Length of parotoid gland X 100 / Length of head and body	20.80	22.75	24.27	1.22	0.41	20.80	23.04
6.	Width of rostrum X 100 / Length of rostrum	121.13	139.95	161.67	12.26	4.09	121.13	142.62
7.	Paratoid lower edge interdental X 100 / Distance between mouth and lover edge of tympanum	155.56	172.88	187.80	11.34	3.78	155.56	175.00
8.	Length of parotoid gland X 100 / Length of upper eye-lid	172.55	188.67	210.84	13.98	4.66	172.55	185.88
9.	Length of rostrum X 100 / Distance of internasel	120.00	141.64	157.78	12.98	4.33	120.00	141.30
10.	Width of upper eye-lid X 100 / Interorbital space	109.43	120.84	132.00	7.54	2.51	346.19	394.55
11.	Distance between from nostril opening to front eye X 100 / Distance between parotoids gland	97.96	103.85	117.78	7.00	2.33	100.00	100.00
12.	Length of head X 100 / Length of head and body	24.13	25.84	28.89	1.35	0.45	24.13	25.35
13.	Width of head X 100 / Length of head	128.43	138.01	161.21	10.12	3.37	128.43	136.08
14.	Length of tibia X 100 / Length of head and body	35.93	38.07	40.76	1.66	0.55	35.93	37.87
15.	Length of finger matatarsal tubercle X 100 / Length of tibia	14.34	15.81	18.58	1.26	0.42	14.34	15.52
16.	Length of head X 100 / Width of head	62.03	72.78	77.87	4.93	1.64	62.03	73.48
17.	Distance of internasel X 100 / Interorbital space	80.36	90.17	102.00	7.06	2.35	80.36	91.07
18.	Interorbital space X 100 / Width of upper eye-lid	75.76	83.04	91.38	5.21	1.74	83.58	83.58
19.	Length of foot X 100 / Length of finge matatarsal tubercle	608.51	735.71	835.90	71.92	23.97	608.51	717.39
20.	Width of first hand finger X 100 / Length of first hand finger	48.75	54.29	58.67	3.66	1.22	53.01	53.01

Table :24 The Indexes of Eastern Anatolian region on *Bufo viridis* (♀)

	PROPORTIONS	Min.	Mean	Max.	SD	SE	Mode	Median
1.	Length of head and body X 100 / Length of head	349.24	387.98	414.62	20.40	4.45	349.24	395.00
2.	Length of femur X 100 / Length of tibia	96.18	100.80	105.13	2.62	0.57	100.00	100.00
3.	Length of head and body X 100 / Length of femur	259.18	277.07	298.15	13.77	3.01	259.18	277.08
4.	Length of first finger of foot X 100 / Length of finger matatarsal tubercle	100.00	109.23	126.83	8.10	1.77	100.00	107.14
5.	Length of parotoid gland X 100 / Length of head and body	20.21	22.43	25.26	1.55	0.34	20.21	22.09
6.	Width of rostrum X 100 / Length of rostrum	116.67	140.47	152.38	9.23	2.01	143.28	143.28
7.	Paratoid lower edge interdental X 100 / Distance between mouth and lover edge of tympanum	149.18	165.22	195.00	10.22	2.23	162.00	163.64
8.	Length of parotoid gland X 100 / Length of upper eye-lid	147.69	187.32	215.38	16.45	3.59	147.69	187.30
9.	Length of rostrum X 100 / Distance of internasel	130.56	145.03	162.16	9.37	2.05	154.76	142.55
10.	Width of upper eye-lid X 100 / Interorbital space	108.33	123.30	145.71	9.33	2.04	120.00	124.07
11.	Distance between from nostril opening to front eye X 100 / Distance between parotoids gland	97.73	106.31	124.39	9.29	2.03	100.00	100.00
12.	Length of head X 100 / Length of head and body	24.12	25.85	28.63	1.42	0.31	24.12	25.32
13.	Width of head X 100 / Length of head	121.21	135.88	153.85	7.20	1.57	121.21	137.08
14.	Length of tibia X 100 / Length of head and body	32.95	35.88	38.24	1.31	0.29	32.95	35.86
15.	Length of finger matatarsal tubercle X 100 / Length of tibia	15.47	17.18	19.41	0.93	0.20	17.00	17.00
16.	Length of head X 100 / Width of head	65.00	73.80	82.50	3.94	0.86	65.00	72.95
17.	Distance of internasel X 100 / Interorbital space	81.48	90.22	104.65	6.48	1.41	84.00	88.68
18.	Interorbital space X 100 / Width of upper eye-lid	68.63	81.54	92.31	6.10	1.33	83.33	80.60
19.	Length of foot X 100 / Length of finge matatarsal tubercle	564.29	676.29	729.27	43.31	9.45	702.27	693.10
20.	Width of first hand finger X 100 / Length of first hand finger	31.25	46.35	58.90	7.43	1.62	49.38	49.02

Table :25 The Indexes of Mediterranean region on *Bufo viridis* (♂)

	PROPORTIONS	Min.	Mean	Max.	SD	SE	Mode	Median
1.	Length of head and body X 100 / Length of head	365.31	389.16	419.05	13.98	2.98	365.31	385.51
2.	Length of femur X 100 / Length of tibia	96.26	99.88	108.14	2.62	0.56	100.00	100.00
3.	Length of head and body X 100 / Length of femur	222.89	263.90	295.05	15.10	3.22	270.83	263.96
4.	Length of first finger of foot X 100 / Length of finger matatarsal tubercle	100.00	110.52	130.43	8.74	1.86	100.00	110.87
5.	Length of parotoid gland X 100 / Length of head and body	19.69	21.59	23.64	1.18	0.25	19.69	21.64
6.	Width of rostrum X 100 / Length of rostrum	121.62	131.81	150.88	8.50	1.81	141.54	131.17
7.	Paratoid lower edge interdental X 100 / Distance between mouth and lover edge of tympanum	138.18	176.67	194.29	11.94	2.54	180.56	179.53
8.	Length of parotoid gland X 100 / Length of upper eye-lid	141.00	176.54	197.22	16.35	3.49	185.71	179.55
9.	Length of rostrum X 100 / Distance of internasel	139.02	146.94	158.54	5.26	1.12	150.00	145.38
10.	Width of upper eye-lid X 100 / Interorbital space	108.33	123.17	146.00	9.81	2.09	120.00	122.15
11.	Distance between from nostril opening to front eye X 100 / Distance between parotoids gland	100.00	100.87	110.00	2.45	0.52	100.00	100.00
12.	Length of head X 100 / Length of head and body	23.86	25.73	27.37	0.91	0.19	23.86	25.94
13.	Width of head X 100 / Length of head	114.29	132.20	149.35	9.64	2.05	114.29	132.55
14.	Length of tibia X 100 / Length of head and body	33.82	38.12	41.61	2.16	0.46	33.82	37.89
15.	Length of finger matatarsal tubercle X 100 / Length of tibia	15.06	16.89	19.89	1.33	0.28	15.06	16.74
16.	Length of head X 100 / Width of head	66.96	76.03	87.50	5.57	1.19	66.96	75.45
17.	Distance of internasel X 100 / Interorbital space	81.82	94.06	104.55	5.75	1.23	100.00	93.26
18.	Interorbital space X 100 / Width of upper eye-lid	68.49	81.67	92.31	6.38	1.36	83.33	81.87
19.	Length of foot X 100 / Length of finge matatarsal tubercle	600.00	693.38	755.88	42.54	9.07	600.00	698.57
20.	Width of first hand finger X 100 / Length of first hand finger	38.75	50.77	60.00	5.22	1.11	50.00	50.00

Table :26 The Indexes of Mediterranean region on *Bufo viridis* (♀)

PROPORTIONS	Min.	Mean	Max.	SD	SE	Mode	Median
1. Length of head and body X 100 / Length of head	334.67	377.11	428.57	26.29	3.88	334.67	378.05
2. Length of femur X 100 / Length of tibia	92.59	99.91	108.27	3.38	0.50	100.00	100.00
3. Length of head and body X 100 / Length of femur	248.24	270.51	308.67	13.20	1.95	283.33	271.39
4. Length of first finger of foot X 100 / Length of finger matatarsal tubercle	86.79	110.70	134.62	11.03	1.63	100.00	107.69
5. Length of parotoid gland X 100 / Length of head and body	19.28	22.65	26.52	1.80	0.26	19.28	22.64
6. Width of rostrum X 100 / Length of rostrum	112.90	135.10	157.78	11.15	1.64	140.00	136.09
7. Paratoid lower edge interdental X 100 / Distance between mouth and lover edge of tympanum	148.08	173.48	205.13	11.38	1.68	166.67	172.32
8. Length of parotoid gland X 100 / Length of upper eye-lid	142.86	170.41	193.33	13.96	2.06	156.25	172.69
9. Length of rostrum X 100 / Distance of internasel	119.05	145.08	170.00	12.68	1.87	125.00	143.96
10. Width of upper eye-lid X 100 / Interorbital space	102.22	124.21	157.14	12.37	1.82	125.00	124.16
11. Distance between from nostril opening to front eye X 100 / Distance between parotoids gland	85.71	104.66	143.33	13.75	2.03	100.00	100.00
12. Length of head X 100 / Length of head and body	23.33	26.64	29.88	1.85	0.27	23.33	26.45
13. Width of head X 100 / Length of head	116.78	132.19	152.17	9.34	1.38	126.40	131.23
14. Length of tibia X 100 / Length of head and body	32.08	37.11	40.88	1.84	0.27	38.12	37.04
15. Length of finger matatarsal tubercle X 100 / Length of tibia	13.07	17.52	22.58	2.03	0.30	13.07	17.26
16. Length of head X 100 / Width of head	65.71	76.01	85.63	5.24	0.77	79.11	76.20
17. Distance of internasel X 100 / Interorbital space	75.00	93.10	127.33	12.38	1.83	100.00	90.12
18. Interorbital space X 100 / Width of upper eye-lid	63.14	81.26	97.83	7.79	1.15	80.00	80.54
19. Length of foot X 100 / Length of finge matatarsal tubercle	525.64	659.62	875.00	71.65	10.56	610.00	666.25
20. Width of first hand finger X 100 / Length of first hand finger	33.25	42.86	55.00	4.13	0.61	46.67	43.00

Table :27 The Indexes of Hatay-Gaziantep-Kahramanmaraş region on *Bufo viridis* (♂)

PROPORTIONS	Min.	Mean	Max.	SD	SE	Mode	Median
1. Length of head and body X 100 / Length of head	361.88	367.83	413.41	17.04	4.02	361.88	383.26
2. Length of femur X 100 / Length of tibia	93.45	98.65	105.59	2.86	0.67	100.00	98.52
3. Length of head and body X 100 / Length of femur	237.23	255.84	274.71	11.05	2.61	237.23	253.22
4. Length of first finger of foot X 100 / Length of finger matatarsal tubercle	100.00	112.47	145.95	14.07	3.32	100.00	106.25
5. Length of parotoid gland X 100 / Length of head and body	19.65	22.87	25.00	1.64	0.38	19.65	22.25
6. Width of rostrum X 100 / Length of rostrum	121.74	136.87	161.19	11.31	2.67	123.53	133.86
7. Paratoid lower edge interdental X 100 / Distance between mouth and lover edge of tympanum	157.45	170.84	186.05	9.33	2.20	159.57	170.21
8. Length of parotoid gland X 100 / Length of upper eye-lid	152.22	179.85	236.49	18.25	4.30	152.22	177.14
9. Length of rostrum X 100 / Distance of internasel	122.22	141.51	151.11	8.50	2.00	146.81	143.38
10. Width of upper eye-lid X 100 / Interorbital space	101.64	121.31	145.45	14.44	3.40	101.64	119.31
11. Distance between from nostril opening to front eye X 100 / Distance between parotoids gland	87.27	109.11	121.74	9.86	2.32	114.89	112.37
12. Length of head X 100 / Length of head and body	24.19	25.83	27.63	1.13	0.27	24.19	26.09
13. Width of head X 100 / Length of head	123.20	143.93	162.57	13.23	3.12	123.20	142.60
14. Length of tibia X 100 / Length of head and body	36.95	39.70	41.58	1.44	0.34	36.95	40.06
15. Length of finger matatarsal tubercle X 100 / Length of tibia	14.02	16.01	20.10	1.59	0.37	14.29	15.66
16. Length of head X 100 / Width of head	61.51	70.04	81.17	6.56	1.55	61.51	70.17
17. Distance of internasel X 100 / Interorbital space	72.13	90.68	112.50	12.20	2.87	79.66	89.42
18. Interorbital space X 100 / Width of upper eye-lid	68.75	83.53	98.39	9.81	2.31	68.75	83.87
19. Length of foot X 100 / Length of finge matatarsal tubercle	623.81	724.59	821.62	55.79	13.15	623.81	724.20
20. Width of first hand finger X 100 / Length of first hand finger	48.31	54.03	59.74	3.41	0.80	53.33	54.36

Table :28 The Indexes of Hatay-Gaziantep-Kahramanmaraş region on *Bufo viridis* (♀)

