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ANTHROPOLOGY

BIOANTHROPOLOGICAL STUDY OF HUMAN SKULLS FROM THE MAUSOLEUM CRYPT OF THE FIRST WORLD WAR HEROES, IN IAŞI (IAŞI COUNTY, ROMANIA)

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In this paper, the authors present the results of the anthropological research conducted upon a sample of 50 skulls belonging to skeletons from the Mausoleum Crypt of the First World War Heroes, in Iași – *Calea Galata* (Iași County, Romania). The skulls have been collected during consolidation and rehabilitation of the monument, in 2020–2021. After estimating the age at death and sex, followed by metric data analysis, a typological and paleodemographic study was performed. Most skulls were recorded in the young adult category (50.00%), followed by middle adult (38.00%), adolescent (8.00%) and old adult (4.00%) ones. Distribution by sex categories indicates a higher frequency of males (92%).

The morphometrical typology in the analysed sample corresponds to a population mixture, with the predominance of the Mediterranido-Dynaric elements, and Alpinoid, Nordoid and East-Europoid influences.

Keywords: bioanthropology, human skulls, Mausoleum of the First World War Heroes, Iași (Romania)

INTRODUCTION

The Romanian Kingdom entered World War I in August 1916, following two years of neutrality. During the war, the defeats forced the authorities and King Ferdinand to leave temporarily the capital Bucharest for Iași. The First World War represented an important event in the Romanian history, because its end marked the birth of Greater Romania, achieved by the union of the historical provinces inhabited by Romanians (Moldova and Wallachia became united in 1859, Dobrudja was annexed in 1878, to which Bessarabia, Bukovina and Transylvania were added in 1918) [8,15,21,25].

At the initiative of the Society of the Cult of Heroes from Iași, in 1928, the Municipal Council of Iași approved the allocation of a land of 4,400 m^2, on which the Mausoleum of Heroes was built between 1929 and 1930. The architect and painter Ioan Bălău and the future scientist Henri Coandă contributed to the realization of the project [28].

According to the photographic archive, the Mausoleum had a protection zone around it, in which six large and 600 smaller crosses were placed, in the memory of the 6,000 soldiers whose remains were reburied around the Mausoleum or in its basement. There is no reliable information but, probably, reburials in the perimeter of Heroes' Mausoleum were made after its inauguration, the skeletons from the Great Cemetery of Heroes, located north of Galata Monastery, being also transferred here.

This paper aims at enriching the existent data in terms of biological anthropology of the human skeletons reinhumated in the basement of Heroes' Mausoleum.

MATERIAL AND METHODS

The analysed 50 skulls (Fig. 1) were randomly sampled from a mixture of bones without anatomical connection, belonging to skeletons from secondary deposits, found in the Mausoleum Crypt of the First World War Heroes in Iași – *Calea Galata* (Iași County, Romania). This context undoubtedly raises methodological difficulties in terms of anthropological study, as all analysed skulls, codified with C1→ C50, lack mandibles.

Study of the human skulls was preceded by a process of bone restoration, to allow morphoscopic analysis, recording of biometric data, estimations of age at death, and sex.

To estimate the age at death, we used criteria applicable to different stages of growth. In the subjects under 20 years, we considered the eruption stages of teeth [26,30,31]. The age at death in subjects over 20 year-old was estimated using the following criteria: dental attrition [4,19]; degree of closure of the cranial sutures [22]; specific pathologies that can appear with age [18,30].

Sex estimation in the subjects over 20 years was based on the development of bone relief, shape and degree of forehead inclination, mastoid apophysis size, teeth shape and size [33].

After estimating the age at death and sex for each subject, we proceeded to the demographical evaluation of the 50 skulls. The age classes proposed by Buikstra and Ubelaker were considered [5].

The anthropometric and conformational study of each skull has been done with Martin and Saller techniques [20]; for dimensional evaluation, we used the dimorphic scales of Alexeev and Debeț [1] while, for somatoscopical and typological characterization, we applied the methods and scales of Eickstedt [7]. The absolute

and relative values resulted from direct measurements and calculation of the conformational indices have been positioned in the scales proposed by Olivier [24].

RESULTS AND DISCUSSION

SAMPLE STRUCTURE BY AGE AND SEX

Evaluation of the structure by age and sex in a human group represents a first important step in understandings the social aspects of its past [2,6,17,23,29,32]. The analysed 50 skulls are in a satisfying state of preservation allowing this evaluation.

