

Results of the research cruises of FRV 'Walther Herwig' to South America. LXXIII. Fourth record of *Bathyraja papilionifera* Stehmann, 1985 from the continental slope off northern Argentina (Pisces, Rajiformes, Rajidae)

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Abstract

An immature male of *B. papilionifera* had already been trawled during the third fishery expedition to South America in 1971 seven years prior to the type series obtained at two stations of the fourth expedition in 1978. The additional record was taken somewhat north of the type locality on the continental slope off North Argentina. This fourth and second largest specimen of the rare southwestern Atlantic deep-water skate is described here in comparison with the likewise immature three type specimens. The catch composition of the three trawls stations was similar, despite minor differences between the 1971 and 1978 stations in depth and size of bottom trawls fished. Based on the example of these three slope stations within the 660 to 1040 m depth range, the distinctly lower fish species diversity in the southwestern Atlantic off Argentina is briefly commented on, as compared with that at similar slope depth in other ocean areas.

Kurzfassung

Ergebnisse der Forschungsreisen des FFS 'Walther Herwig' nach Südamerika. LXXIII. Der vierte Nachweis von *Bathyraja papilionifera* Stehmann, 1985 vom nordargentinischen Kontinentalabhang (Pisces, Rajiformes, Rajidae).

Sieben Jahre vor der Typenserie von *B. papilionifera*, die von zwei Stationen des 1. Abschnitts der 4. Südamerika-Expedition 1978 stammte, war bereits bei der 3. Expedition 1971 ein juveniles Männchen dieser Rochenart etwas nördlich vom *locus typicus* am Kontinentalabhang vor Nordargentinien gefangen worden. Dieses vierte und zweitgrößte Exemplar der seltenen südwestatlantischen Tiefwasser-Rajidenart wird im Vergleich mit den ebenfalls juvenilen drei Typen nachbeschrieben. Die Fangzusammensetzung der drei Trawlstationen 1971 und 1978 war ähnlich, abgesehen von kleineren Unterschieden in der Fangtiefe und der eingesetzten Grundschleppnetze. Am Beispiel dieser drei Fangstationen am Kontinentalabhang im 660 to 1040 m Tiefenbereich wird, verglichen mit ähnlichen Hangtiefen in anderen Ozeanbereichen, die deutlich geringere Artenvielfalt der Fischfauna im SW-Atlantik vor Argentinien kurz kommentiert.

Resumen

Resultados de las campañas científicas del BIP 'Walther Herwig' a Sudamérica. LXXII. Cuarto registro de *Bathyraja papilionifera* Stehmann, 1985 en el talud continental frente al norte de la Argentina.

Un macho inmaduro de *B. papilionifera* fue obtenido durante la tercera expedición a Sudamérica en 1971, siete años antes que la serie tipo obtenida en dos estaciones de la cuarta expedición de 1978. Este registro adicional proviene de poco más al Norte que la localidad tipo, ubicada en el talud continental frente a Argentina. El ejemplar es el cuarto obtenido, a le segundo en tamaño, de esta rara raya de aguas profundas del Atlántico sudoccidental. Se lo describe comparándolo con los tres ejemplares tipo, que también son inmaduros. La composición de las capturas en las tres estaciones de arrastre fue similar, con diferencias menores debidas a diferencias de profundidad y del características de las redes. Se discute la proeza en especies del talud del Atlántico sudoccidental.

Introduction

Bathyraja papilionifera was described by Stehmann (1985) from the continental mid-slope off northern Argentina, based on three postembryonic to half-grown male and female type specimens (217 to 681 mm TL) collected by the coauthors at two stations during the first leg of the fourth South America fishery expedition with FRV 'Walther Herwig' in 1978. It was stated further, that none such skate had been found during the three former German expeditions to the area in 1966, 1968 and 1971, neither during similar surveys by other countries, and that adults of this species were supposed to inhabit still greater depth than the 660 to 1040 m depth range of the three types. Stehmann (1986) defined three morphotypes, based on external morphology features, within the genus *Bathyraja* Ishiyama, 1958 and accordingly grouped its about 45 species then known from the world oceans without drawing nomenclatorial consequences. *B. papilionifera* was assigned to the 'transitional morphotype' being intermediate in characters of colouration, squamation and depth distribution between the 'shallow water' and 'deep-water morphotypes'.