PROPORTIONS	Min.	Mean	Max.	SD	SE	Mode	Median
1. Length of head and body X 100 / Length of head	335.52	372.41	430.77	23.62	4.31	335.52	367.53
2. Length of femur X 100 / Length of tibia	91.15	99.17	107.36	3.13	0.57	100.00	100.00
3. Length of head and body X 100 / Length of femur	248.56	270.43	296.72	13.39	2.45	248.56	267.86
4. Length of first finger of foot X 100 / Length of finger matatarsal tubercle	100.00	113.26	145.71	13.75	2.51	100.00	110.10
5. Length of parotoid gland X 100 / Length of head and body	18.88	22.21	26.49	1.92	0.35	18.88	22.02
6. Width of rostrum X 100 / Length of rostrum	119.70	140.09	162.00	9.72	1.77	132.81	138.53
7. Paratoid lower edge interdental X 100 / Distance between mouth and lover edge of tympanum	154.29	171.96	188.57	9.01	1.65	165.00	172.59
8. Length of parotoid gland X 100 / Length of upper eye-lid	151.67	174.54	194.37	12.01	2.19	151.67	174.11
9. Length of rostrum X 100 / Distance of internasel	110.91	140.38	177.14	14.37	2.62	122.22	137.05
10. Width of upper eye-lid X 100 / Interorbital space	78.57	122.98	171.40	20.04	3.66	116.22	120.48
11. Distance between from nostril opening to front eye X 100 / Distance between parotoids gland	86.67	104.88	134.15	13.29	2.43	100.00	100.00
12. Length of head X 100 / Length of head and body	23.21	26.95	29.80	1.65	0.30	23.21	27.21
13. Width of head X 100 / Length of head	109.29	129.60	180.29	14.04	2.56	109.29	126.45
14. Length of tibia X 100 / Length of head and body	33.07	37.40	41.08	1.99	0.36	33.70	37.42
15. Length of finger matatarsal tubercle X 100 / Length of tibia	14.06	17.60	22.50	2.04	0.37	14.06	17.65
16. Length of head X 100 / Width of head	55.47	77.94	91.50	7.55	1.38	55.47	79.09
17. Distance of internasel X 100 / Interorbital space	65.71	93.27	116.28	13.28	2.43	100.00	97.57
18. Interorbital space X 100 / Width of upper eye-lid	55.13	83.49	127.27	14.38	2.63	86.05	83.00
19. Length of foot X 100 / Length of finge matatarsal tubercle	542.22	664.45	791.67	64.61	11.80	542.22	659.55
20. Width of first hand finger X 100 / Length of first hand finger	35.90	45.61	55.45	5.32	0.97	44.12	45.45