Among the 50 skulls, four belonged to adolescents (three males and one female), 25 to young adults (22 males and three females), 19 to middle adults (males) and only two belonged to old adults (males). The highest frequency was recorded in the young adult category (50%), followed by middle adult (38%), adolescent (8%) and old adult (4%) (Table 1).

The sex ratio in the sample (*i.e.*, the ratio between the number of males and number of females) indicates a very high frequency of males (92%), as opposed to females (8%). Life expectancy upon birth in the total analyzed group was calculated to 35.70 years (age range 0-x years).

Comparatively with other populations who inhabited the old city of Iaşi, the human group here analyzed had a similar average lifespan (35.70 years) with that found in other samples (35.92 years – "Curtea Domnească" [9]; 36.94 years – Roman Catholic Cathedral [11]; 37.07 years – Aroneanu Monastery necropolis [13]; 34.06 years – "Sfântul Nicolae-Ciurchi" Church [27]; 35.63 years – "Banu" Church [10].

ANTHROPOMETRIC ANALYSIS

The anthropometric study was conducted on 50 skulls, of which 46 belonged to males and only four to females. Under these conditions, the results for the female skulls are strictly indicative.

The variability of the craniofacial characters defining the analysed sample is presented in Table 2, whereas the distribution on categories of the main craniofacial indices is illustrated in Table 3.

a. Neurocranium

Biometrical data

The horizontal diameters (g-op and eu-eu) of the neurocranium in males offer a short-size average for the longitudinal dimension (175.95 mm) and a medium size for the transversal one (140.99 mm), their ratio giving a cranial index of brachycranic type (80.31 u.i).

In the case of females, the average values of the longitudinal and transversal diameters are situated of the middle category (g-op – 171.50 mm; eu-eu – 139.00 mm);

the average of the cranial index exceeds the inferior limit of the brachycranic category (80.31 u.i. – male; 81.09 u.i - female) (Table 2). In the case of males, the mesocranic and brachycranic forms represent most of the cases (28.26% and 32.61%), followed by hyperbrachycranic (21.74%), dolichocranic (15.22%) and hyperdolicocranic (2.17%) ones; in the case of females, three have a brachycranic, and one a mesocranic form (Table 3).

The basio-bregmatic height of the neurocranium (ba-b) indicates medium dimensions in males (135.07 mm), and very high dimensions in females (137.00 mm). The height-length index (longitudinal basio-bregmatic index: ba-b/g-op) is hypsicranic, on the average, in both sexes (76.96 u.i. in males, and 79.91 u.i. in females). The distribution of this index on categories is hypsicranic (74.42%), orthocranic (23.26%) and chamecranic (only 2.33%) in males; in all females, it is hypsicranic.

The mean of the transversal basio-bregmatic index (ba-b/eu-eu) belongs to the medium–metriocranic category in males (95.65 u.i.), and high–acrocranic in females (98.48 u.i.). As to the distribution of the transversal basio-bregmatic index, the highest concentration of subjects corresponds to the meinocranic category in both sexes (39.53% in males and 75% in females), followed by the acrocranic (34.88% in males, and 25.00% in females), and tapeinocranic category (25.58% in males) (Table 3).

Porion-bregma height (the cranial height, po-b) presents average values, which are positioned, for both males and females, in the high-sized category (117.73 mm, and 113.00 mm, respectively) while, in females, they are positioned at the inferior limit of the high-sized category (112.30 mm).

The longitudinal porio-bregmatic index (po-b/g-op) is positioned, for both sexes, in the hypsicranic category (67.00 u.i. in males, and 65.96 u.i. in females) – Table 2. The distribution of the porio-bregmatic longitudinal index on sexes indicates that the hypsicranic category has the highest incidence in both sexes (91.30% for males, and 100% for females), followed by the orthocranic category (8.70% for males).

In relation to skullcap width, the transversal porio-bregmatic index (po-b/eu-eu) is, on the average, metriocranic, for both males and females (83.67 u.i., and 81.38 u.i.). As to the distribution of the transversal porio-bregmatic index, the highest frequency of subjects corresponds to the metriocranic category in both sexes (56.52% in males, and 75.00% in females), followed by the tapeinocranic (25.00% in females, and 19.57% in males) and acrocranic category (23.91% in males).

