HOW TO COUNT THE RENCULI OF THE CETACEAN KIDNEYS, WITH SPECIAL REGARD TO THE KIDNEY OF THE RIGHT WHALE

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The highest degree of lobulation of the kidney is met with amongst all mammalia in the kidney of the cetacea. The cetacean kidney is separated into numerous renculi, looking as a whole like a bunch of grapes. Many authors have counted hitherto the renculi constituting a kidney in various kinds of the cetacea (Table 1). But in determining the number an important point to be considered is, that the lobulation of the cetacean kidney is always never so complete that all the renculi are individualized and there are many formations made of two or more renculi fused together or incompletely separated.

TABLE 1. NUMBER OF THE RENCULI OF THE CETACEA REPORTED HITHERTO

Name of the authors	Year	Species of the whale	Number of the renculi	Remarks
Hyrtl, J.	1872	*B. rostrata*	156	Embryo
Watson, M. and Young, A. H.	1879	*Delphinapterus*	400	*
Beauregard et Boulart.	1882	*B. musculus*	ca. 3000	
Daudt, W.	1898	*B. musculus*	ca. 3000	
Schulte, H. von W.	1916	*B. borealis*	ca. 1350	Embryo
Anthony, R.	1922	*Mesoplodon*	474	*
Anthony, R.	1926	*Delphinus delphis*	459	*
Ping, Chi.	1926	*Neomeris phocaenoides*	145–150	
Ommanney, F. D.	1932	*B. physalus*	5998–6372	
Hosokawa, H. and Ohe, T.	1947	*B. borealis*	3251	Unpublished
Matthews, L. H.	1950	*Stenella frontalis*	ca. 300	**
Matthews, L. H.	1950	*B. musculus*	ca. 3000	**

* cited from Daudt, W. 1898 and Ommanney, F. D. 1932.
** cited from Burne, R. H. 1952.

A great variance upon the number of renculi reported until today is caused not to a small extent very probably by the ways how the authors treated the aggregated renculi, though the calculation methods employed by them have not been always mentioned. Usually in cases of larger whales only a small portion of the kidney was really examined and the

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whole number was estimated roughly by arithmetical multiplication. As an example, Ommanney (1936) adopted the following method upon the kidney of one female Fin whale. The whole weight of the kidney was 65.5 kg. The number of renculi counted in a given area (20×20 cm) of a section surface was between 80 and 85. The weight of a given block of the kidney substance measuring 20 × 20 × 5 cm was 1.82 kg. The average diameter of the renculi (counting 40 renculi) was 2.4 cm. The number of renculi in the block was therefore : (80 or 85)×5.0/2.4. The result is nearly to double the number counted in the given area, since the block of kidney was about twice (5/2.4) the rencular diameter in depth. The total number of renculi in the whole mass of the kidney was thus given roughly by :

$$\frac{(80 \text{ or } 85)\times 5}{2.4}\times\frac{\text{Total weight of the kidney}}{\text{weight of the block}},\ \text{i. e.}\ \frac{(80 \text{ or } 85)\times 5}{2.4}\times\frac{65.5}{1.82}$$

i. e. 5998 or 6372. Ommanney estimated that the true number will lie somewhere between these two figures. He cut the block of the renal substance at random from the mass of a lobe of the organ, and he added also that the calculation took account of the spaces in the kidney occupied by connective tissue and blood vessels.

In such cases the connective tissue with blood-vessels and roots of the ureter deserve special attention. And it is noteworthy that the comparative volume of these non-proper tissues is quite different among the cetacea. The present author is interested to find rather few connective tissue in the kidney of the dolphins in comparison with those of mystacoceti and of some larger odontoceti. With the latter are meant here such toothed whales as *Ziphius cavirostris*, *Berardius bairdii* etc., in which the connective tissues are comparatively tough and pretty abundant.

In the present work an attempt was done for counting the renculi of a cetacean kidney as exactly as possible. For this purpose we settled at first the standard unit of a renculus and then counted the renculi separately one by one. When in the counting we adhere only to the external appearance of a renal mass, we find it often very difficult to determine the degree of fusion or separation. From this reason a new method was devised after we had observed comparatively the kidneys of some cetacean kinds ; that is the combination of external studies by macroscopic dissection with internal observations by cutting across the renculus with dissection knife on a horizontal or sagittal plane. By doing so, we tried to discern the structure of the cortex, medulla and papilla of a renculus, and were able to determine the standard unit (Fig. 1).