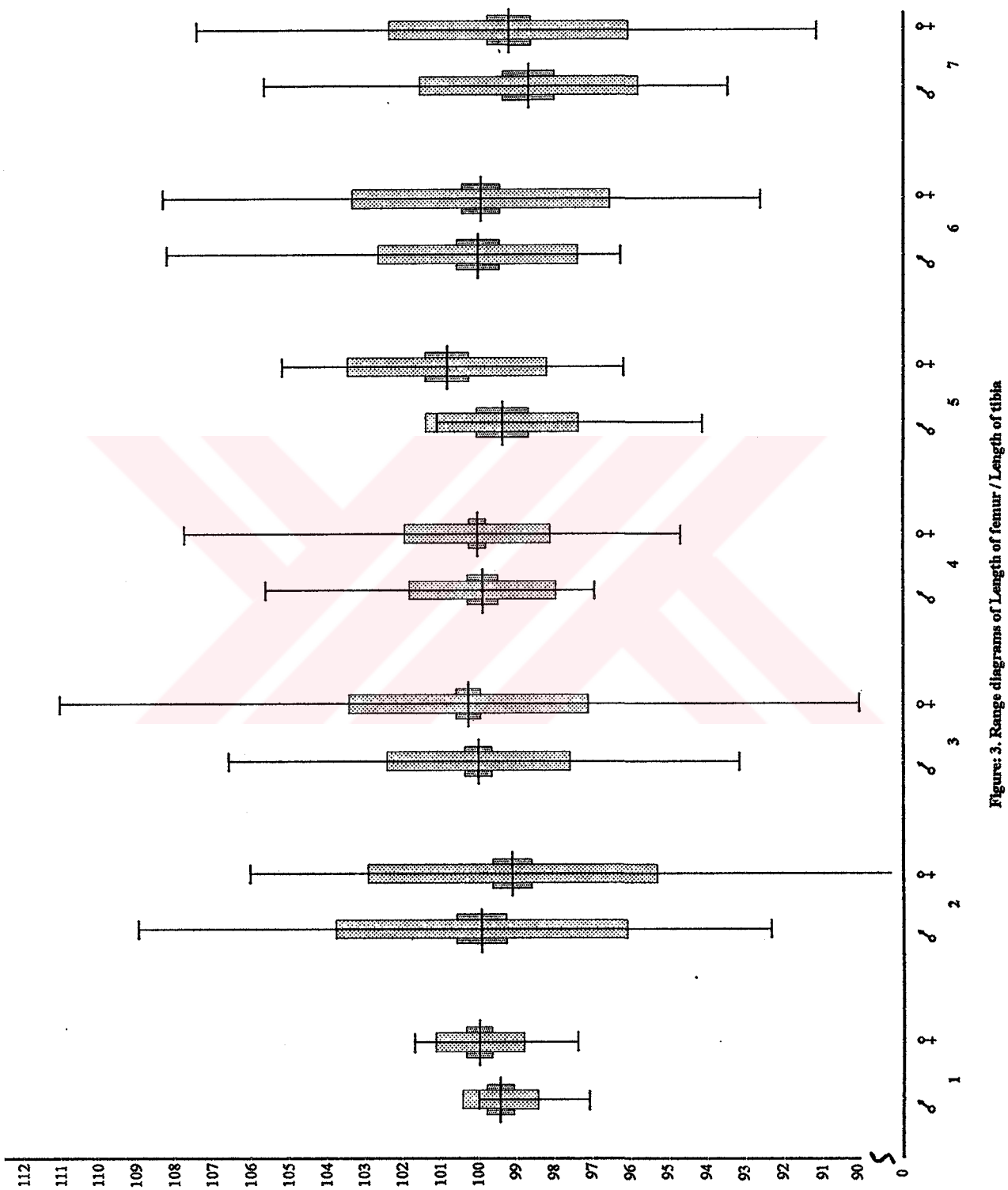


Figure: 3. Range diagrams of Length of femur / Length of tibia

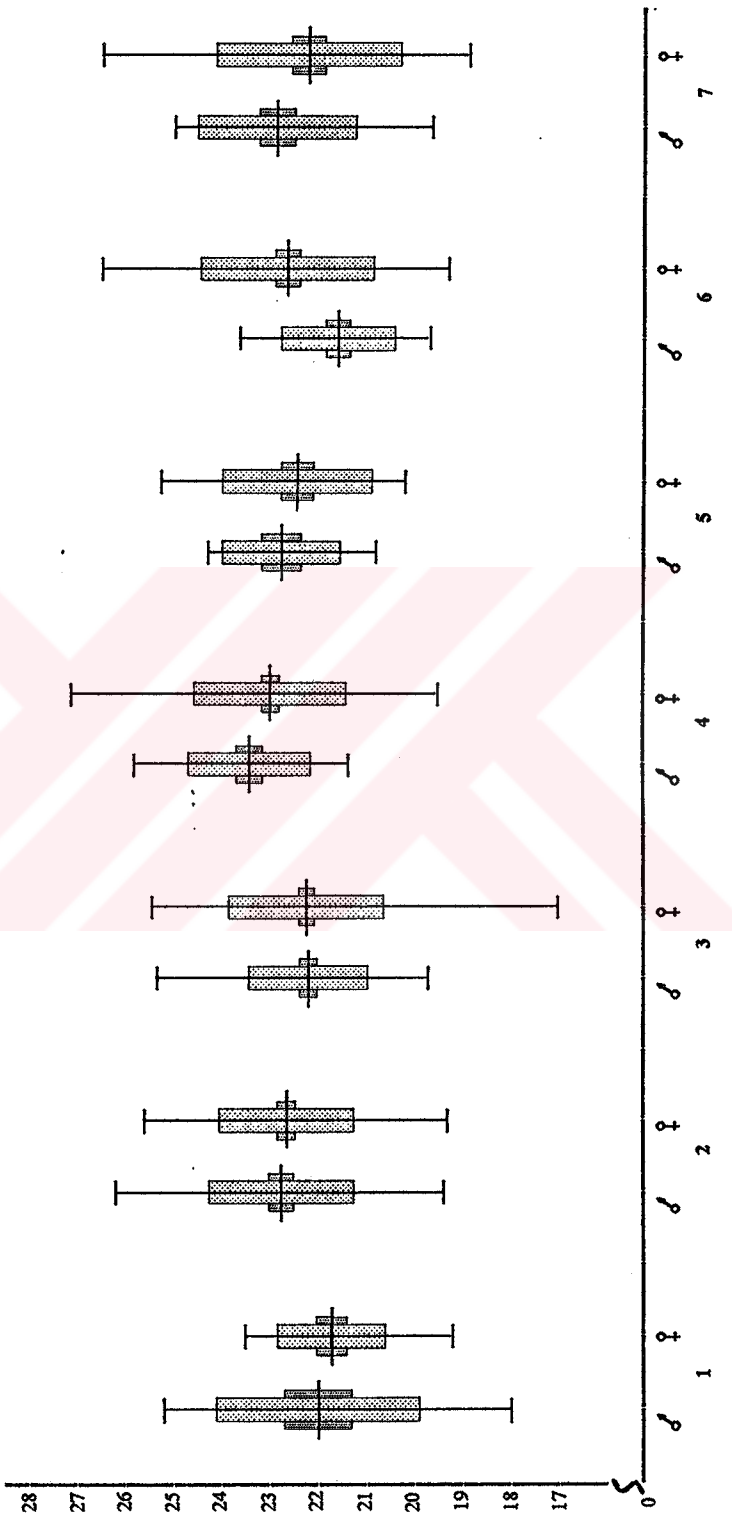


Figure: 4. Range diagrams of Length of parotoid glands / Length of head and body

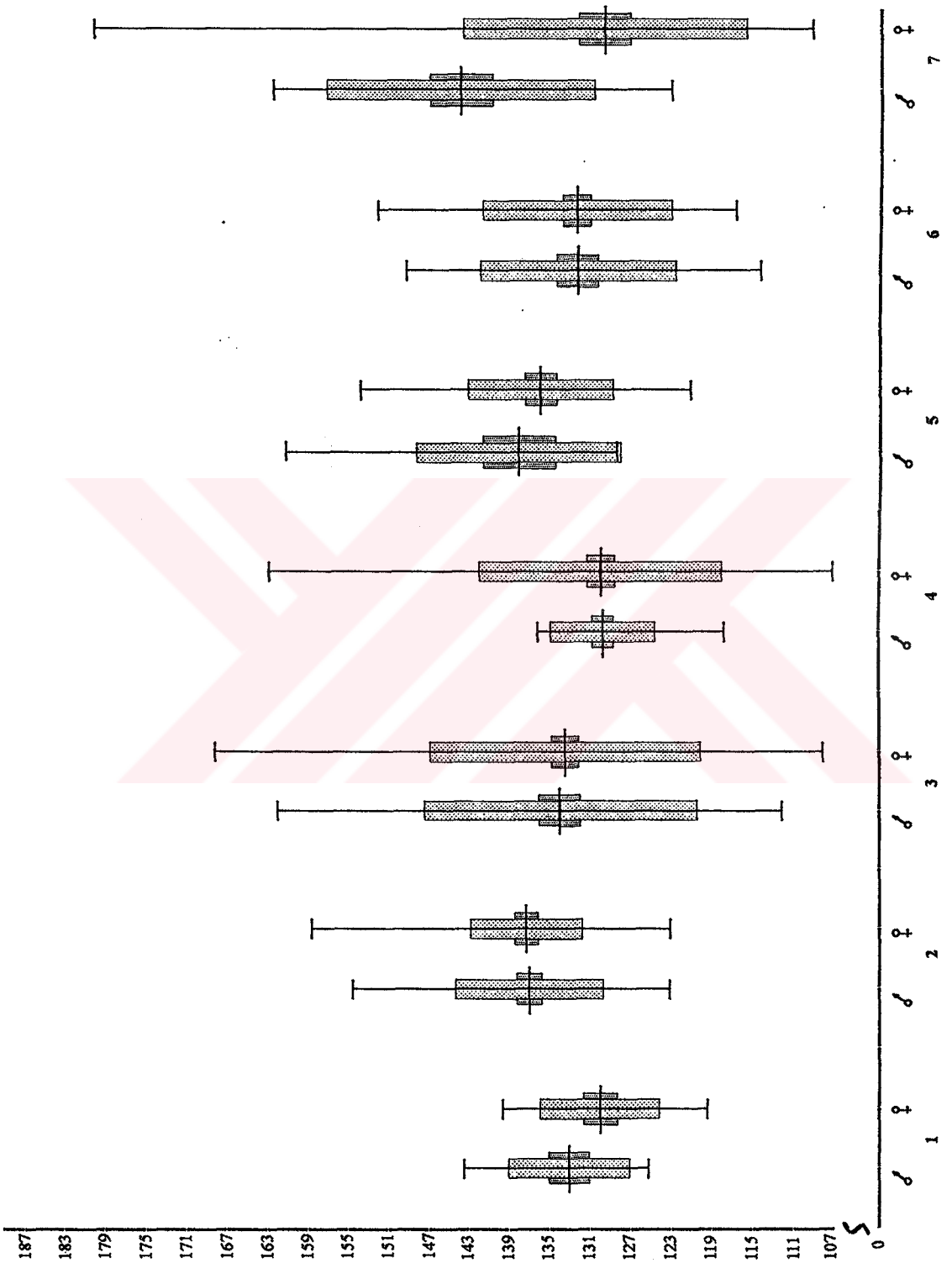


Figure: 5. Range diagrams of Width of head / Length of head

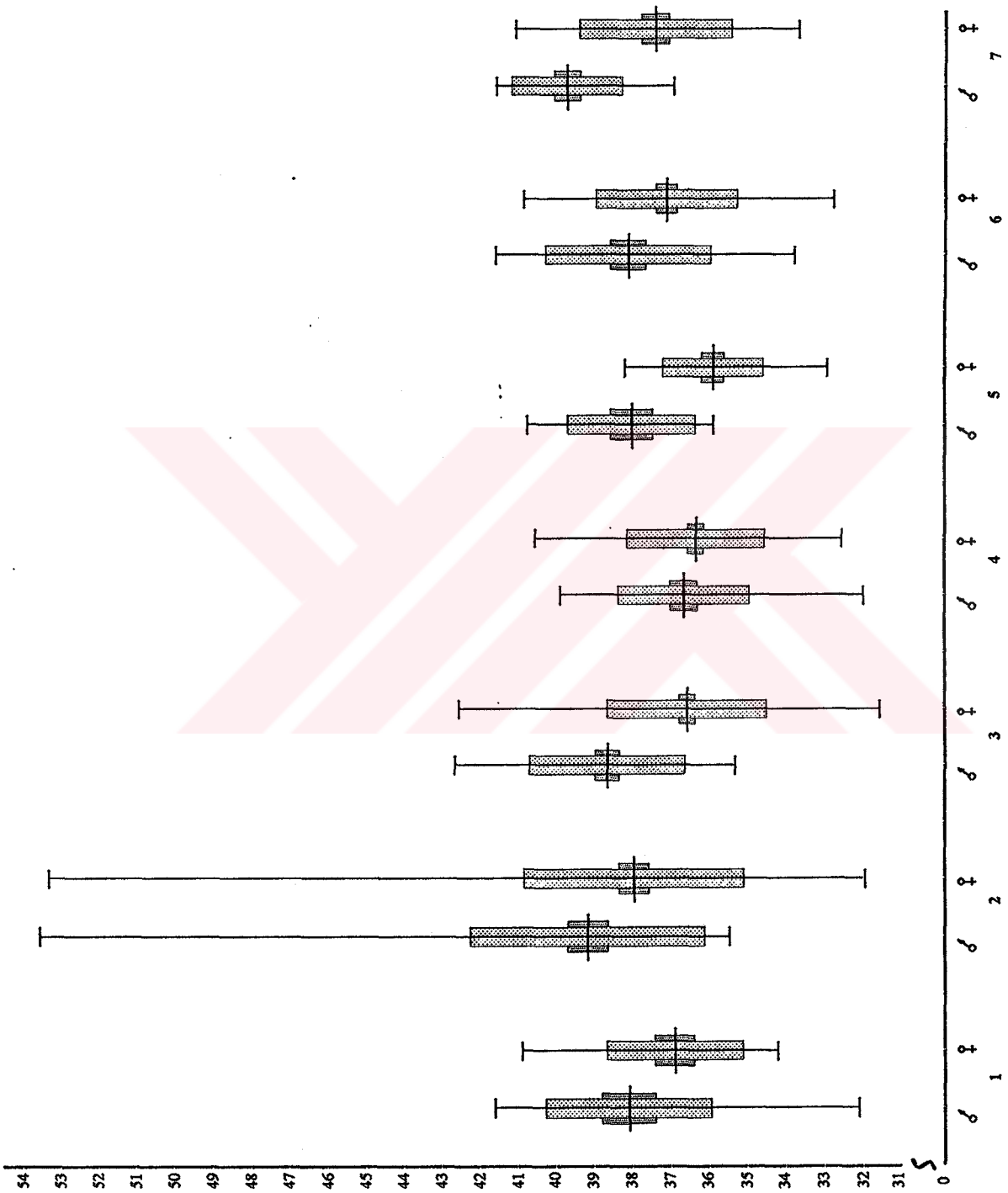


Figure: 6. Range diagrams of Length of tibia / Length of head and body

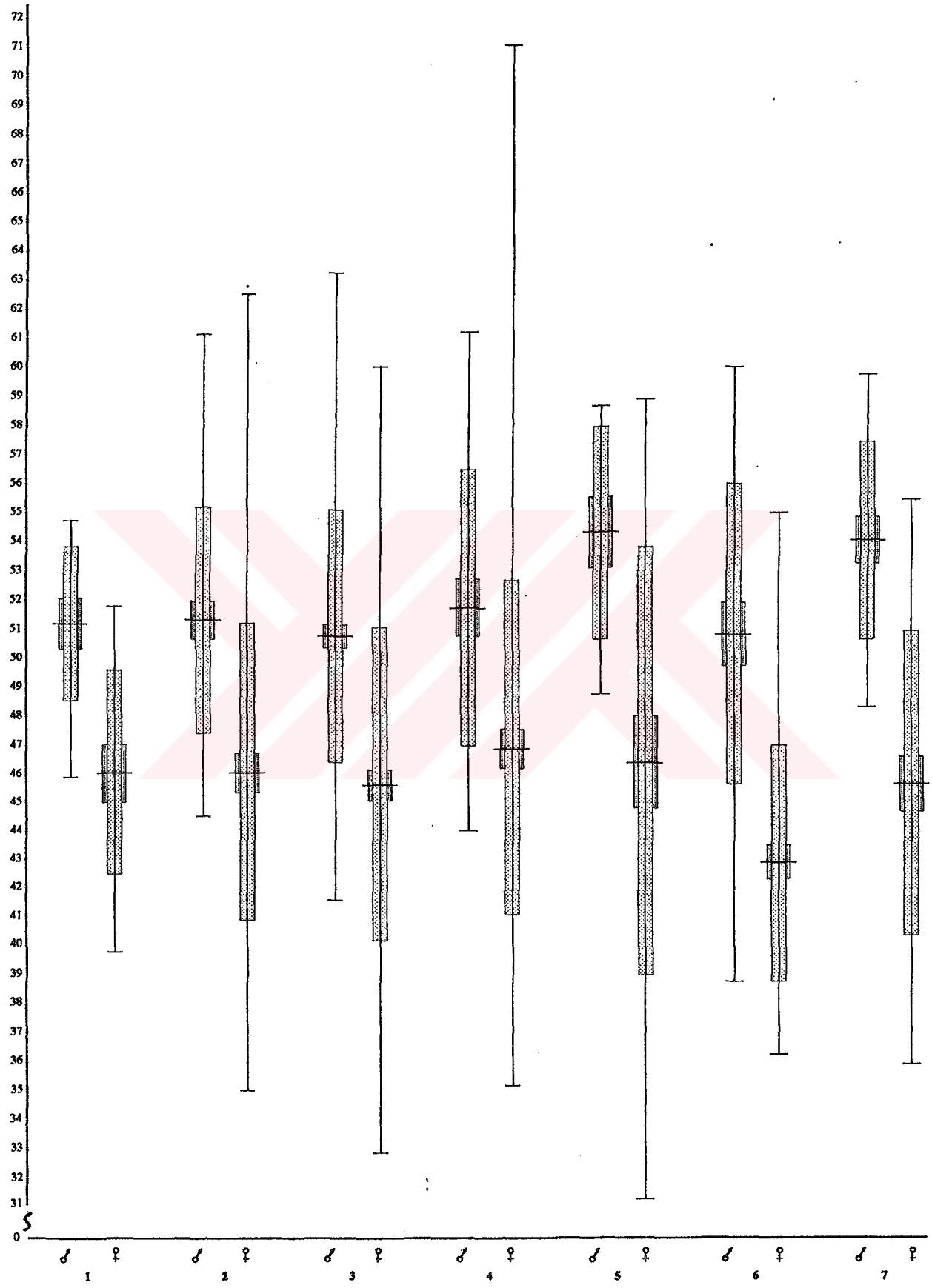


Figure: 8. Range diagrams of Width of first han finger / Length of first hand finger

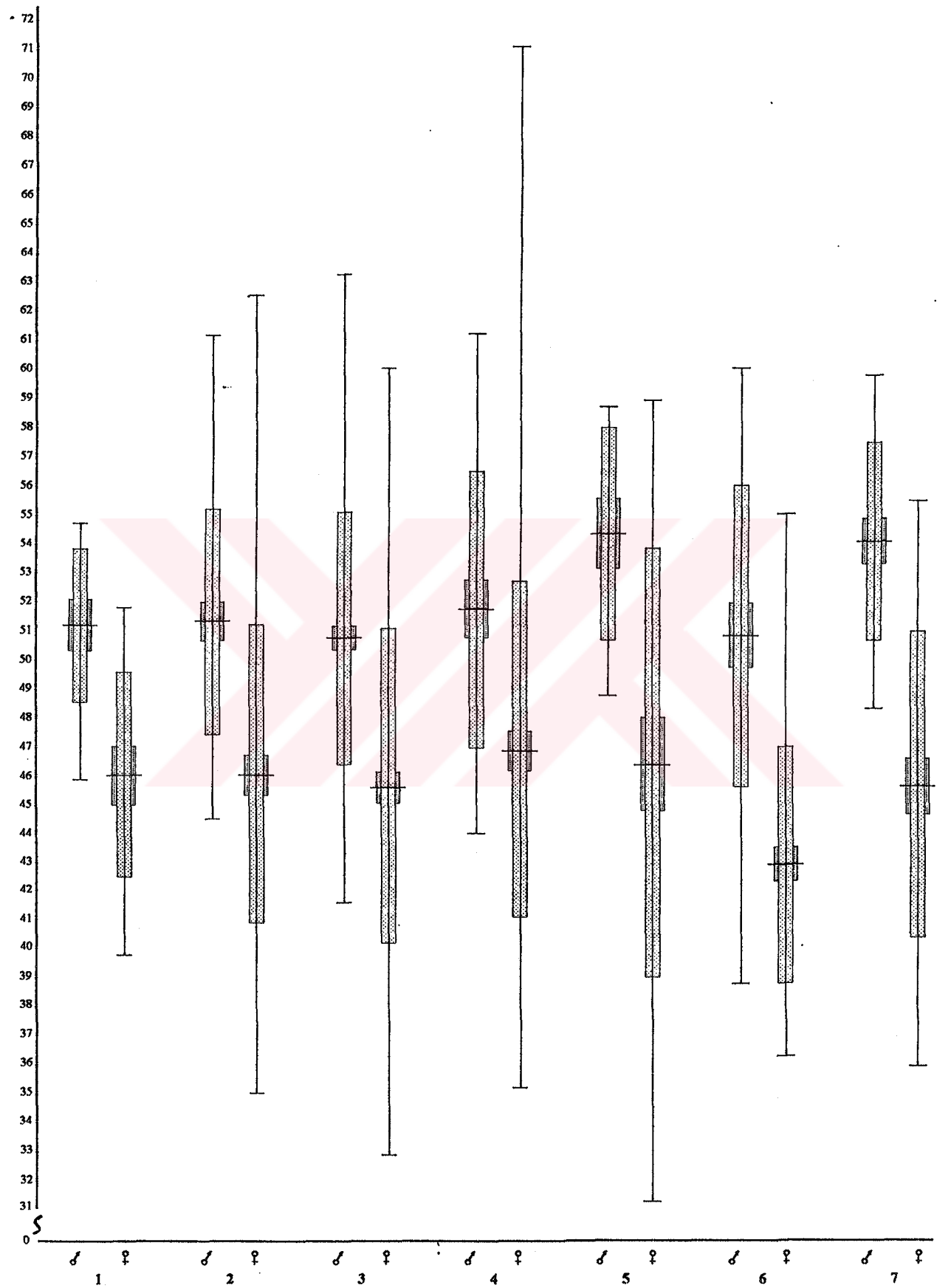


Figure: 8. Range diagrams of Width of first hand finger / Length of first hand finger

3.2 Color and pattern

When we examine the color - pattern conditions, for the *Bufo viridis* samples that are collected from different regions of Turkey, different designs are determined. In this color - pattern discrimination, the related studies of Eiselt - Schmidtler (1973), Yılmaz (1984), (1989) and Yılmaz - Uğurtaş (1990) are taken into consideration.

The color of the ridge ground of *B. viridis* forms a color range from greyish green to alive brown on it there are spots with the colors from darkbrown - green to light green and these spots are of different shapes and sizes. According to these color - patterns and spots, five different types are discriminated. Photographs of each sample of them are taken and their pictures are drawn (Fig. 9-10)

Figure: 9 Determined colour pattern type photo

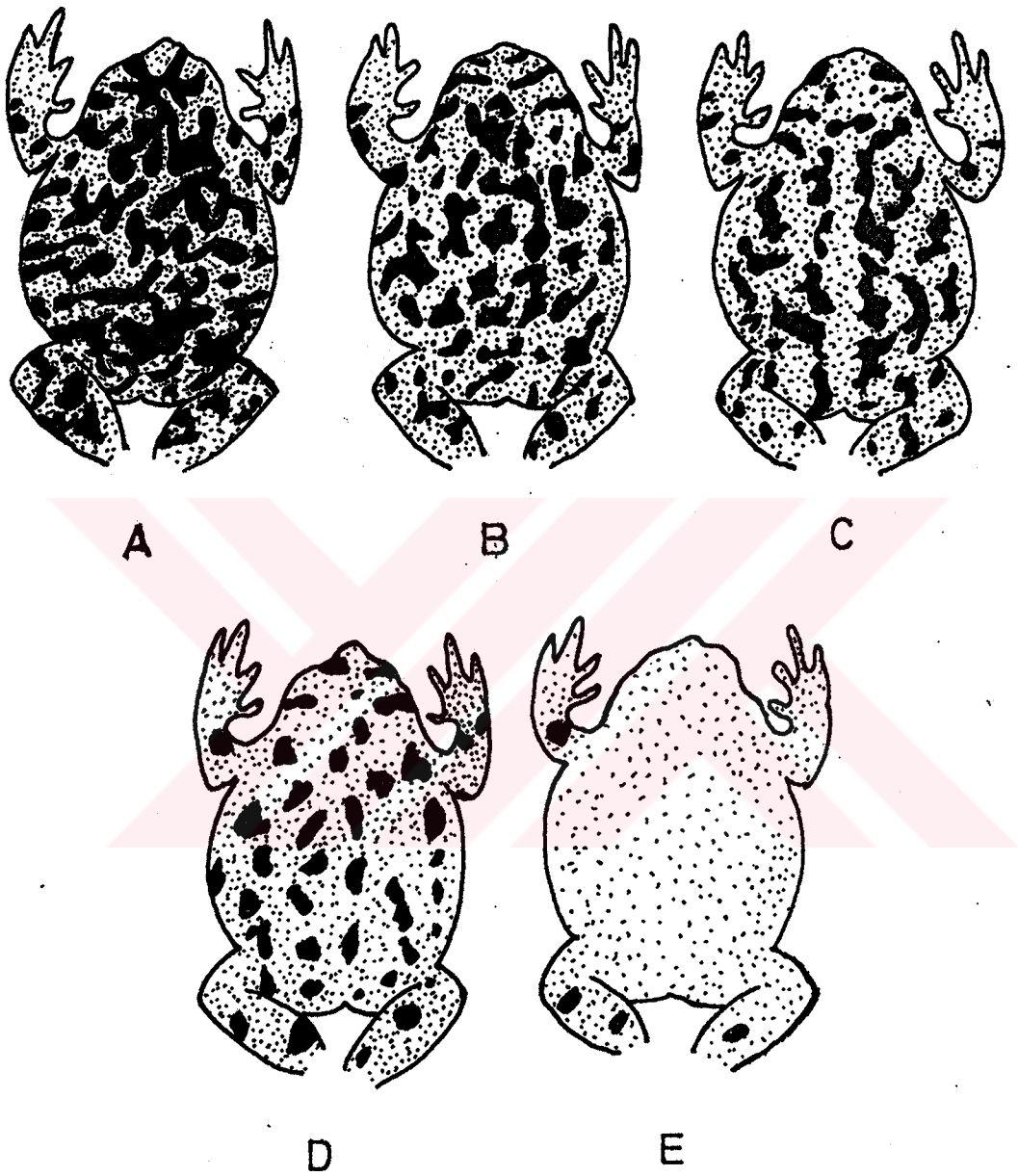


Figure: 10 Determined five type of pattern samples

So:

A type : Large and dark back spots are restless and disordered. This type has the most spots.