In the course of safety measures, the junior author reworked also the large rajiform section of the former Institut für Seefischerei Hamburg (ISH) collection at the Zoological Museum Hamburg (ZMH), when eventual questionable and uncertain identifications were sorted out and verified by the senior author. A specimen catalogued under *B. ? griseocauda* surfaced at this occasion, which had been sampled by the senior author toward the end of the third South America expedition in 1971 and rested since without having received further attention. The coauthors re-identified it as *B. papilionifera*. Half a page of notes taken on this specimen in the original 1971 cruise record book clearly, in retrospect, emphasised the diagnostic features for this species of the original description in 1985. Regrettably, the specimen had been overlooked for the latter procedure and thus not been considered for the type series. According to published information after 1985 and personal information by colleagues in Argentina and other countries having been involved in bottom trawl surveys of the area since, the 1971 ISH specimen is the only additional record of this apparently very rare species. It will be described here according to the original description. Proportional morphometrics and meristic counts given in

table 1. The following description of the ISH 173-1971 juvenile male includes for comparison corresponding value ranges of the three type specimens in brackets, respectively.

MATERIAL: ISH 173-1971, immature male 426 mm TL (in 70 % Ethanol, 440 mm TL fresh) 'W. Herwig' sta. 340/71, 25.II.1971; 38°50' S, 54°25' W at 1000 m depth, T_b 2.3 °C; 140-foot bottom trawl. The specimen is in good condition, except for posterior disc margins being dried up and somewhat obdurate through initial deep-frozen preservation on board, slight patchy abrasions dorsally of the ground colour along right side of trunk and on the inner left pectoral from about scapula to orbit, and finally the artifact of a weak indentation dorsally at right head margin due to an original field number tag attached there with a metal safety pin, corrosion of which caused the two dark spots ventrally at right anterior disc margin.

Description (Figure 1, Table 1)

Disc nearly evenly rhombic, with anterior margins weakly undulated and only about one fourth longer than weakly convex posterior margins. Disc width 1.2 (1.2 to 1.3) times the disc length axis of maximum disc width at 61.7 % (59 % to 61 %) of disc length and the disc length axis of shoulder girdle. Outer corners marked in being abruptly level with posterior edge of shoulder girdle. Outer corners marked in being abruptly rounded, and inner posterior corners to P-axils sharply rounded. Snout moderately long rounded, and inner posterior length 2.9 (2.6 to 3.5) times the interorbital width, with anterior angle of 113.5° (98.5 to 129°) and tip narrowly rounded and a little marked off. Horizontal diameter of orbit 1.1 (0.9 to 1.2) times the interorbital width and 36.8 % (27 % to 47 %) of preorbital snout length. Length of spiracle 60.5 % (58 % to 66 %) of preorbit diameter. Interspiracular width 1.6 (1.5 to 1.9) times the interorbital distance. Pseudobranchial lamellae in spiracle 14 (15 to 17). Anterior and posterior pelvic lobes separated by distinct indentation of their joint outer margin. Anterior pelvic lobe strong and evenly tapering to bluntly rounded tip; its length 68.5 % (71 % to 83 %) of length of posterior lobe. The latter broadly trapezoid, with distinctly angled outer margin running weakly convex to narrowly angled, pointed apex, and relatively long inner margin straight. Claspers still undeveloped, their abruptly tapering terminal part not yet reaching to level of posterior pelvic lobe tips. The solid tail 51 % (50 % to 56 %) of TL; its lateral folds along nearly full length from pelvic axils to shortly before tail tip and a little widening only from level of D1 rearward. Tail gradually tapering to its tip, in cross-section a low trapezoid in anterior third of its length, a little deeper trapezoid in posterior two thirds. Both dorsal fins small, subequal in size and shape, their bases separated by short interspace; their height about two thirds of their base length. Their shape like a rearward inclined parallelogram without clear marked corners between the straight anterior margin, rising at about 45° angle, the strongly convex upper margin, sloping to the rounded apex overhanging posterior base end, and the short, straight rear margin. Postdorsal tail section short, nearly one third less than D2 base length. Distinct upper caudal fold, about one third in height of that of D2 and not confluent with the latter's base end, evenly deep over most of its length, exceeding tail tip and continued ventrally as a very low fold only in posterior one fifth of postdorsal tail length. Preoral snout length 1.8 (1.7 to 2.2) times the mouth width, which is 1.4 (1.3 to 2.0) in prenasal snout length and almost equal to internarial distance. Ventral head length 2.0 (1.8 to 2.1) times