The method here employed is well applicable to systematic observation

of the cetacean kidneys and any body can use it with ease.

I wish to thank Prof. Teizo Ogawa and Ass. Prof. Hiroshi Hosokawa for their kind help, guidance and encouragement.

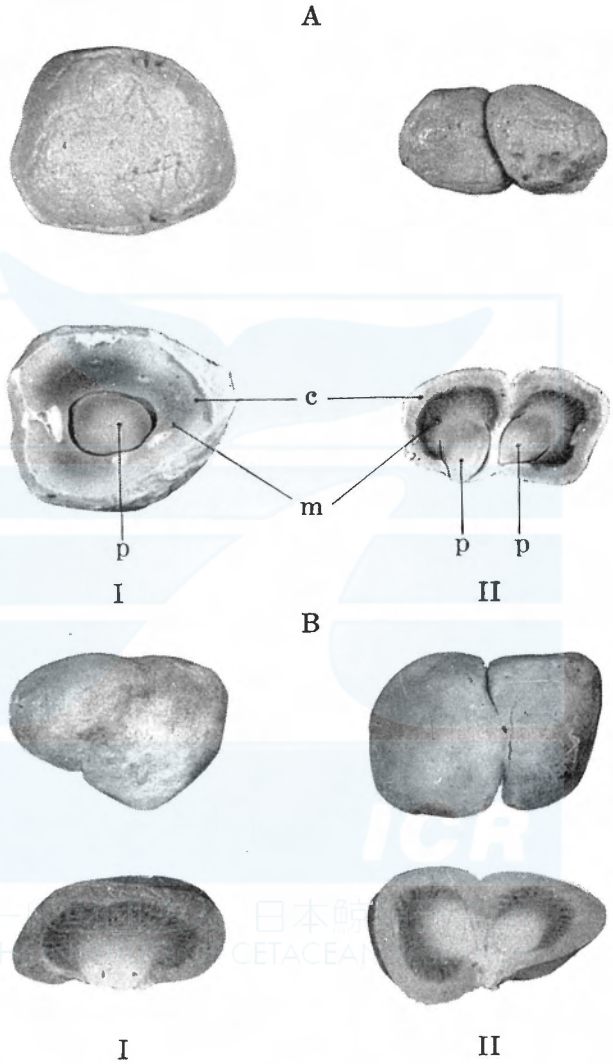

Fig. 1. Standard types of the renculus (natural size)
A–Sperm whale (*Physeter catodon*)
B–Sei whale (*Balaenoptera borealis*)
c–renal cortex (rencular cortex)
m–renal medulla (rencular medulla)
p–renal papilla (rencular papilla)
A–I is by horizontal section; A–II, B–I and B–II are by sagittal sections.

METHOD

All the materials are fixed in 10% formalin, and then the ureter, blood-vessels and the connective tissue are cut out and removed carefully. At first, all of the renculi are arranged in order by natural appearance, and classified as the following: apparently a single renculus---two renculi apparently fused---three renculi apparently fused---four renculi apparently fused---etc., in this way by external appearance each renculus-group is numbered (Group I, II, III, ---, 1st column in Appendix table I), the number of renculi belonging to each renculus-group is reckoned (2nd column in Appendix table I) and weights of each group are measured (7th column in Appendix table I). This way is termed **the classification by external appearance.**

Secondly, all of the renculi are cut in the horizontal or sagittal direction without dissolving the above mentioned grouping and in each group the renculi are arranged in order according to the number of papillae as the following: renculus with one papilla---renculus with two papillae---renculus with three papillae---renculus with four papillae---etc., in this was each renculus-group is divided according to the number of papillae (Group 1, 2, 3,---, 3rd column in Appendix table I), the number of renculi and papillae belonging to each papillae-group is reckoned (4th and 5th column in Appendix table I), and in the same way the number of papillae belonging to each renculus-group is calculated (6th column in Appendix table I). This way is termed **the classification by counting papillae of the renculus.**

On hand of the above procedures, the following calculations are done: 1) the number of renculi by their natural appearance (2nd column in Appendix table I), 2) proportion of the number of each group determined by external appearance to the total number of the renculi (2nd column in Appendix table I), 3) proportion of the number of papillae belonging to each renculus-group classified above to the total number of the papillae contained in all the renculi (6th column in Appendix table I).