B type : Dorsal spots are composite with double. In the middle of the back, sometimes there is a spotless part.

C type : In the middle of the dorsum there is a light - colored line. Around this line there are small non-composite spots.

D type : Spots on the dorsum are infrequent and single.

E type : The spots on the dorsum are very rare and indistinct.

The ground colors are darker green in males in comparison to females. For females the ground color is lighter so the spots are more striking and generally it is possible to compare the males and females.

Further more, young *B. viridis* that has just completed his metamorphosis has small, frequent, single spots on his dorsum. But later these small probably come together and then become composite.

The distribution of the samples that are collected from several regions in terms of color - pattern types is seen in table 29. Also there are column graphics that show color - pattern conditions according to the regions (Fig. 11-14) .

These rates are seen when we examine the color - pattern distribution of the *B. viridis* samples which we collected from different parts of Turkey:

A type : 39,6 %

B type : 49,7 %

C type : 7,1 %

D type : 2,2 %

E type : 1,4 %

Also among the regions there are color - pattern differences.

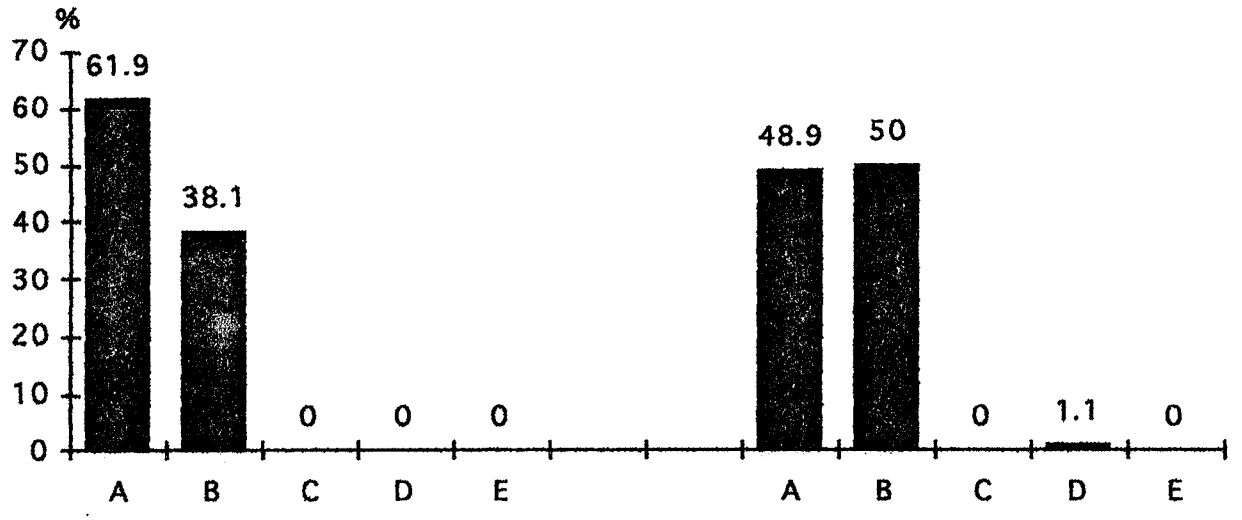


Figure 11. Thrace and Black Sea Region.

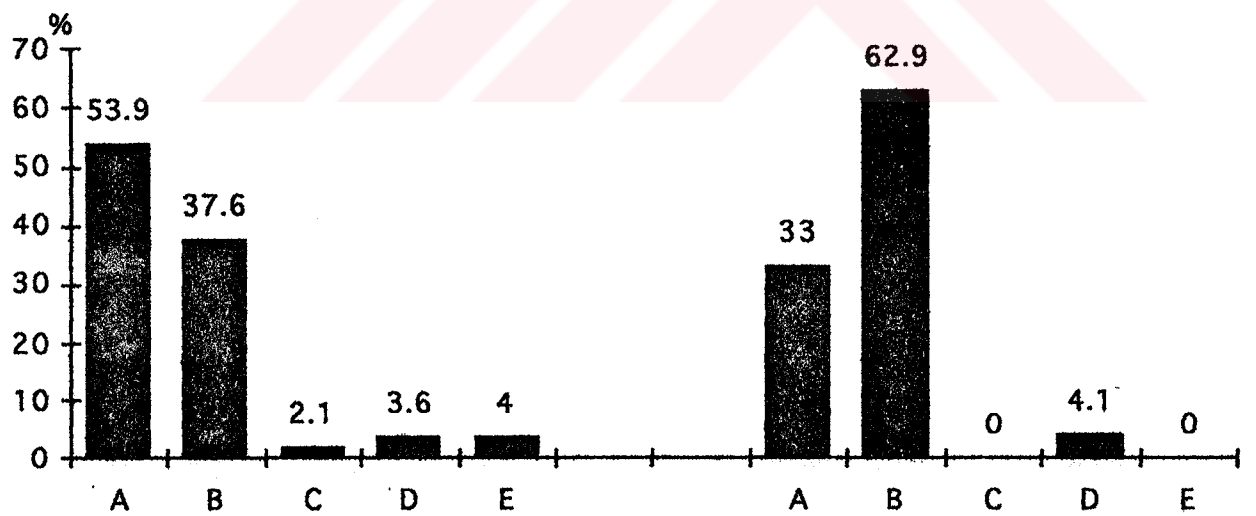


Figure 12. Aegean and Central Anatolian Region.

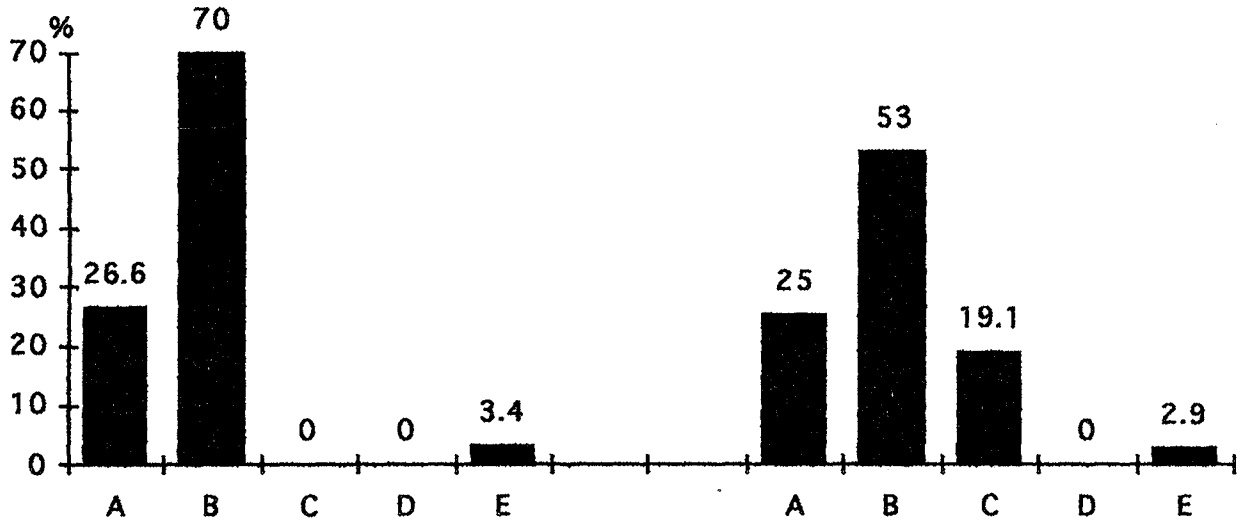


Figure 13. Eastern Anatolian and Mediterranean Region.

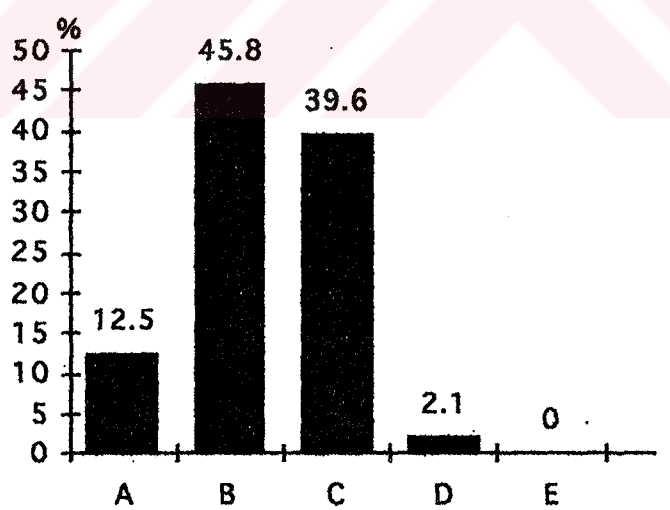


Figure 14. Hatay-Gaziantep-Kahramanmaraş Region.

Table : 29 *Bufo viridis* color - pattern distribution in terms of regions:

1 st. Region : Sample number : 21

(Thrace)	A type:	61,9%	B type:	38,1%
	4 ♂	9 ♀	5 ♂	3 ♀

2 nd. Region : Sample number : 90

(Black Sea)	A type:	48,9%	B type	50%	D type	1,1%
	13 ♂	31 ♀	21 ♂	24 ♀	1 ♂	

3 rd. Region : Sample number : 141

(Aegean)	A type:	53,9%	B type:	37,6%	C type:	2,1%
	15 ♂	61 ♀	21 ♂	32 ♀	1 ♂	2 ♀
	D type:	3,6%	E type:2,8%			
	3 ♂	2 ♀	4 ♂			

4 th. Region : Sample number : 97

(Central	A type:	33%	B type:	62,9%	D type:	4,1%
Anatolia)	8 ♂	24 ♀	13 ♂	48 ♀	2 ♂	2 ♀

5 th. Region : Sample number 30

(Eastern	A type:	26,6%	B type:	70%	E type:	3,4%
Anatolia)	1 ♂	7 ♀	7 ♂	14 ♀	1 ♂	

6 th. Region : Sample number : 68

(Mediterranean)	A type:	25%	B type:	53%	C type:	19,1%
	4 ♂	13 ♀	10 ♂	26 ♀	6 ♂	7 ♀
	E type:2,9%					
	2 ♂					

7 th. Region : Sample number : 48 (Adana - Gaziantep - Kahramanmaraş)

	A type:	12,5%	B type:	45,8%	C type:	39,6%
	2 ♂	4 ♀	7 ♂	15 ♀	9 ♂	10 ♀
	D type:	2,1%				
	1 ♂					

3.3. Biology of Feeding

In the begining of the larval stage, they are herbiverous, the larvae that is close to metamorphosis and matures are carnivorous. In order to examine the features of nourrishment biology of *B. viridis*, the samples that are collected from different regions died as soon as they caught, that is, before the aliments are digested. Although they come out of water also in daytime to spawn in the reproduction season, in other times they eat near the gardens, in wet and sandy places after the sky darkened. They are seen in city centres after the people and noise become less, near the gardens after midnight, around gyms, in parks. Especially at times that city and people noise is less they are seen near the lights or the places where some insects gather.

The samples from several regions in Turkey are collected at nights mostly between 22.00 and 04.00. In order that the variation of stomach contents to be rich, the stomachs of the samples from different regions such as Tekirdağ, Edremit, Izmir, Bursa, Eskişehir, Çorum, Sivas, Kayseri are opened.

The stomach of the samples that biometric measures are completed are opened and cut from pilor and cardia. Before opening in the 70% alcohol-contained vessel with the overflowing method they found out their stomachs size. Some samples of stomach are given in fig. 15. In the aliments that are brought out from the stomach mostly consist of animals. Some of these animals can be sistematically determined but some cannot. Moreover in many stomach some plants and some small pieces of stones are seen. The systematics of these aliment animals are made mostly on classis and ordo levels and some of them are made on family level. The volumes of the empty stomachs are measured again and total food volumes are found.

The general systematic of the animals that are brought out from the stomach of *B. viridis*:

Classis	**Ordo**	**Subordo**	**Family**	
Insecta	Coleoptera	-	Carabidae	(on 23 samples)
"	"	-	" larva	(on 1 sample)
"	"	-	Tenebrionidae	(on 1 sample)
"	"	-	Dermestidae larva	(on 1 sample)
"	"	-	Elateridae larva	(on 1 sample)

Classis	Ordo	Subordo	Family	
"	"	-	Staphylinidae	(on 3 samples)
"	"	-	Lampyridae	(on 4 samples)
"	"	-	Curculionidae	(on 2 samples)
"	"	-	Cerambycidae	(on 1 sample)
"	"	-	Coccinellidae	(on 2 samples)
"	"	-	Chrysomelidae	(on 1 sample)
"	Plecoptera	-	Perlodidae	(on 1 sample)
"	Hymenoptera	-	Formicidae	(on 1 sample)
Insecta	Hymenoptera	-	Vespidae	(on 1 sample)
"	"	-	Tenthredinidae	(on 4 samples)
"	Hemiptera	Heteroptera	Reduviidae	(on 1 sample)
"	"	"	Pentatomidae	(on 5 samples)
"	"	"	Pyrrhocoridae	(on 1 sample)
"	Diptera	Nematacera	Culicidae	(on 10 samples)
"	"	Brachycera	Muscidae	(on 6 samples)
Oligochceta	-	-	Lumbricidae	(on 1 sample)
Arachnida	Areneae	-	-	(on 16 samples)
"	Acarina	-	-	(on 1 sample)
Crustacea	Isopoda	-	Sphaeromidae	(on 17 samples)
Gastropoda	-	-	Lymacidae	(on 2 samples)
"	-	-		"
Myriapoda	Geophilomorpha	-	Geophilidae	(on 3 samples)
"	Juliformia	-	Julidae	(on 1 sample)
"	Diplopoda	-		(on 2 samples)
"	Chilopoda	-	Lithobiidae	(on 1 sample)
Amfibia	Anura	-		"

As it is seen in the list the *B. viridis* type that has a quite big menu is a useful amphibian in the name of biological fight against insects. Here a juvenil can be given as an example for this. As this juvenil has no head and as it is very small, this aliment cannot be discriminated thoroughly and it is most probably the juvenil of its own kind or the juvenil of *Bufo bufo*.