In the frontal area, metric characters are defined by two horizontal diameters: minimum (ft-ft) and maximum (co-co). Minimum frontal diameter (ft-ft) is situated in the middle-sized category at both sexes (97.28 mm in males, and 91.00 mm in females). Maximum frontal diameter (co-co) is situated in the middle-sized category at both sexes (119.85 mm in males, and 112.25 mm in females).

The frontal-parietal index (ft-ft/eu-eu) is eurymetopic in males (69.10 u.i) and stenometopic in females (65.53 u.i). The sex distribution of this index highlights the above-mentioned situation, the males being concentrated rather on the eurymetopic

category (52.17%), followed by metriometopic and stenometopic category (with equal percentages of 23.91%). The four females are placed in the stenometopic category.

The ratio between the minimum and maximum forehead width, expressed by the frontal-transversal index (ft-ft/co-co), indicates intermediate (oval) foreheads for both sexes (81.36 u.i. – at the lower limit of the category). The distribution of this index on categories shows that the predominant type is of the oval foreheads, at both males and females (60.87%, and 75.00% respectively), followed by the spherical foreheads (39.13% in males, and 25.00% in females).

The maximum width of the occipital (ast-ast) presents an average value belonging to the middle-sized category, at both sexes (111.90 mm in males, 103.38 mm in females).

The mean values for the parietal-occipital index (ast-ast/eu-eu) are middle-sized at both sexes (78.72 u.i in males, and 74.38 u.i in females) (Table 2). Regarding the distribution of this index, the percentage of majority is registered, at both sexes, in the middle-sized category (45.45% in males, and 100% in females), and large-sized category (45.45% in males), followed by the very large and narrow ones (6.82%, 2.27% respectively, in males) (Table 3).

Morphological features. The shape of the neurocranium in the *norma verticalis* is ovoid, at both sexes (47.82% in males, and 75.00% in females), followed by the sphenoid (39.13% in males, and 25.00% in females), and spheroid (13.04% in males) ones. In the *norma occipitalis*, the most frequent shape of the neurocranium is of "house" (78.26% in males, and 75.00% in females) rather than of "bomb" (17.39% in males, and 25.00% in females). Regarding the degree of occipital curvature, the majority of skulls present a moderate occipital (47.82% in males, and 50.00% in females), flattened (30.43% in males and 25.00% in females) or having the shape of a bomb (21.73% in males and 25.00% in females). The glabellar relief displays a low variability; we only discovered cases pertaining to three of the six possible levels in both sexes; the first level has the highest frequency, while the second and third levels have lower incidences.

The supraorbital relief is slightly marked (first degree) in all females and marked in males (first degree → second degree – 39.13%, second degree – 34.78%, and second degree → third degree – 26.08%).

b. Facial skeleton

The facial massive presents average values of the bizygomatic width (zy-zy) small-sized in males (126.26 mm), and very small dimensions in females (107.00 mm – one skull).

The superior face height (n-pr) is usually middle-sized at both sexes (68.77 mm in males, and 66.50 mm in females – three cases).

The superior facial index for the male skulls have values belonging to four different categories – euryene (7.41%), mesene (51.85%), leptene (29.63%), and hyperleptene (11.11%), the mean value being situated at the lower limit of the

leptene category (55.10 u.i.). The female facial index (one case) suggests a very high shape (67.76 u.i. – towards the upper limit of the hyperleptene category) (Tables 2, 3).

The average width of the orbit (mf-ek), with an ample variability in the studied sample, is situated in the very small category (37.28 mm in males, and 34.67 mm in females). The averages of the orbit height are positioned at the inferior limit of the middle category in males (34.23 mm), and at the superior limit of the small category in females (32.50 mm). Distribution of the orbital indices (Table 3) shows the predominance of the hypsiconch orbits at both sexes (80.43% in males, and 100% in females), followed by the mesoconch shapes in males (19.57%).

The length of the nose is small at both sexes (23.12 mm in males, 23 mm in females), the height being small-sized in males (50.95 mm) and very big in females (55.17 mm). The nasal index is leptorrhinic in males (45.66 u.i), and mesorrhinic (42.60 u.i) in females. Distribution of the nasal index varies between the leptorrhine and chamaerrhine shapes, with maximum frequencies of the leptorrhine category in males (63.04%), followed by the mesorrhine (23.91%) and chamaerrhinic categories (13.14%). Of the three female skulls, two fall into the leptorrhine category and one in the chamaerrhinic category (Table 3).