MATERIALS

MYSTACOCETI;

1. Right whale (*Balaena glacialis* LINNÉ)*
2. Little Piked whale (*Balaenoptera acuto-rostrata* L.)

ODONTOCETI;

3. Goose-beaked whale (*Ziphius cavirostris* CUVIER)
4. Killer whale (*Orcinus orca* LINNÉ)
5. Risso's dolphin (*Grampus griseus* CUVIER)

* This Right whale was legitimately caught in May 1956, for the scientific investigation with the special permission of the Japanese Government.

6. Pacific Pilot whale (*Globicephalus melas* TRAILL)
7. Bottle-nosed dolphin (*Trusiops truncatus* MONTAGU)
8. Common dolphin (*Delphinus delphis* LINNÉ)
9. Suji-iruka (*Prodelphinus caeruleo-albus* MEYEN)
10. Finless black porpoise (*Neomeris phocaenoides* CUVIER)
11. True's porpoise (*Phocaenoides truei* ANDREWS)

The following three species were used for comparison :

Sei whale (*Balaenoptera borealis* LESSON)
Sperm whale (*Physeter catodon* LINNÉ)
Pacific Beaked whale (*Berardius bairdii* STEJNEGER)

Those materials could be obtained through the kindness of many persons ; I wish to say here sincere thanks especially to Dr. Munesato Yamada of the University of Okayama, Mr. Masayuki Nakajima at Enoshima Marineland and Messrs. Yoshinori Kimura and Katsuro Abe at Ayukawa-machi.

OBSERVATIONS

The number of the renculi in eleven species of the cetacea is shown in Appendix table I (in each species only the right kidney was examined).

We will treat here especially the kidney of the Right whale in details :

The total number of the renculi is 5377 in the Right whale ; this value surpasses the total number of the renculi of the Blue whale, which amounts to 3000 (Beauregard et Boulart 1882, Daudt W. 1898 and Matthews L. H. 1950) and comes pretty near that of the Fin whale, which was said ca. 6000 (Ommanney F. D. 1932).

From my studies the following data are given ;

1. Classification by external appearance

Group	I	2303	(42.8%, not aggregated renculus)
Group	II	2110	(39.4%, two renculi are aggregated together)
Group	III	740	(13.8%)
Group	IV	211	(3.9%)
Group	V	9	(0.2%)
Group	VI	4	(0.07%)

In comparison with other species of the cetacea it is remarkable in the Right whale that the difference between Group I and Group II is very small, being only 193 (3.4%), and the highest aggregation is seen in Group VI. Those two points may be influenced to some extent by immaturity of the individual (Fig. 2).

2. Classification by counting the papillae

Group	I	2748	(27.1%)
Group	II	4204	(41.4%)
Group	III	2268	(22.3%)
Group	IV	865	(8.5%)