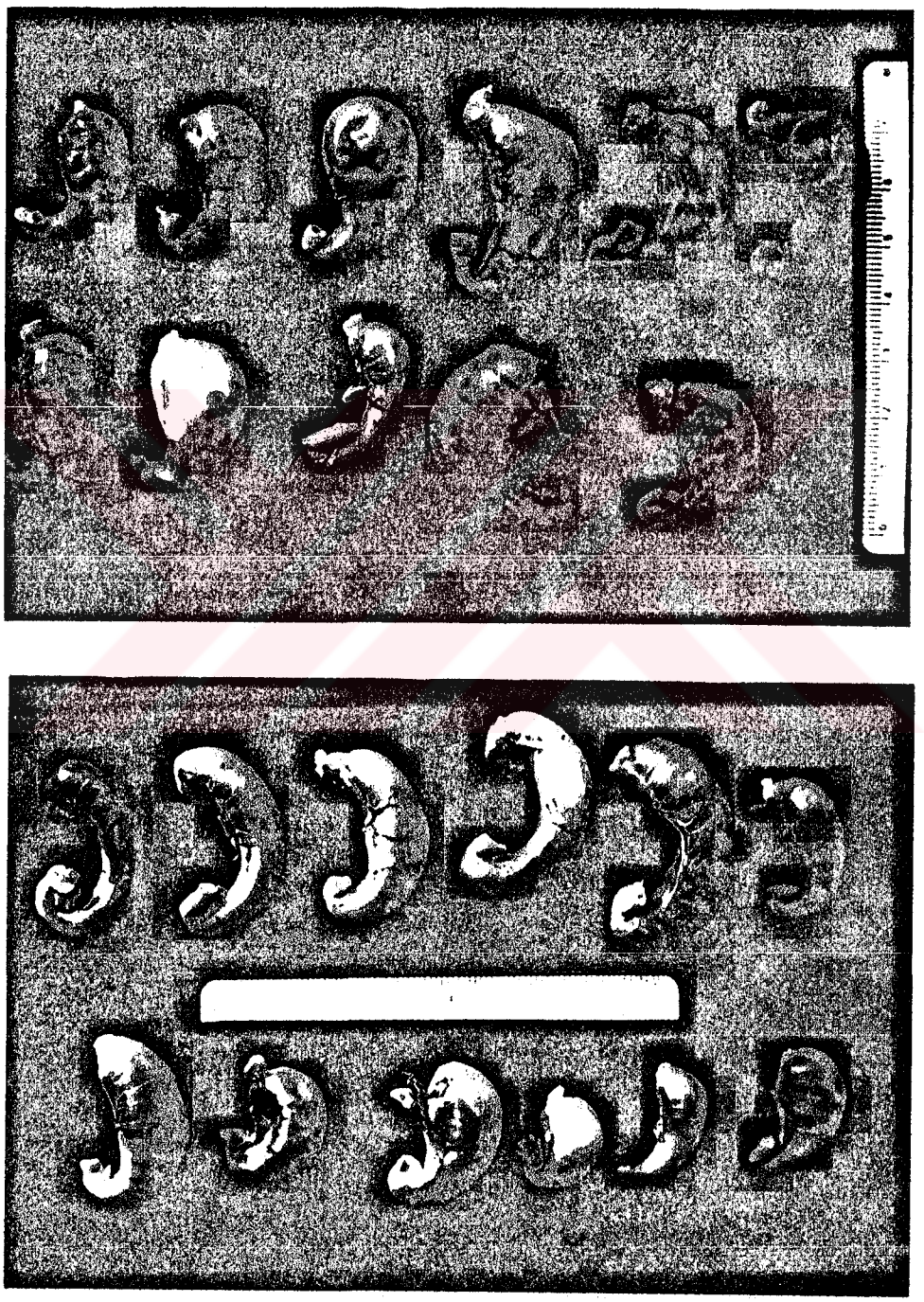


Figure: 15 Some samples of stomach

3.4. Biology of Reproduction

About the reproduction biology of *B. viridis* , no sources are available expect the ones that belong to Çaydam (1974) and Yılmaz (1984).

The reproduction time can last from January until June due to the climate conditions.

In the appropriate climate conditions, in shallow water masses there is a lot of samples of amplexus condition. From the males and females that are in amplexus condition, generally the males are smaller and they are on the females. Male passes their front legs through the females armpits. He grasps her from her breast. Male's first finger of his front foot and many of their 2nd and 3rd fingers have corns in the reproduction season (Fig. 16).

Figure: 16 Corny front food digits of a male *B. viridis.*

These corns prevent the females from slipping. In the amplexus condition when the female is on the back of the male, she can walk comfortably and she can carry the male.

In the researches on 27-February-1995, at a time that the weather was temporarly hot, two *B. viridis* on the condition of amplexus were seen in a pool where there was a shallow water. A week later in the same pool and also in some other pools, there were alot of *B. viridis* on the condition of amplexus

and also egg cords. At the some date *B. viridis* on amplexus condition and egg cords were seen in shallow parts of the Karşıyaka - Bostanlı stream. On May.24.1995 a *B. viridis* couple on the amplexus condition and that was spawning was seen in the pool where researches were made before.

In the same pools on 29.March.1993 and 17.April.1988, at the regions Adana-Eskibaraj and Adana-Yenibaraj in shallow waters there were *B.viridis* on amplexus condition. At the same times when there were researches, near wet gardens at nights no *B. viridis* were seen. They were seen only in shallow waters. On 24.June.1994 in Kayseri and around city centre while some researches were being made some male and female *B. viridis* were seen on the amplexus condition in shallow waters.

About mating of *B. viridis* , it is stated that there is spawning at the end of April in England, and in August in Germany (Boulenger 1898). Çaydam (1974) states that spawning starts in January or February in Izmir. According to Yılmaz (1984) the beginning and ending dates of reproduction are the same as we stated before. In our research, spawning lasts until March or May. this shows us spawning depends upon heat and rain and so it can spread over a long time.

An artifical pool was prepared in the garden of Buca Faculty of Education where *B. viridis* could spawn in February, 1993 (Fig. 17). At the beginning of March, 2 males and a female were seen in the big pool at the Faculty of Education. These samples were taken and put into the artifical pool to spawn. But the next day it was seen that these animals didn't spawn and they ran away.

On 29.3.1993, some eggs and *B. viridis* were seen in the big pool in which there is 10 cm water. Some of these eggs were taken to lab and put into the aquarium. On 31.3.1993, the larvae started to pierce through the eggs. For feeding they were put into the fresh algea water everday. This water is aired at certain intervals.

On 1.5.1995, *B. viridis* that completed their metamorphosis were taken outside (the 64th day). Until 19.5.1995, all the metamorphosis was completed.

In the group that we started to examine in 1993, in the eggs that were put by different *B. viridis* at the some date it was seen that the metamorphosis period was quite different. Altough the first juvenils started to be seen on 24.May, the last *B. viridis* did not complete its metamorphosis until 21.June.

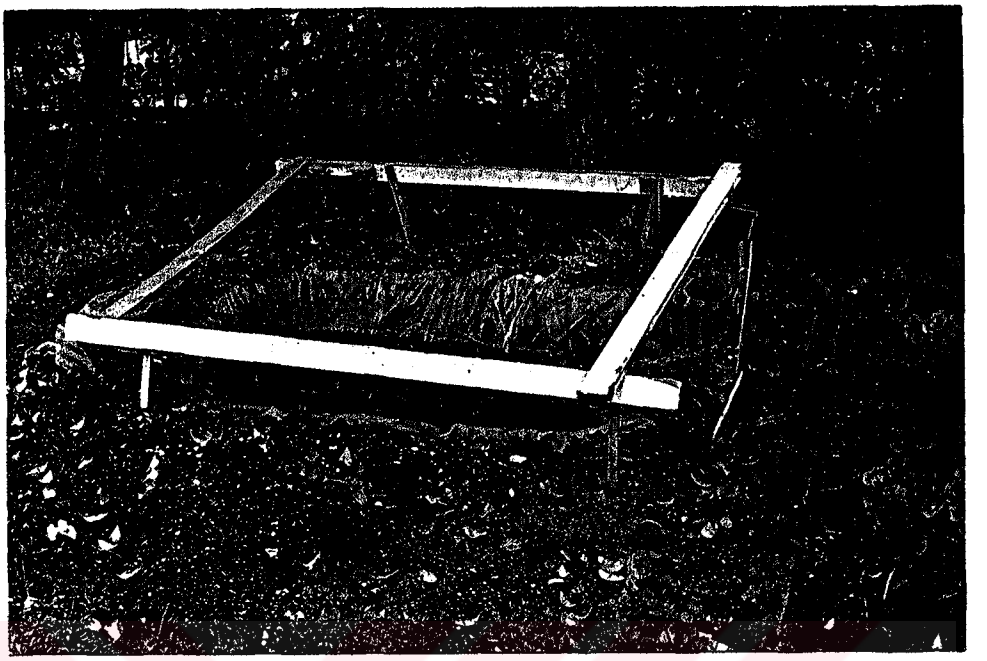


Figure: 17 Prepared artificial pond

Also the larvae which we took from the some *B. viridis* in the aquarium show difference in metamorphosis period. This difference is about one month and it is related to heat, light and feeding and also it may be related to genetic features.

From 29.3.1993, the *B. viridis* eggs and larvae that were growing were observed at certain intervals. The photos of these eggs and larvas were taken later and their metamorphosis period was also observed. And then the development of the samples was examined in binokus, their shape of mounth and teeth was drawn. Also body size head, body and tail lengths were measured and compared.

While the eggs were being examined, it was seen that they formed lines one by one or twos. Thousands of eggs are seen generally like thin, long cords (Fig. 18)

It was observed that grown-up embryos pierced through the gelatine and they went out the cord and they come together in groups in the algae in the bottom of the water. The grown-up larvae in the aquarium ate fish food and also algae.

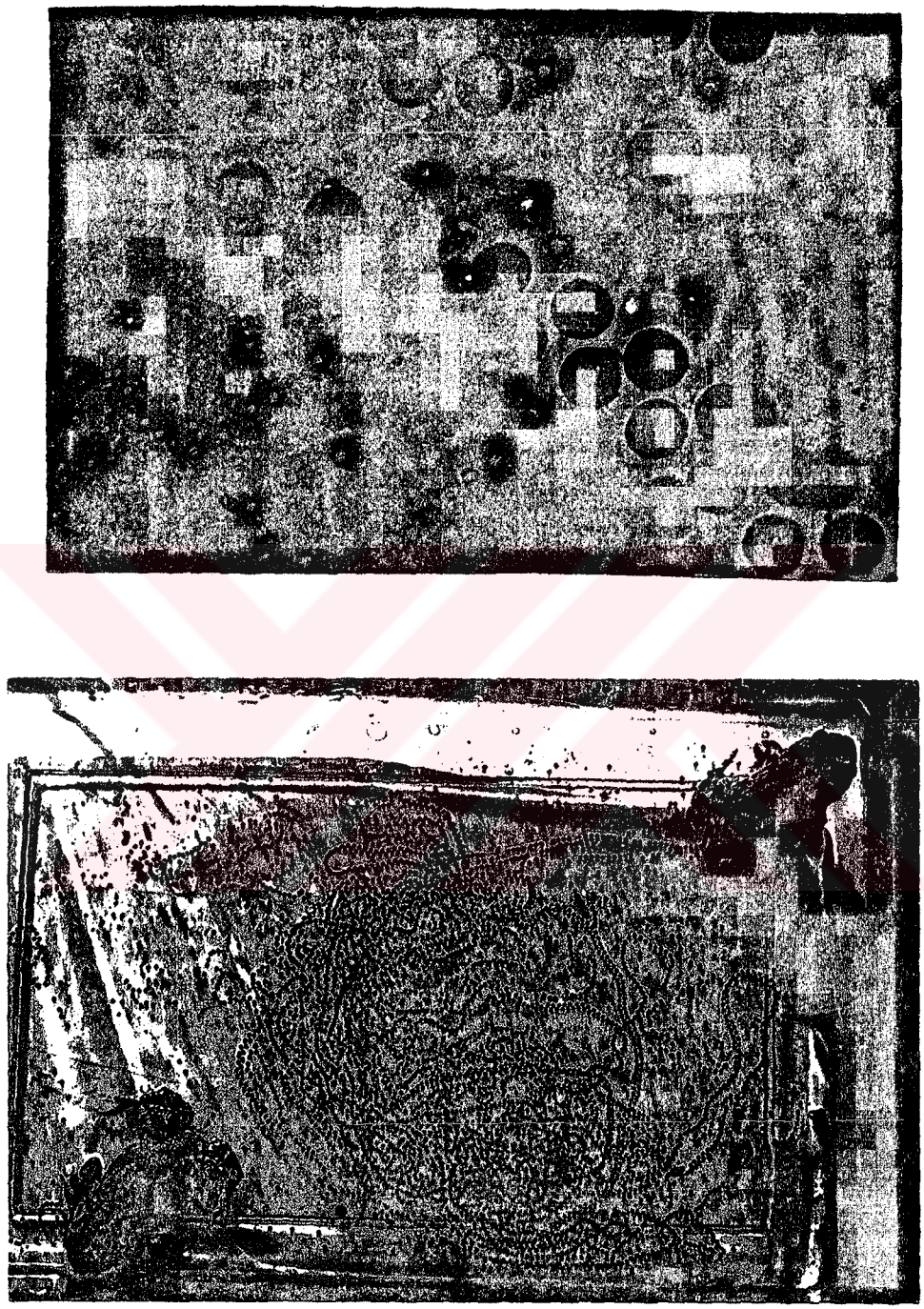


Figure: 18 Eggs of *Bufo viridis*

After the larvae pierced through the eggs their development was observed and their body measures were as follows:

3 days ' eggs are in a transparent gelatine as a cord. In the cords there are single range or double renge eggs. Their width is about 1,5 mm. The animal and vegetable sides of a fertilized egg cells are seen.