Morphological features

The malar bones have a predominantly frontal display in males (56.81%), followed by the temporalized ones (36.36%), the intermedially disposed malar bones being rarely met (6.81%). In females, the temporalized malar bones are predominant (75.00%), followed by the intermedial form (25.00%).

The canine fossa presents an ample variability, from slightly outlined (first degree) to deep ones (three degree). The poorly outlined fossae (first degree, first → second degree) are present in all female skulls, and in 21.73% of males; the middle-sized fossae (second degree, second degree → third degree and third degree) – 78.24% in males.

The form of the pyriform aperture belongs to the anthropine type (80.20% in males, and 75.00% in females), the shapes with prenasal channel registering lower percentages (19.80% in males, and 25.00% in females).

The nasal spine is predominantly medium-sized (third degree) for both sexes (62.00% in males, and 50.00% in females), the second place being held by the shapes with a very slight (first degree: 20.00%, and 25.00%, respectively) and slight development (second degree: 18.00%, and 25.00%, respectively).

TYPOLOGICAL ANALYSIS

Within an anthropologic type, all individuals from a group with certain association of characteristics or metrical characters converge. A human population contains many morphometrical features with various expressions, defining a certain typological composition [3,14,16].

To evaluate the typological patterns in the analysed skull sample, we considered both the biometrical and morphological data, in terms of character frequency, as well as their combinations. The individual association of the main biometrical and morphoscopic features shows typological polymorphism. Considering the frequency of the various elements, we appreciate that the background for this group can be defined as Mediterranido-Dynaric. The Nordic, Alpine and East-European shapes are secondary elements. If we compare this sample to other skeletal samples from the old city of Iași – the necropolis of "Sfântul Nicolae-Ciurchi" Church [27], the necropolis discovered in the eastern part of the ancient "Curtea Domnească" site [12], the necropolis of "Banu" Church [10], or the Aroneanu Monastery [13], bio-typological similarities can be observed.

CONCLUSIONS

The analysed 50 skulls belong to skeletons found in secondary deposition in the Mausoleum Crypt of the First World War Heroes, in Iași-*Calea Galata* (Iași County, Romania). The majority of skulls were recorded in the young adult category (22 males and three females – 50.00%), followed by middle adult (19 males – 38.00%), adolescent (three males and one female – 8.00%) and old adult one (two males – 4.00%).

The average lifespan estimated for the group subjected to analysis (0-x – 35.70 years) is close to the values defining the populations of the old Iasi city.

The anthropological structure of the analysed group is characterized by a cranial index which is usually brachycranic (more accented in females than in males), whose variability goes from a hyperdolicocranic shape to a hypebrachycranic one (in males). The longitudinal porio-bregmatic index is mainly hypsicranic, and the transversal porio-bregmatic index is generally metriocranic. The forehead is most frequently eurymetopic in males and stenometopic in females, with intermedially disposed margin. The occipital is generally midlle-sized, the sample occupying four categories specific to this feature (narrow, middle, large and very large). The face is lepten in males, and hyperlepten in females (one female), with hypsiconch orbits and leptorine nose (for both sexes).

The individual association of the main morphometrical features evidences that the primary background for this group is Mediterrannido-Dynaric, with secondary Alpinoid, Nordoid and East-Europoid influences.

Anthropological results indicate that, possibly, besides the skeletal remains of the heroes who fell in the First World War, other people had been also reburied in the Mausoleum.

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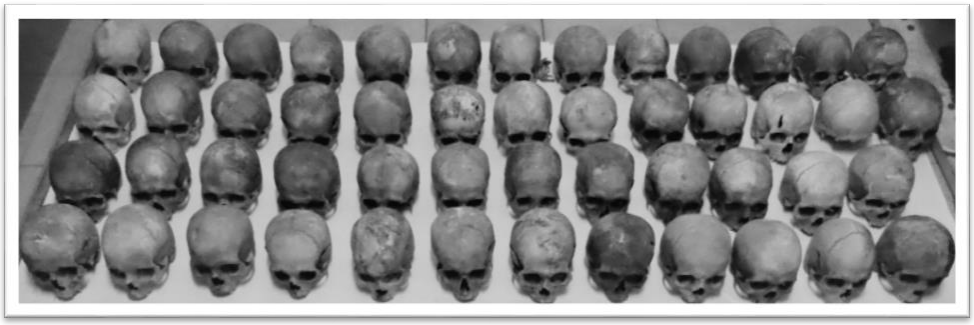