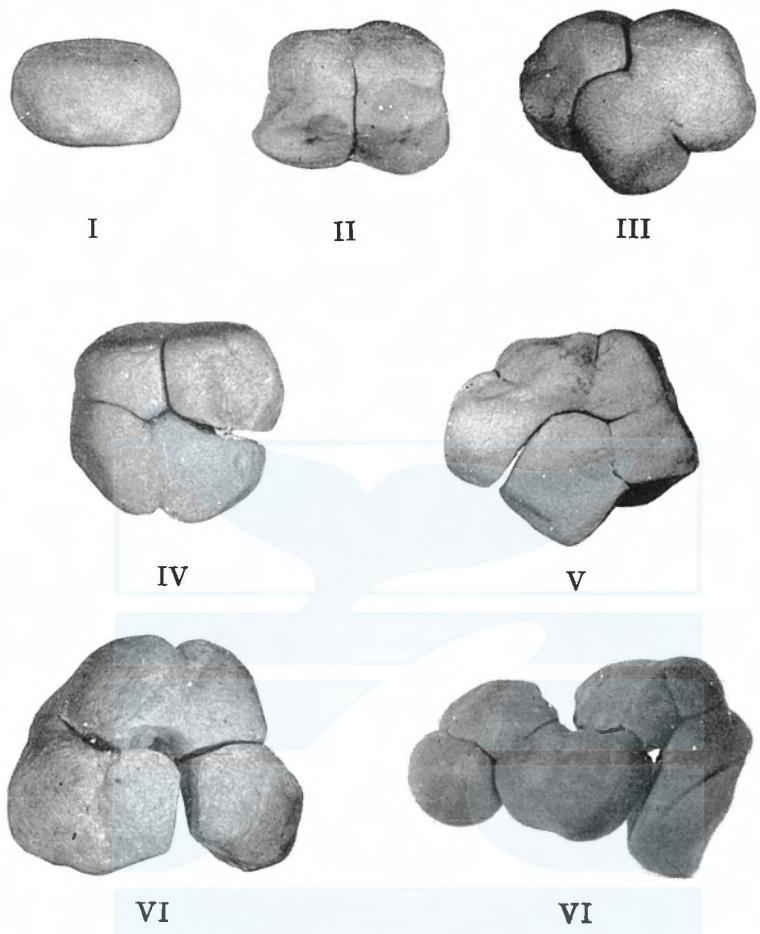

Fig. 2. Several types of the renculus of the Right whale; classification by the external appearance (natural size)

Group V 47 (0.5%)
Group VI 24 (0.2%)

The classification by external appearance is coincident with the classification by counting the papillae at 80.8% in Group I, at 94% in Group II, at 87.3% in Group III, at 88.2% in Group IV, at 88.8% in Group V and at 100% Group VI. These percentages mean the degree of coincidence between external lobulation and internal formation of papillae (3rd and 4th columns in Appendix table I).

Next, all of the renculi are classified again by the number of papillae (Appendix table II). In Appendix table II, each renculus is classified according to the papillae. Group I means that they have one papilla within one renculus, Group II means that they have two papillae within one renculus, and so forth. There are seven groups in all. By com-

TABLE 2. SUMMARY OF MEASUREMENTS AND CALCULATIONS ON THE CETACEAN KIDNEYS (IN EACH SPECIES ONLY THE RIGHT KIDNEY WAS EXAMINED)

Species of the whale	Body length (m)	Sex	Total weight of the kidney (kg)	Total weight of the renculi (kg)	Number of the renculi	Number of the papillae	Average weight of one renculus (g)	Average weight of one papilla (g)
Balaena glacialis	11.65	♀	32.40	13.813	5377	10156	2.57	1.36
Balaenoptera acuto-rostrata	6.80	♀	4.16	3.269	1250	1290	2.61	2.53
Ziphius cavirostris	6.40	♀	3.64	2.165	1912	2743	1.13	0.79
Orcinus orca	5.42	♀	3.04	1.801	1217	2024	1.47	0.89
Globicephalus melas	3.05	♀	1.15	0.693	641	906	1.08	0.76
Grampus griseus	3.00	♂	0.79	0.666	378	394	1.76	1.69
Trusiops truncatus	2.23	♂	0.31	0.242	375	542	0.65	0.45
Prodelphinus caeruleo-albus	2.07	♂	0.21	0.185	270	318	0.69	0.58
Delphinus delphis	1.77	♀	0.18	0.153	269	415	0.57	0.37
Neomeris phocaenoides	1.52	♀	0.23	0.212	138	152	1.53	1.38
Phocaenoides truei (embryo)	0.82	♀	0.03	0.027	389	492	0.07	0.05

TABLE 3. THE RELATION BETWEEN GROWTH AND LOBULATION *PRODELPHINUS CAERULEO-ALBUS* MEYEN (IN EACH STAGES ONLY THE RIGHT KIDNEY WAS EXAMINED)

Body length (cm)	Sex	Number of the renculi	Number of the papillae
85 (embryo)	♀	288	347
110	♀	271	394
150	♀	344	435
180	♀	274	299
200	♂	270	303
207	♂	270	318
220	♂	330	395

TABLE 4. THE DIFFERENCE OF THE NUMBER BETWEEN RIGHT AND LEFT

Species of the whale	Number of the renculi		Number of the papillae	
	r	l	r	l
Grampus griseus	378	381	394	402
Delphinus delphis	269	249	415	386
Phocaenoides truei (embryo)	389	409	492	495
Prodelphinus caeruleo-albus (embryo)	288	275	347	325
〃 〃 (young)	344	386	435	466
〃 〃 (adult)	270	318	257	304
Neomeris phocaenoides (adult)	185	240	154	205
〃 〃 (adult)	138	132	152	156

paring with the classification by external appearance there are some distinguishable traits, for example Group II is 2448 (45.5%) showing a higher percentage than Group I which is 1935 (36%).