5 days ' embryo pierces through the gelatine cords. Its length is about 5 mm. The mounth starts to appear and there is sticky gland.

7 days ' embryo is 6,5 mm. The length of head+body: 3,5 mm, the length of tail: 3 mm. Outher gill is apparent, the tip of the tail is round and its centre has dark pigment , its sides are transparent. Anus is apparent, the mounth and sticky gland are apparent.

At the end of the 10 th day head+body length is 3,5 mm. tail length is 6 mm., total length is 9,5 mm. Mounth is quite apparent, The 1st supralabial teeth line is completed, under it , on the right and on the left there are supralabial teeth that are not completed. In the lower lip there are infralabial teeth in two ranges. In the middle there are keratin chins like black beaks. Under the mounth V-shaped sticky gland is apparent . Outher gills are transparent, on the dorsal of the head there is a pair of eyes and in the front there are nostrils

At the end of the 12th day head+body length is 5 mm.,tail: 7,5 mm, total lenght:12,5. The tip of the tail is round. The central part is dark pigment, sides are transparent. In the mouth there are 2 supralabiale teeth, under it 2 infralabiale teeth, adding to these there is an other infralabiale teeth. The sticky gland starts to dissappear. Outer gills are apparent. Larva can swim freely with the spiraculum.

At the end of the 17th day head +body: 4 mm, tail: 9 mm, length: 13 mm. Back feet start to appear near anus. Spiraculum grows, outer gills completely dissappear. Bowels are apparent in the abdominal regions. Sticky gland completely dissappears. Embryo forms a typical larva.

At the end of the 22nd day length: 18 mm, head+body: 7 mm, tail: 11 mm. The back foot swelling is more apparent, tip of the tail is round, bowels are apparent like spiral-shaped, inner gills are apparent, spiraculum is completely apparent on the left lateral in the middle. Mouth is developed, there are 2 supralabial teeth row and 3 infralabial teeth row and there are chin-like beaks.

At the end of the 29th day length: 18 mm, head+body: 7 mm, tail: 11 mm. On the tail, on the pigmented area, segmentation starts, there is a pair of eyes whose iris is apparent. Spiraculum is closer to anus. Mouth is developing, chins get thick and large.

At the end of the 44th day length: 22 mm, head+body: 10 mm, tail: 12 mm. Tail is with the segment. The back foot swelling is quite apparent, chins are in a swelling form.

At the end of the 58th day length: 32 mm, head+body: 13 mm, tail: 19 mm. Back feet are completed. they are 3 mm and the fingers are apparent. Mouth is developed, body is larger, back skin is roughened.

At the end of the 68th day length: 33 mm, head+body: 13 mm., tail 20 mm., Back feet: 4 mm. Fingers are apparent. Body is big and dark in dorsal.

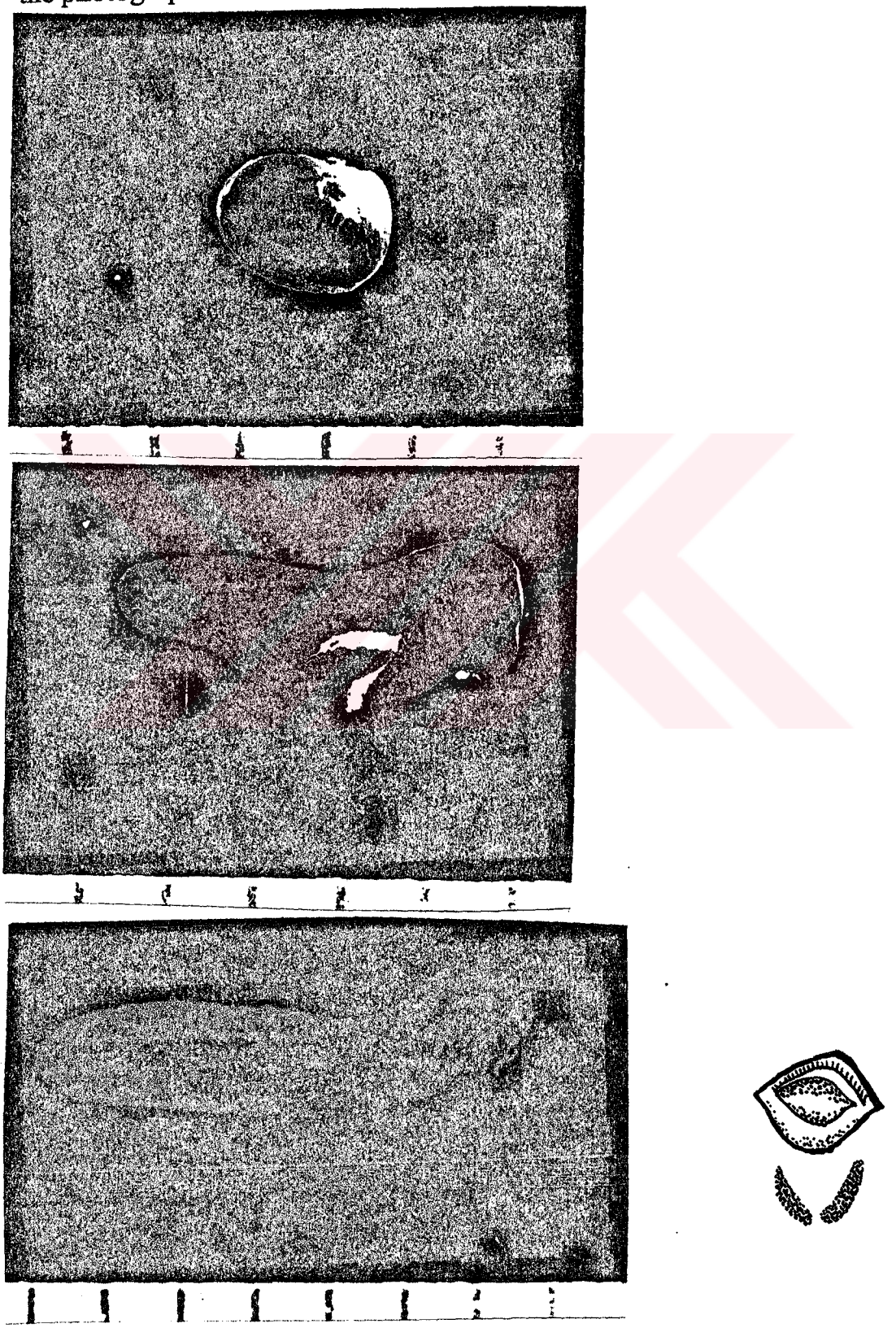
At the end of the 70th day length: 33 mm. head+body: 13 mm., tail : 20 mm. Fingers are completed and membranes are apparent. Upper eyelids begin to swell skin is roughened and pigmented.

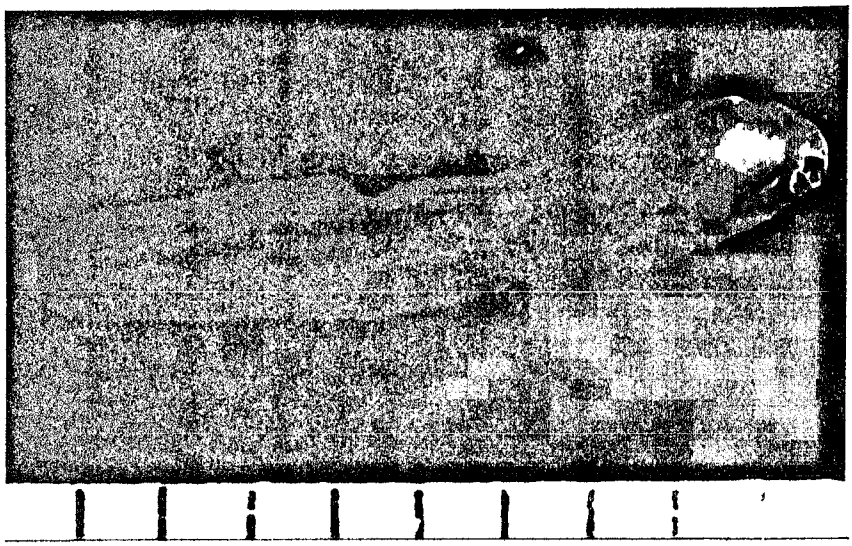
At the end of the 72nd day length: 29 mm, head+body: 12 mm., tail: 17 mm. Although the body grows, the tail starts to become smaller, its shape is like the mature one, but the tail still exists and spiraculum is lost. Front feet are formed, eyelids are completed, skin starts to get it' s color and pattern.

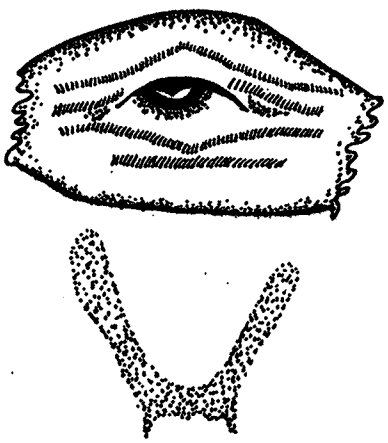
At the end of the 75th day tail begins to dissappear. Mouth is completed and in the mouth the tongue which is stable.

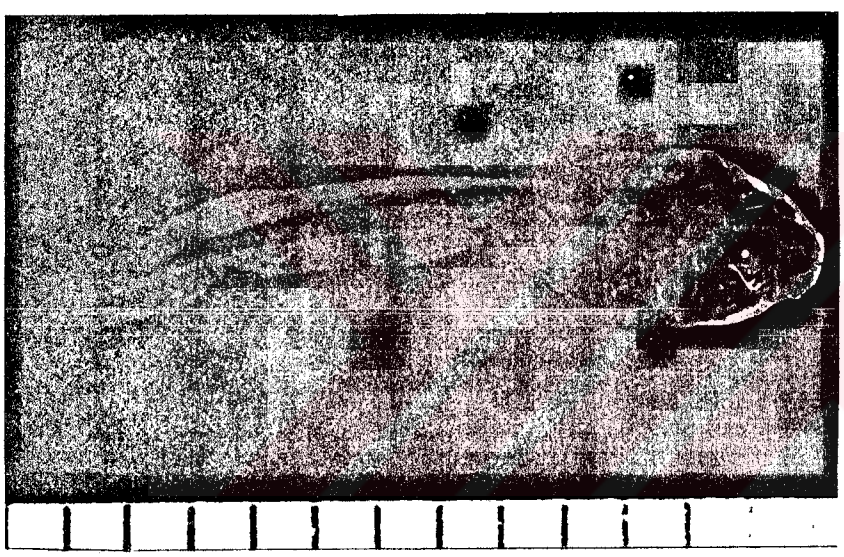
During this development, although some *B. viridis* that completed metamorphosis were seen on 24.5.1993, all the metamorphosis period was completed on 11.6.1993. The youngs that completed metamorphosis and whose feet developed, whose tail dissappeared and that made lung respiration died when they could not get out of the water so some tree branches were thrown for them to save themselves. They are also an aliment source for some birds like crows.

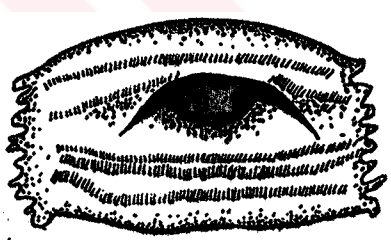
Figure: 19 Metamorphosis levels of *B. viridis* started from when they are eggs are given below in order and the related mouth-shapes are drawn near the photographs:

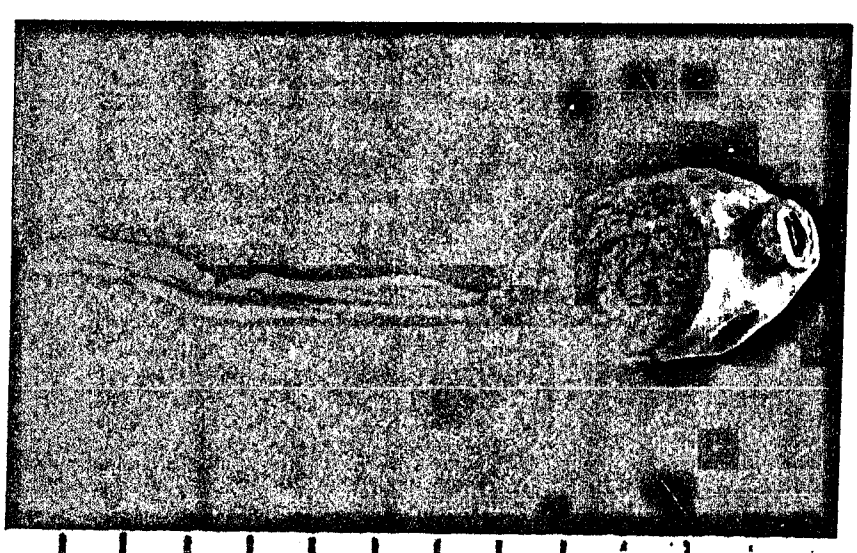


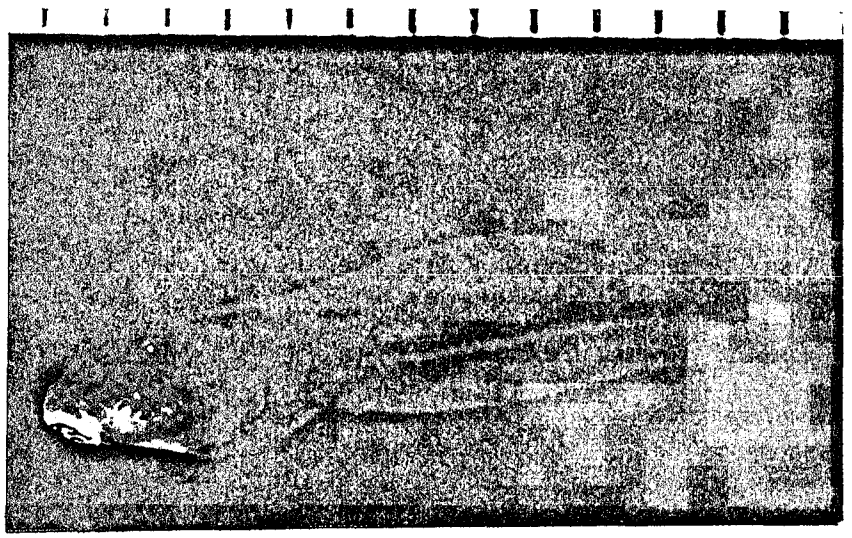


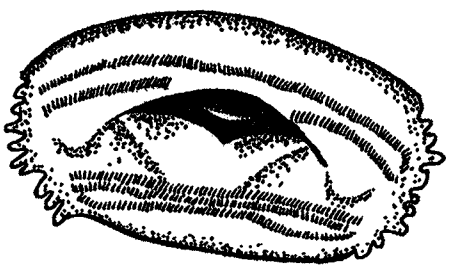


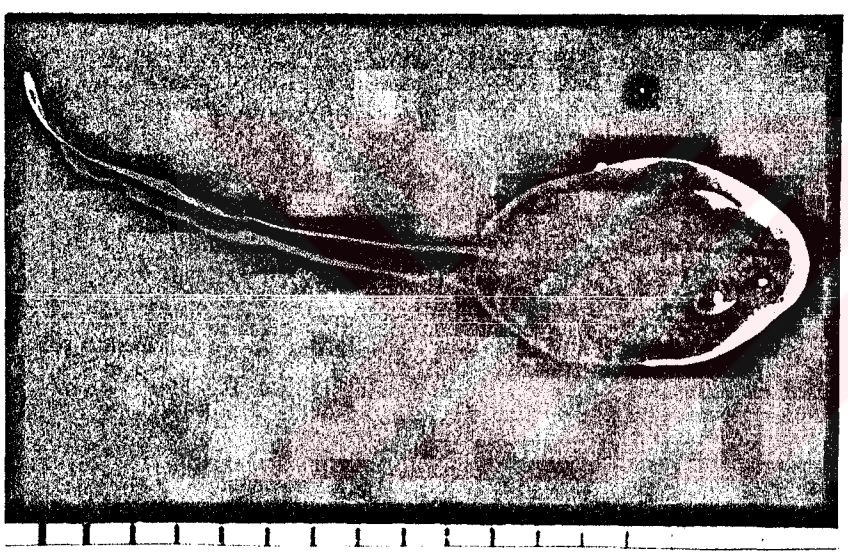


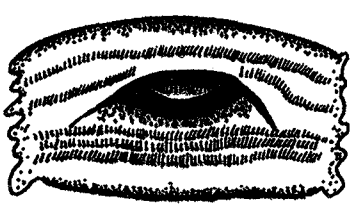


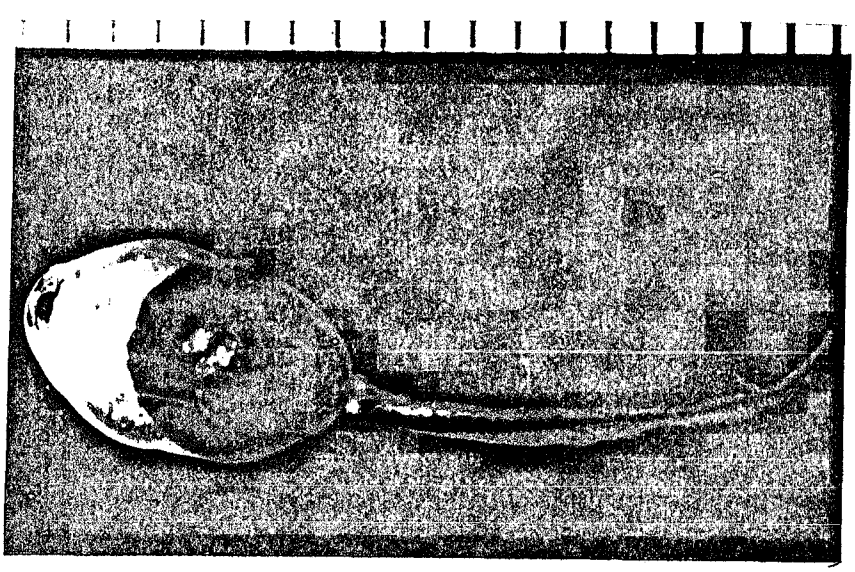


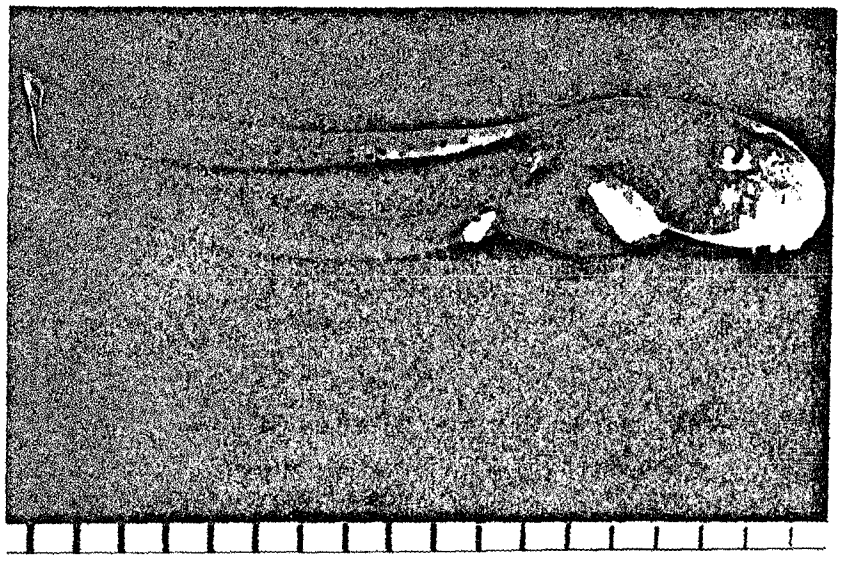


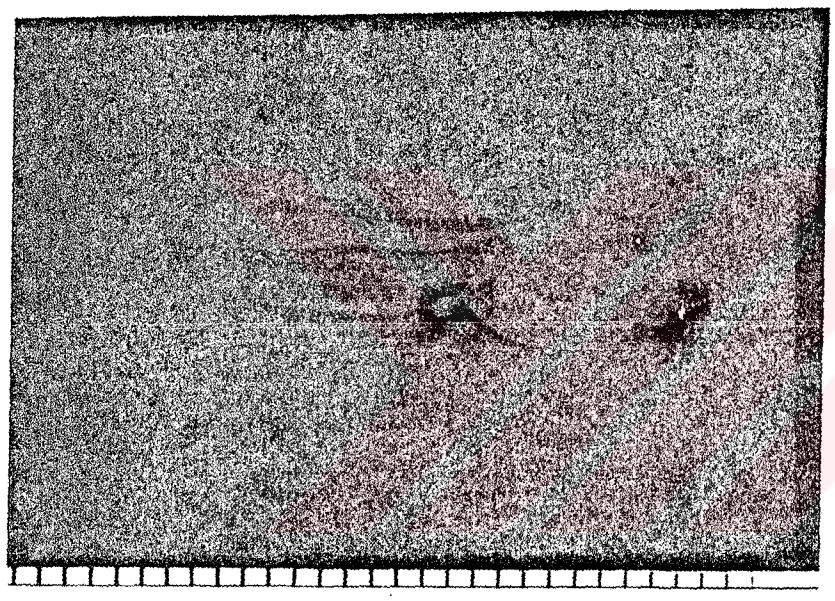


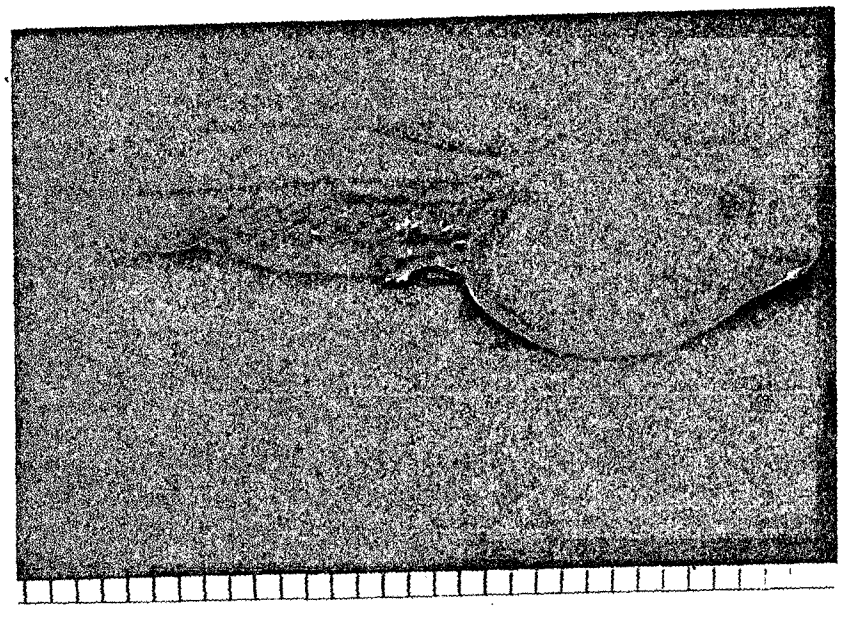


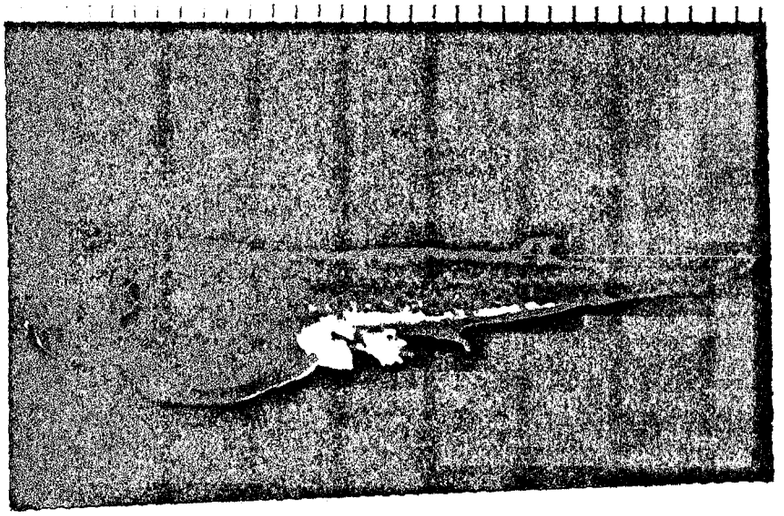


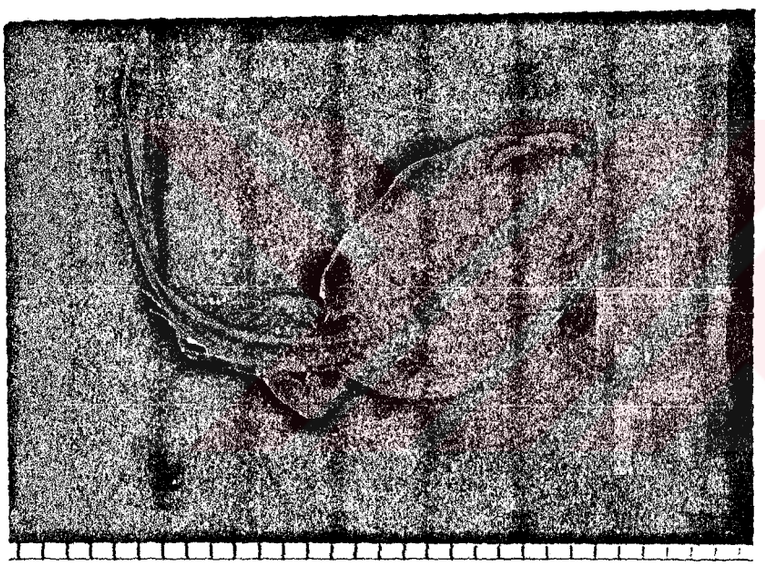


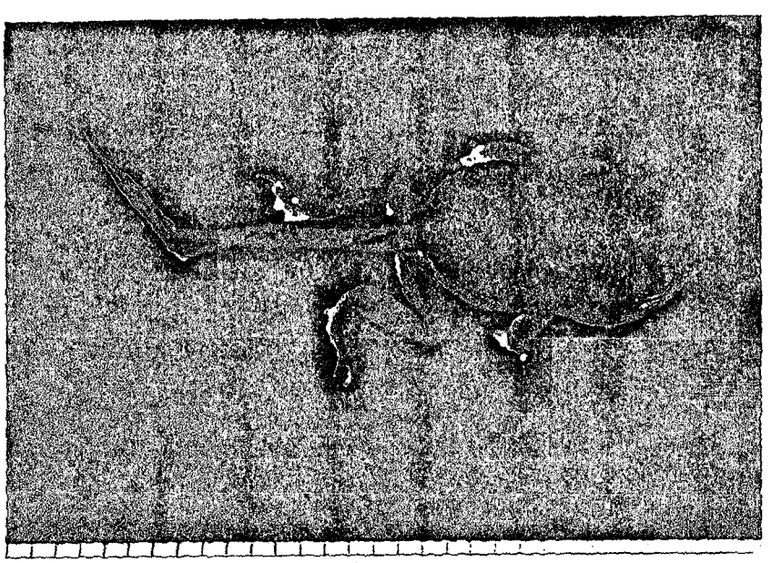


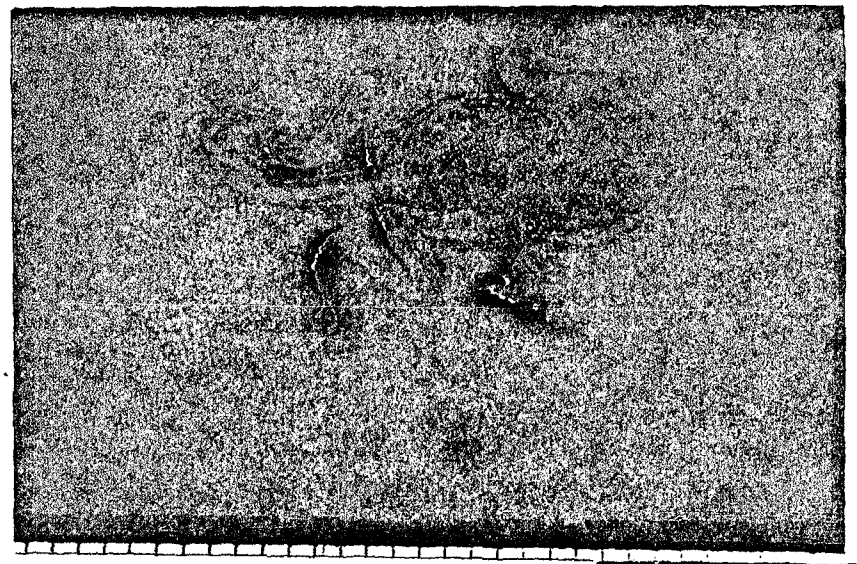


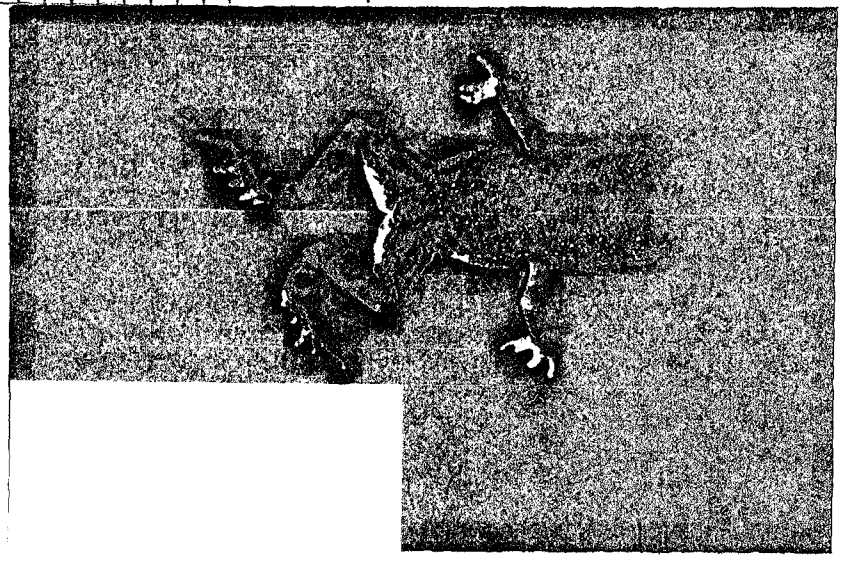












4. DISCUSSION

As it is stated before, *B. viridis* is found in the appropriate climate conditions, appropriate biotops where 2700 m height from the sea (Özeti - Yılmaz 1994). In accord with these information it is seen at the seaside Izmir-Yenişakran, in Bolu-Aladağ that is 1850 m. and also Izmir-Karagöl and Sinop-Dranas mountains that are more than 1000 m.

As we see in the research results of many researchers, the *B. viridis* that exists in the South and Central Europe, Northern Africa, Middle East and Asia also accords with the one that lives in Turkey. It is seen that *B. viridis* almost lives together with people (Mertens-Wermuth 1960, Kasparek-Kinzelbach 1992, Eiselt-Schmidtler 1973).

It is generally said that the *B. v. arabicus* that lives in the mountainous regions are stronger then the *B. v. arabicus* that lives in the valleys (Eiselt-Schmidtler 1973), but for we do not have enough material of examples from high regions, in our study we cannot confirm this statement.

We compared the *B. viridis* that we examined its spread in Turkey and its measurements with the *B. viridis* that are outside of Turkey. The measurements below that belong to Fuhn (1960), Yılmaz-Uğurtaş (1990), Boulenger (1898) show resemblance to our findings.

Table 30, The comparison of body measurments that are new and old from Turkey and some other regions outside Turkey.

1. Thrace
2. Black Sea
3. Aegean
4. Central Anatolia
5. Eastern Anatolia
6. Mediterranean
7. Hatay - Gaziantep - Kahramanmaraş
8. Romania
9. Europe

Biometrical is measurements	Yılmaz-Uğurtaş (1990)		New Measurements	
Length of head+body	40 - 66.3 - 88	(1)	48.8 - 89.1	(1)
	46 - 66.7 - 88	(2)	45.2 - 79.2	(2)
	62 - 67 - 68	(8)	42.6 - 87.9	(3)
	71 - - 93	(9)	44.7 - 89.9	(4)
			46.1 - 80.6	(5)
			41.5 - 79.2	(6)
			43.2 - 89.6	(7)
Length of head	12 - 17.7 - 22	(1)	13.8 - 22.5	(1)
	13 - 17.5 - 21	(2)	13.1 - 20.2	(2)
	17 - 21.2 - 27	(8)	11.4 - 25.2	(3)
	17 - - 21	(9)	11.8 - 23.4	(4)
			12.0 - 19.8	(5)
			10.8 - 19.5	(6)
			11.6 - 21.0	(7)
With of head	15 - 23.2 - 32	(1)	17.5 - 29.9	(1)
	15 - 23.6 - 30	(2)	17.1 - 29.0	(2)
	19 - 21.7 - 26	(8)	13.2 - 35.3	(3)
	24 - - 30	(9)	14.8 - 32.5	(4)
			16.0 - 27.8	(5)
			14.0 - 28.7	(6)
			15.1 - 37.5	(7)
Length of upper eye-lid	5 - 7.9 - 10	(1)	7.0 - 9.9	(1)
	5 - 6.6 - 9	(2)	6.0 - 10.3	(2)
	6 - 7 - 8	(8)	5.5 - 10.2	(3)
	7 - - 8	(9)	5.7 - 10.5	(4)
			6.0 - 9.0	(5)
			5.4 - 10.0	(6)
			5.0 - 11.2	(7)
Length of tibia	15 - 24 - 30	(1)	18.7 - 30.5	(1)
	16 - 25.5 - 33	(2)	15.6 - 30.3	(2)
	21 - 24 - 29	(8)	15.7 - 32.5	(3)
	26 - - 31	(9)	15.5 - 31.2	(4)
			16.7 - 30.0	(5)
			15.3 - 30.7	(6)
			15.5 - 34.6	(7)
Length od femur	15 - 24.6 - 31	(1)	18.6 - 30.2	(1)
	17 - 25.9 - 34	(2)	15.5 - 30.5	(2)
	23 - 25.3 - 30	(8)	15.5 - 32.5	(3)
			15.2 - 31.2	(4)
			17.0 - 30.0	(5)
			15.0 - 33.2	(6)
			15.5 - 34.4	(7)
Length of rostrum	6 - 9.8 - 13	(1)	4.8 - 8.3	(1)
	7 - 10.3 - 13	(2)	5.0 - 7.9	(2)
	7 - 9.2 - 11	(8)	3.9 - 9.9	(3)
			4.4 - 8.3	(4)
			4.7 - 7.6	(5)
			4.4 - 8.0	(6)
			4.3 - 8.4	(7)

Mertens (1957) states that *B. v. arabicus* is smaller, a scantier and has longer - thinner body, smaller spots and dark - green designs than the typical form, but there is no striking difference between the two.

When comparing the body lengths of the *B. viridis* that are caught in Adana (60 - 67.9 - 76) with *B. viridis* that are collected from Central Europe (males; 49 - 60 - 76, females; 49 - 64.9 - 83) it is seen that *B. viridis* from Asia is bigger than the one from Central Europe and so Mertens' thoughts do not fit these samples. For this reason it was thought that when the regional materials were caught, the big ones were selected so it is necessary not to give importance to the statistical values (Flindt - Hemmer 1968). The some researcher shows that the ratios of back feet lengths and body lengths fit to the nominat form.

Eiselt - Schmidtler (1973) finds a lot of subspecies in the researches of Turkey, Iran, Irak, Pakistan but he says that the subspecies of *B. viridis viridis* exists generally in Turkey and *B. viridis arabicus* exists mostly in the South - West Iran including Sina Peninsula and North Africa (Heyden 1827). In this research it is understood that there is difference between their internasal distance ratios of the two subspecies. So it is observed that the mouth and nose of the *B. v. arabicus* is more pointed and its internasal distance is narrower. Iran Rezaiyeh samples have wider Internasal distance and narrow interorbital distance so these can be counted in the nominant race.

The samples from Arabic Peninsula are thought as *B. arabicus* and its last place in the south is Jabal Dabbagh, Midyan. This species can be found any place with some water in Arabic Peninsula and it can live with *B. viridis* as sympatric (Balletto - Cherchi - Gasperetti 1985), so these researchers say that the distinctive characters are as follows:

Head length / Head width : 70 - 74, Head length / Head+body length : 26, Internasal / Interorbital : 80 - 100, Paratoid / Head+body length : 22 - 26, first finger length / first finger with : 42 - 58, Inner metatarsal tub. / Foot length : 11 - 14.The samples that are collected from Syria belong to the subspecies of *B. v. arabicus* (Kasparek - Kinzelbach 1992).

The samples from Izmir and Adana by Kete (1992) are examined before and in the researches it is found that tibias are relatively shorter than femur and there is a cline from the north to the south. But these researches are done once more and the measurement are made again and in the result of this it is understood that the measurements are wrong because the device was out of order so the cline from the north to the south is not so apparent.