Figure 1. View of the analysed skull sample

Table 1

Sample structure by age and sex

Sex / Age (years)	Male		Female		Total	
	N*	%	N	%	N	%
Adolescent (12-19 years)	3	6.00	1	2.00	4	8.00
Young adult (20-34 years)	22	44.00	3	6.00	25	50.00
Middle adult (35-49 years)	19	38.00	–	–	19	38.00
Old adult (50+ years)	2	4.00	–	–	2	4.00
Total	**46**	92.00	**4**	8.00	**50**	**100**

*N=number of individuals

Table 2

Statistics of absolute and relative characters in skull sample
(N = number of estimated individuals; M = average; δ = standard deviation;
min = minimum; max = maximum)

Martin No.	Character	Male					Female				
		N	M	δ	min	max	N	M	δ	min	max
1	g-op	46	175.95	7.26	164	192.5	4	171.50	6.34	163.5	179
5	n-ba	44	101.20	4.00	92	111	4	96.00	4.16	91	101
8	eu-eu	46	140.99	6.25	123	152.5	4	139.00	4.55	133	143
9	ft-ft	46	97.28	4.50	85.5	105	4	91.00	3.16	87	94
10	co-co	46	119.85	6.90	103	136	4	112.25	6.34	106	121
12	ast-ast	44	111.90	5.35	101	123	4	103.38	4.27	98	107.5
17	ba-b	43	135.07	7.21	99	145.5	4	137.00	12.36	127	155
20	po-b	46	117.73	3.88	107	126.5	4	113.00	2.00	110	114
40	ba-pr	44	93.58	8.10	71	129.5	3	92.67	1.26	91.5	94
44	ek-ek	44	92.33	3.55	85	101	3	86.00	2.65	84	89
45	zy-zy	27	126.26	6.33	106	138.5	1	107.00	-	107	107
47	n-gn	–	–	–	–	–	–	–	–	–	–
48	n-pr	46	68.77	4.86	59	87	3	66.50	5.22	63	72.5
50	mf-mf	46	22.35	2.48	18	46	3	20.50	2.78	18	23.5
51	mf-ek	46	37.28	2.03	32.5	46	3	34.67	1.15	34	36
52	Height of the orbit	46	34.23	2.13	30.5	46	3	32.50	1.32	31	33.5

Table 1 (continued)

54	al-al	46	23.12	1.72	20	46	3	23.00	1.32	22	24.5
55	n-ns	46	50.95	4.09	44	63.5	3	55.17	8.52	47	64
62	ol-sta	44	36.12	2.81	31	44	3	35.33	1.53	34	37
63	enm_2-enm_2	44	35.26	4.00	24	44	3	37.83	1.61	36	39
$69_{(1)}$	Height at the g.m.level	–	–	–	–	–	–	–	–	–	–
$69_{(3)}$	Thickness at the g.m. level	–	–	–	–	–	–	–	–	–	–
8/1	Cranial index	46	80.31	5.52	69.61	89.02	4	81.09	2.78	77.09	83.14
17/1	Longitudinal basio-brgmatic index	43	76.97	4.80	54.40	84.80	4	79.91	6.91	74.86	90.12
17/8	Transversal basio-brgmatic index	43	95.65	6.20	76.74	110.16	4	98.48	6.82	92.96	108.39
20/1	Longitudinal porio-brgmatic index	46	67.00	3.15	60.11	72.42	4	65.96	2.75	63.69	69.72
20/8	Transversal porio-brgmatic index	46	83.67	4.84	77.29	97.56	4	81.38	3.58	77.46	85.71
9/10	Frontal transversal index	46	81.36	4.80	70.66	93.20	4	81.36	7.02	71.90	87.74
9/8	Frontal-parietal index	46	69.12	5.29	58.97	78.05	4	65.53	3.33	60.84	68.12
12/8	Parietal-occipital index	44	78.72	4.12	70.07	87.21	4	74.38	2.48	71.01	76.69
40/5	Gnathic index	44	92.52	7.97	68.93	132.14	4	96.33	3.83	93.07	100.55
47/45	Total facial index	–	–	–	–	–	-	–	–	–	–
48/45	Facial superior index	27	55.10	4.75	47.20	69.05	1	67.76	-	67.76	67.76
52/51	Orbital index	46	92.09	7.81	77.22	109.72	3	93.76	3.00	91.18	97.06
54/55	Nasal index	46	45.66	4.82	31.50	56.18	3	42.60	8.95	34.38	52.13
63/62	Palatal index	43	97.72	11.96	70.83	120.00	3	107.17	5.41	102.86	113.24
45/8	Cranial-facial transversal index	27	90.37	5.56	75.44	101.53	1	77.54	-	77.54	77.54
9/45	Fronto-jugal index	27	77.46	4.20	72.66	92.45	1	87.85	-	87.85	87.85
66/45	Jugo-mandibular index	–	–	–	–	–	–	–	–	–	–
$69_3/69_1$	Mandible robustness index	–	–	–	–	–	–	–	–	–	–