The average weight of one renculus and papilla are 2.57 g and 1.36 g, while the highest and lowest weight of one renculus is 8.5 g and 0.9 g respectively. The heaviest renculus has seven papillae, while the lightest has only one papilla within the renculus. The total weight and the total renculi weight of the right kidney are in the Right whale 32.4 kg and 13.813 kg respectively. The principal results on the kidney of each species are shown in Table 2. The relation between growth and lobulation in one dolphin-species (*Prodelphinus caeruleo-albus* MEYEN) is shown in Table 3. Increase of the lobulization with age can not be clearly concluded from this table. The difference of the number between kidneys of both sides is shown in Table 4, but the sampling number is insufficient to say any definite difference, and there seem also to exist individual and sexual differences. In a species of dolphin (*Prodelphinus caeruleo-albus* MEYEN), a difference was observed by individuals, but perhaps no difference by the sex.

SUMMARY

The cetacean kidney shows the highest degree of the lobulation in all the mammals, but its lobulation can never be said as perfect and we see many renculi fused together or incompletely separated. Because of it, to determine the real number of the renculi, a great difficulty occurs if one proceeds without keen discrimination. For this reason a new method was devised and countings were performed by two following ways :

1. Classification by external appearance.
2. Classification by counting papillae of the renculi.

This method gives the results much more accurately than any method of previous authors, as to the number of the cetacean renculi.

By this method the number of the renculi was studied in eleven species of the cetacea and especially the right kidney of a 11.65 m long female Right whale was here treated. The total number of the renculi and papillae amounted in this whale to 5377 and 10156 respectively. In this species of the baleen whale the rencular aggregation occurs in higher degree than in any other cetacea comparatively studied in the present work. Remarkably high percentage of the renculi in fusion was confirmed in the Right whale not only by external appearance, but also by counting the papillae.

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APPENDIX TABLE I. THE CLASSIFICATION BY EXTERNAL APPEARANCE (IN EACH SPECIES ONLY THE RIGHT KIDNEY WAS EXAMINED)

Italic denotes percentage.

1) Ratio to the total number of the renculi.
2) Ratio to the number of the renculi of each groups of the classification by external appearance.
3), 4) Ratio to the total number of the papilla.
5) Ratio to the total weight of the renculi.

1. *Balaena glacialis* 11.65 m. ♀

Groups by natural appearance	Number of renculi of each group	Types by number of papillae in a renculus	Number of renculi of each type	Number of papillae	Total number of papillae of each group	Weight (g)
I	2303 *42.8*[1]	1	1860 *80.8*[2]	1860 *18.3*[3]	2748 *27.1*[4]	4157 *30.1*[5]
		2	441 *19.1*	882 *8.68*		
		3	2 *0.09*	6 *0.06*		
II	2110 *39.4*	1	75 *3.55*	75 *0.74*	4204 *41.4*	5857 *42.4*
		2	1984 *94.03*	3968 *39.07*		
		3	43 *2.04*	129 *1.27*		
		4	8 *0.28*	32 *0.32*		
III	740 *13.8*	2	23 *3.1*	46 *0.45*	2268 *22.3*	2700 *19.5*
		3	646 *87.3*	1938 *19.08*		
		4	71 *9.6*	284 *2.8*		
IV	211 *3.9*	3	3 *1.42*	9 *0.09*	865 *8.5*	1021 *7.4*
		4	186 *88.15*	744 *7.33*		
		5	21 *9.95*	105 *1.03*		
		7	1 *0.58*	7 *0.07*		
V	9 *0.2*	5	8 *88.8*	40 *0.39*	47 *0.5*	52 *0.4*
		7	1 *11.2*	7 *0.69*		
VI	4 *0.07*	6	4 *100*	24 *0.24*	24 *0.2*	26 *0.2*
Total	**5377**		**5377**	**10156**	**10156**	**13813**