the preoral snout length and 3.4 (3.4 to 4.3) times the mouth breadth. Distance between inner ends of fifth gill slits 76% (74% to 75%) (this relation by mistake reversed in original description) of that between first gill slits, and the latter 2.0 (2.0 to 2.3) times the internarial width. Anterior nasal flaps thick, subrectangular in shape, and only with a few tiny fringes at posterior margin. Nasal curtain with undulated outer margin through short, bluntly triangular lobe proximally just posterior to nostril; outer margin continued distinctly convexly to weakly angled apex, and the short, nearly transverse rear margin set with short, coarse fringes. Isthmus between rear lobes of nasal curtain shaped as evenly rounded, shallow arc. Jaws nearly straight, with relatively large teeth closely set in quincunx pattern of 35 (35 to 38) rows in upper, and 32 (34 to 36) in lower jaw. Individual tooth with flattened, rhomboid crown bearing at inner corner a short, broadly conical cusp which less distinct on teeth in outer thirds of jaws.

Upper disc only partially set with coarse spinules, which are found loosely scattered along midline of snout, sides of head and on anterior nape. In contrast, spinules are densely set in a broad band along each anterior disc margin from shortly posterior of snout tip to beginning of outer corners, from which point they continue very loosely scattered across outer corners and at a fair distance parallel to posterior margins to P-axils. Interorbital space densely spinulose, but orbits largely smooth except for a regular row of spinules along outer edge just above the eyes. From shoulder girdle rearward, a broad band of densely set spinules along back of trunk being sharply delimited to smooth sides of trunk and centres of pectorals. Likewise are sides of tail densely set with coarse spinules to shortly before its tip, but small median stripe in the course of median tail thorns with occasional spinules only and thus appearing almost smooth. Both dorsal fins and upper caudal with a few spinules only along base and on lower third. Both pelvic lobes smooth. Underside of disc, pelvics and tail totally smooth. (Fig. 1)

Only thorns on upper disc are three large conical ones along midline of posterior nape and on suprascapula, with interspaces of about half their base length, plus a fourth (3 in types only) much smaller one just posterior to shoulder girdle and another still smaller one on each shoulder (only present in postembryonic paratype male, ISH 300-1978), of which the left one broken off. Male alar thorns not yet developed. From level of P-axils to D1 a regular median row of 19 (20 to 22) distinct tail thorns, of which only the first three are somewhat smaller, and all are set at equal interspaces of about a thorn's base length (Fig. 1). No thorns (1 small) between dorsal fins. All thorns with oval base, with the high basal cone very weakly ribbed, and a short, massive, slightly recurved, smooth tip which not overhanging end of basal plate.

In 70% ethanol, upper side of disc, pelvics and tail chestnut-brown, somewhat darker to disc and pelvic margins and on back of trunk and tail. Spinules and thorns marked off pale milky-white. Rostral area and orbits as brown as remainder of upper side. Anterior pelvic lobe edged whitish. Claspers brown with lightened inner edge and terminal part marked creamy-white. Lateral tail folds brown, only at level of dorsal fins with whitish outer edge and becoming semitransparent light posteriorly. Dorsal fins whitish along their base. Except for midline and broad posterior margin, upper disc with a vague pattern of loosely and irregularly scattered pale whitish circular spots, each with 'misty' pale