Table 3

Categories of craniofacial indices in males and females

Indices	Categories	Male		Female	
		N	%	N	%
8/1	Ultradolichocrane (x-64.9)	–	–	–	–
	Hyperdolichocrane (65.0-69.9)	1	2.17	–	–
	Dolichocrane (70.0-74.9)	7	15.22	–	–
	Mesocrane (75.0-79.9)	13	28.26	1	25.00
	Brachycrane (80.0-84.9)	15	32.61	3	75.00
	Hyperbrachycrane (85-89.9)	10	21.74	–	–
	Ultrabrachycrane (90-x)	–	–	–	–
17/1	Chamecrane (x-69.9)	1	2.33	–	–
	Orthocrane (70-74.9)	10	23.26	–	–
	Hypsicrane (75-x)	32	74.42	4	100.00
17/8	Tapeinocrane (x-91.9)	11	25.58	–	–
	Metriocranae (92-97.9)	17	39.53	3	75.00
	Acrocrane (98-x)	15	34.88	1	25.00
20/1	Chamecrane (x-57.9)	–	–	–	–
	Orthocrane (58.0-62.9)	4	8.70	–	–
	Hypsicrane (63.0-x)	42	91.30	4	100.00
20/8	Tapeinocrane (x-79.9)	9	19.57	1	25.00
	Metriocrane (80.0-85.9)	26	56.52	3	75.00
	Acrocrane (86.0-x)	11	23.91	–	–
9/8	Stenometope (x-65.9)	11	23.91	4	100.00
	Metriometope (66.0-68.9)	11	23.91	–	–
	Eurymetope (69.0-x)	24	52.17	–	–
9/10	Spherical foreheads (x-79.99)	18	39.13	1	25.00
	Oval forheads (80.00-99.99)	28	60.87	3	75.00
	Parallel margins - foreheads (100.0-x)	–	–	–	–
12/8	Narrow occipital (x-71.9)	1	2.27	–	–
	Middle occipital (72.0-78.9)	20	45.45	4	100.00
	Broad occipital (79.0-85.9)	20	45.45	–	–
	Very broad occipital (86.0-x)	3	6.82	–	–
47/45	Hypereuryprosope (x-80.9)	–	–	–	–
	Euryprosope (81-84.9)	–	–	–	–
	Mesoprosope (85-89.9)	–	–	–	–
	Leptoprosope (90-94.9)	–	–	–	–
	Hyperleptoprosope (95-x)	–	–	–	–
48/45	Hypereuryene (x-44.9)	–	–	–	–
	Euryene (45.0-49.9)	2	7.41	–	–
	Mesene (50.0-54.9)	14	51.85	–	–
	Leptene (55.0-59.9)	8	29.63	–	–
	Hyperleptene (60.0-x)	3	11.11	1	100.00
52/51	Chameconch (x-75.9)	–	–	–	–
	Mesoconch (76.0-84.9)	9	19.57	–	–
	Hypsiconch (85.0-x)	37	80.43	3	100.00
54/55	Leptorrhine (x-46.9)	29	63.04	2	66.67
	Mesorrhine (47.0-50.9)	11	23.91	–	–
	Chamaerrhine (51.0-57.9)	6	13.04	1	33.33
	Hyperchamaerrhine (58.0-x)	–	–	–	–

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