2. *Balaenoptera acuto-rostrata* 6.8 m. ♀

Groups by natural appearance	Nnmber of renculi of each group	Types by number of papillae in a renculus	Number of renculi of each type	Number of papillae	Total number of papillae of each group	Weight (g)
I	1003 *80.24*	1	1003 *100*	1003 *77.75*	1003 *77.75*	2408 *73.65*
II	216 *17.28*	1	186 *86.1*	186 *14.42*	246 *19.07*	727 *22.24*
		2	30 *13.9*	60 *4.65*		
III	30 *2.4*	1	22 *73.3*	22 *1.71*	39 *3.02*	127.5 *3.90*
		2	7 *23.3*	14 *1.09*		
		3	1 *3.4*	3 *0.23*		
IV	1 *0.08*	2	1 *100*	2 *0.16*	2 *0.16*	7 *0.24*
Total	**1250**		**1250**	**1290**	**1290**	**3269.5**

3. *Ziphius cavirostris* 6.4 m. ♀

Groups by natural appearance	Number of renculi of each group	Types by number of papillae in a renculus	Number of renculi of each type	Number of papillae	Total number of papillae of each group	Weight (g)
I	1398 *73.1*	1	1121 *80.19*	1121 *40.87*	1679 *61.2*	1360 *62.8*
		2	273 *19.53*	546 *19.91*		
		3	4 *0.29*	12 *0.44*		
II	490 *25.6*	1	26 *5.31*	26 *0.95*	995 *36.3*	745 *34.4*
		2	426 *86.94*	852 *31.06*		
		3	35 *7.14*	105 *3.83*		
		4	3 *6.12*	12 *0.44*		
III	20 *1.0*	2	7 *35*	14 *0.51*	54 *2.0*	45 *2.1*
		3	12 *60*	36 *1.31*		
		4	1 *5.0*	4 *0.15*		
IV	4 *0.2*	3	1 *25.0*	3 *0.11*	15 *0.5*	15 *0.7*
		4	3 *75.0*	12 *0.44*		
Total	**1912**		**1912**	**2743**	**2743**	**2165**

4. *Orcinus orca* 5.42 m. ♀

Groups by natural appearance	Number of renculi of each group	Types by number of papillae in a renculus	Number of renculi of each type	Number of papillae	Total number of papillae of each group	Weight (g)
I	534	1	520	520	548	590
	43.9		*97.4*	*25.7*	*27.1*	*32.8*
		2	14	28		
			2.6	*1.4*		
II	571	1	7	7	1137	960
	46.9		*1.2*	*0.3*	*56.2*	*53.3*
		2	562	1124		
			98.4	*55.5*		
		3	2	6		
			0.4	*0.3*		
III	96	2	15	30	275	204
	7.9		*15.6*	*1.5*	*13.4*	*11.3*
		3	79	237		
			82.3	*11.7*		
		4	2	8		
			2.1	*0.4*		
IV	16	4	16	64	64	47
	1.3		*100*	*3.2*	*3.2*	*2.6*
Total	**1217**		**1217**	**2024**	**2024**	**1801**

5. *Globicephalus melas* 3.05 m. ♀

Groups by natural appearance	Number of renculi of each group	Types by number of papillae in a renculus	Number of renculi of each type	Number of papillae	Total number of papillae of each group	Weight (g)
I	420	1	416	416	424	373
	65.5		*99.05*	*45.92*	*46.8*	*53.82*
		2	4	8		
			0.95	*0.88*		
II	183	1	2	2	364	247
	28.5		*1.09*	*0.22*	*40.18*	*35.64*
		2	181	362		
			98.91	*39.96*		
III	35	3	35	105	105	65
	5.5		*100*	*11.59*	*11.59*	*9.38*
IV	3	4	2	8	13	8
	0.5		*66.67*	*0.88*	*1.43*	*1.15*
		5	1	5		
			33.33	*0.55*		
Total	**641**		**641**	**906**	**906**	**936**