According to color - pattern status the samples from Mid. - Europe have grey ground and greenish spots that change to alive color (Mertens 1957), or they have light - yellowish, white ground and greenish - grey spots (Flindt - Hemmer 1967). The samples from Turkey resemble the ones from Mid. - Europe and have spots from light - green to dark - green. Sometimes samples from Turkey have always olive - green only.

According to Flindt - Hemmer (1968) the Anatolian *B. viridis* has isolated, intensive and small spots. But on the other hand it is also seen that some *B. viridis* have frequent and small spots or sometimes quite big or sometimes they have designs similar to nominat form.

In the samples from Iran Rezaiyeh we see that 1:3 of these samples have small spots. This situation is considered as transition to *arabicus* Eiselt - Schmidtler (1973) who work on the samples from Iran - Irak say that *B. viridis* and *B. arabicus* that are considered as the two subspecies have some differences in terms of dorsum design especially. According to this *B. v. arabicus* has isolated spots and the spots are smaller and lesser. Generally the centre of the dorsum is spotless and nearly has a vertebral cord. Yılmaz (1984, 1989), Yılmaz - Uğurtaş (1990) who studied on *B. viridis* from Thrace and Blacksea report that according to color - pattern condition they resemble but while going to the South the dorsum spots start to get smaller. Moreover, in this type that has warts, especially for the male ones these warts become more apparent during the reproduction period. The tips of the dorsalateral warts are red for females.

The samples that we collected in Turkey are A types and B types according to color - pattern condition (Fig. 10). But in fact the color - pattern condition in different regions shows some differences among themselves.

1. region : Thrace has A and B types but A type is more common.

2. region : Black Sea has A and B types sharing 50 % each but D type is also seen very rarely.

3. region : Aegean Sea has mostly A type but the other five types of color - pattern condition are seen.

4. region : Central Anatolia has mostly B type and also rarely A and D types

5. region : Eastern Anatolia has mostly B type but 1/3 A type and rarely E type are also seen

6. region : Mediterranean has mostly B type and also rarely A, C and E types.

7. region : Hatay - Gaziantep - Kahramanmaraş has mostly B and C types and also A and D types

In the researches of graphics and indexes it is observed that there are no morphological differences. In the researces about body sizes and color - pattern condition we see that *B. viridis* has a rather wide variations. As this variation is so wide this species is very complex to make a clear distiction by our available morphological methods.

The stomach contents of *B. viridis* that we examine its feeding biology resemble the menu of Fuhn (1960) who found in Romania but only the *Scarabeidae* and *Meloide* species do not resemble. Kinzelbach - Kasparek (1992) who examined the *B. viridis arabicus* in Syria states that this species eat worm and snail. In the stomach content of *B. viridis* of Thrace mostly ants are seen (Yılmaz 1984). Additionally it is also seen the species of *Tenebrionidae* and *Diptera* larvas that belong to the families of *Coccinellidae* and *Carabidae*.

The stomach contents of the samples that we collected include mostly *Carabidae* and *Formicidae* families and *Diptera* ordo from *Insecta* classis, *Arachnida* classis and *Sphaeromidae* from *Crustacea*. Ants are the most common feeding source for *B. viridis* , about 300 *Formicidae* were seen in one sample's stomach and in another sample includes 10 *Carabidae*. *Myriapoda* classis is different from other findings that we found. Other than this, *Oligochaeta*, *Crustacea* and *Anura* juvenils are also found. (It is not decided that these juvenils belong to *B. bufo* or their own species).

As they are very rich in terms of stomach contents they are used for biological fight and they form an important role for the ecological balance.

In Silivri in 1979 (Yılmaz 1984) on 13 March the first eggs were seen when the weather was good but a year later as the weather was cold no eggs or living *B. viridis* were seen. This situation is like the situation that we experienced between the years 1993 - 1995. Altough the fitrst metamorphosis is completed in Izmir on 19 June 1994, on 29 June 1994 in Kayseri we saw adults that are on amplexus condition or very small larvae so it is obvious that the reproduction period and the development of larva depend on heat , light and feeding, that is, ecological factors are very significant.

The metamorphosis was completed in 64 days when the climate conditions were appropriate in 1995 but it was completed in 75 days when the climate conditions were inconvenient in 1993.

5. Conclusion

In the end of the studies about the distribution of *B. viridis* in Turkey,it is confirmed that this species can be found in every part of Turkey when there is convenient biotops. This distribution fields and ecological features resemble the samples of Europe.

In the results of the biometric measurements and color - pattern researches it is understood that this species is very complex to make its subspecies distinction easily.

The morphological information that are optained from the region of Hatay - Adana - Gaziantep do not give enough information about the issue that these populations in this region belong to *B. viridis arabicus* or they belong to *B. viridis viridis*. If me accept that the species that lives in Arabia is *B. arabicus*, it must be examined in terms of it' s distribution in north and whether its hybrids are made or not. If the populations that live in Arabia are accepted as *B. v. arabicus* subspecies, it is possible for it to form hybrid populations with *B. v. viridis* and it is also possible that the southern parts of our country are transition field of this species. However all these information should be evaluated in terms of genetic chiasmus, chromosome researches and some biochemical methods such as electrophoresis. So we are in the opinion that this systematic problem can be soluted easier by these.

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