6. *Grampus griseus* 3 m. ♂

Groups by natural appearance	Number of renculi of each group	Types by number of papillae in a renculus	Number of renculi of each type	Number of papillae	Total number of papillae of each group	Weight (g)
I	334	1	334	334	334	565
	88.4		*100*	*84.77*	*84.77*	*84.83*
II	43	1	27	27	59	98
	11.4		*62.79*	*6.85*	*14.97*	*14.71*
		2	16	32		
			37.21	*8.12*		
III	1	1	1	1	1	3
	0.26		*100*	*0.25*	*0.25*	*0.45*
Total	**378**		**378**	**394**	**394**	**666**

7. *Trusiops truncatus* 2.23 m. ♂

Groups by natural appearance	Number of renculi of each group	Types by number of papillae in a renculus	Number of renculi of each type	Number of papillae	Total number of papillae of each group	Weight (g)
I	228 *60.8*	1	228 *100*	228 *42.07*	228 *42.07*	119 *49.17*
II	117 *31.2*	1	6 *5.13*	6 *1.11*	228 *42.07*	91 *37.60*
		2	111 *94.87*	222 *40.96*		
III	29 *7.73*	1	1 *3.45*	1 *0.81*	82 *15.13*	31 *12.81*
		2	3 *10.34*	6 *1.11*		
		3	25 *86.21*	75 *13.84*		
IV	1 *0.26*	4	1 *100*	4 *0.74*	4 *0.74*	1 *0.41*
Total	**375**		**375**	**542**	**542**	**242**

8. *Delphinus delphis* 1.77 m. ♀

Groups by natural appearance	Number of renculi of each group	Types by number of papillae in a renculus	Number of renculi of each type	Number of papillae	Total number of papillae of each group	Weight (g)
I	184 *68.4*	1	150 *81.52*	150 *36.14*	219 *52.77*	86.5 *56.35*
		2	33 *17.93*	66 *15.90*		
		3	1 *0.54*	3 *0.72*		
II	65 *24.2*	1	1 *1.54*	1 *0.24*	133 *32.05*	48 *31.27*
		2	60 *92.31*	120 *28.92*		
		3	4 *6.15*	12 *2.89*		
III	17 *6.3*	3	17 *100*	51 *12.29*	51 *12.29*	15 *9.77*
IV	3 *1.1*	4	3 *100*	12 *2.89*	12 *2.89*	4 *2.61*
Total	**269**		**269**	**415**	**415**	**1535**

9. *Neomeris phocaenoides* 1.5 m. ♀

Groups by natural appearance	Number of renculi of each group	Types by number of papillae in a renculus	Number of renculi of each type	Number of papillae	Total number of papillae of each group	Weight (g)
I	119 *86.2*	1	116 *97.48*	116 *76.32*	122 *80.26*	180.5 *85.75*
		2	3 *2.52*	6 *3.95*		
II	19 *13.8*	1	8 *42.11*	8 *5.26*	30 *19.74*	30 *14.25*
		2	11 *57.89*	22 *14.47*		
Total	**138**		**138**	**152**	**152**	**210.5**

10. *Prodelphinus caeruleo-albus* 2.07 m. ♂

Groups by natural appearance	Number of renculi of each group	Types by number of papillae in a renculus	Number of renculi of each type	Number of papillae	Total number of papillae of each group	Weight (g)
I	214	1	213	213	215	134
	79.3		*99.53*	*66.98*	*67.61*	*72.24*
		2	1	2		
			0.47	*0.63*		
II	49	1	11	11	87	44
	18.1		*22.45*	*3.46*	*27.36*	*23.72*
		2	38	76		
			77.55	*23.9*		
III	7	1	1	1	16	7.5
	2.6		*14.29*	*0.31*	*5.03*	*4.04*
		2	3	6		
			42.86	*1.87*		
		3	3	9		
			42.86	*2.83*		
Total	**270**		**270**	**318**	**318**	**185.5**

11. *Phocaenoides truei* 0.82 m. (Embryo) ♀

Groups by natural appearance	Number of renculi of each group	Types by number of papillae in a renculus	Number of renculi of each type	Number of papillae	Total number of papillae of each group	Weight (g)
I	276	1	269	269	283	17.0
	70.95		*97.46*	*54.7*	*57.5*	*61.2*
		2	7	14		
			2.54	*2.8*		
II	102	1	32	32	172	9.0
	26.22		*31.37*	*6.5*	*35.0*	*32.4*
		2	70	140		
			68.63	*28.5*		
III	7	3	7	21	21	1.0
	1.8		*100*	*4.3*	*4.3*	*3.6*
IV	4	4	4	16	16	0.8
	1.03		*100*	*3.3*	*3.3*	*2.8*
Total	**389**		**389**	**492**	**492**	**27.8**

APPENDIX TABLE II. THE CLASSIFICATION BY COUNTING PAPILLAE OF THE RENCULUS
(IN EACH SPECIES ONLY THE RIGHT KIDNEY WAS EXAMINED)

Species	Groups →	I	II	III	IV	V	VI	VII	Total
Balaena glacialis 11.65 m. ♀	1[1]	1935	2448	694	265	29	4	2	**5377**
	2[2]	*36*	*45.5*	*12.9*	*4.9*	*0.5*	*0.07*	*0.04*	
	3[3]	1935	4896	2082	1060	145	24	14	**10156**
	4[4]	*19.05*	*48.2*	*20.5*	*10.44*	*1.43*	*0.24*	*0.14*	
Balaenoptera acuto-rostrata 6.8 m. ♀	1	1211	38	1	—	—	—	—	**1250**
	2	*96.88*	*3.04*	*0.08*	—	—	—	—	
	3	1211	76	3	—	—	—	—	**1290**
	4	*93.88*	*5.89*	*0.23*	—	—	—	—	
Ziphius cavirostris 6.4 m. ♀	1	1147	706	52	7	—	—	—	**1912**
	2	*59.99*	*36.92*	*2.72*	*0.37*	—	—	—	
	3	1147	1412	156	28	—	—	—	**2743**
	4	*41.82*	*51.48*	*5.69*	*1.02*	—	—	—	
Orcinus orca 5.42 m. ♀	1	527	591	81	18	—	—	—	**1217**
	2	*43.3*	*48.56*	*6.66*	*1.48*	—	—	—	
	3	527	1182	243	72	—	—	—	**2024**
	4	*26.38*	*58.4*	*11.5*	*3.56*	—	—	—	
Globicephalus melas 3.05 m. ♀	1	418	185	35	2	1	—	—	**641**
	2	*65.21*	*28.86*	*5.46*	*0.31*	*0.15*	—	—	
	3	418	370	105	8	5	—	—	**906**
	4	*46.14*	*40.84*	*11.59*	*0.88*	*0.55*	—	—	
Grampus griseus 3 m. ♂	1	362	16	—	—	—	—	—	**378**
	2	*95.77*	*4.23*	—	—	—	—	—	
	3	362	32	—	—	—	—	—	**395**
	4	*91.88*	*8.12*	—	—	—	—	—	
Trusiops truncatus 2.23 m. ♂	1	235	114	25	1	—	—	—	**375**
	2	*62.67*	*30.4*	*6.67*	*0.27*	—	—	—	
	3	235	228	75	4	—	—	—	**542**
	4	*43.36*	*42.07*	*13.84*	*0.74*	—	—	—	
Prodelphnus caeruleo-albus 2.07 m. ♂	1	225	42	3	—	—	—	—	**270**
	2	*83.3*	*15.5*	*1.11*	—	—	—	—	
	3	225	84	9	—	—	—	—	**318**
	4	*70.75*	*26.42*	*2.83*	—	—	—	—	
Delphinus delphis 1.77 m. ♀	1	151	93	22	3	—	—	—	**269**
	2	*56.13*	*34.57*	*8.18*	*1.12*	—	—	—	
	3	151	186	66	12	—	—	—	**415**
	4	*36.39*	*44.82*	*15.9*	*2.89*	—	—	—	
Neomeris phocaenoides 1.52 m. ♀	1	124	14	—	—	—	—	—	**138**
	2	*89.9*	*10.1*	—	—	—	—	—	
	3	124	28	—	—	—	—	—	**152**
	4	*81.6*	*18.4*	—	—	—	—	—	
Phocaenoides truei (Embryo) 0.82 m. ♀	1	301	77	7	4	—	—	—	**389**
	2	*77.4*	*19.8*	*1.8*	*1.03*	—	—	—	
	3	301	154	21	16	—	—	—	**492**
	4	*61.2*	*31.3*	*4.3*	*3.3*	—	—	—	

1) Number of the renculi.
2) Ratio to the total number of the renculi.
3) Number of the papillae.
4) Ratio to the total number of the papillae.