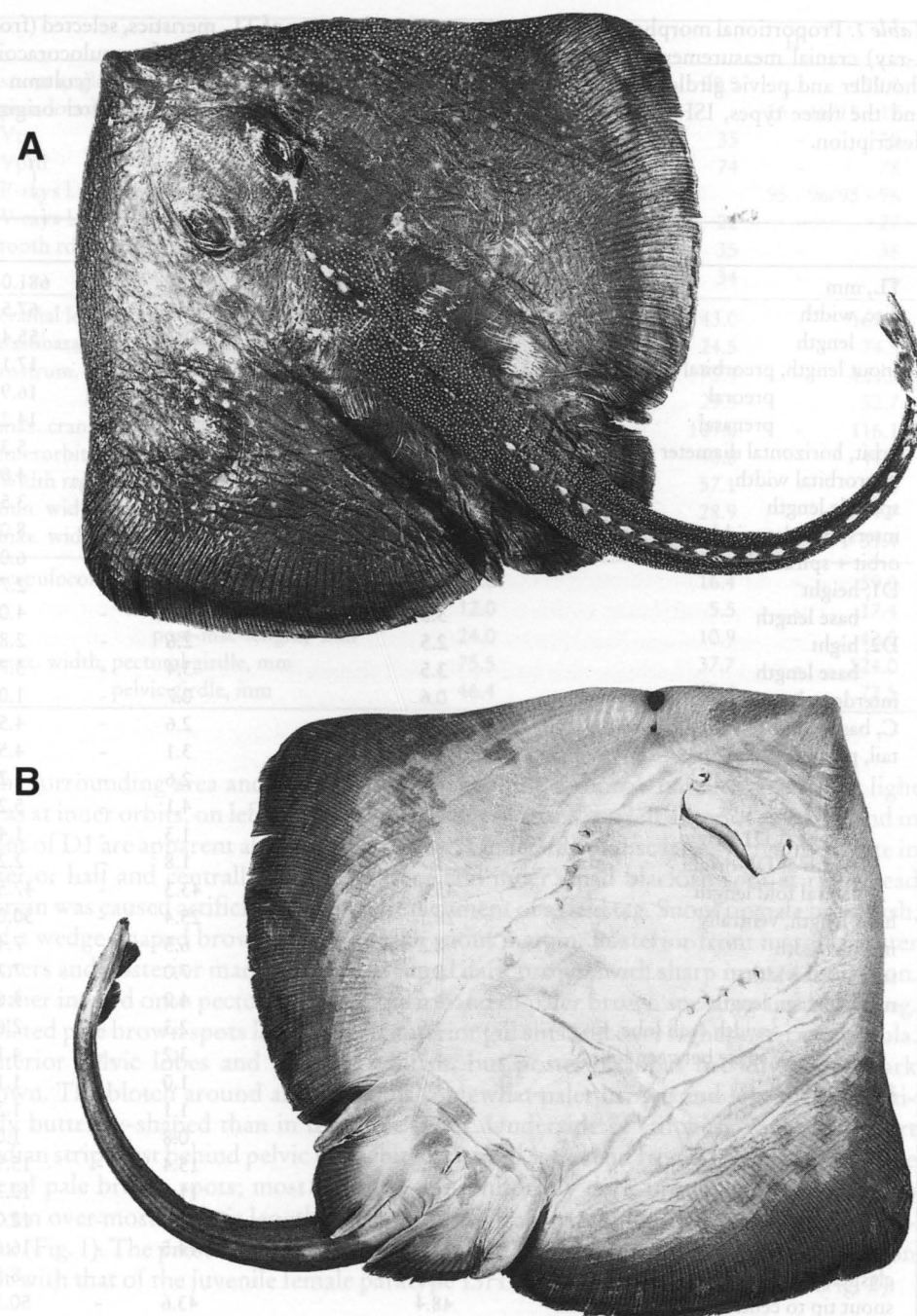


Figure 1: *Bathyraja papilionifera*, ISH 173-1971, juvenile male 426 mm TL in dorsal (A) and ventral (B) views.

Table 1: Proportional morphometric measurements as percentage of TL, meristics, selected (from x-ray) cranial measurements as percentage of nasobasal length, and those of scapulocoracoid, shoulder and pelvic girdles in millimetres of *Bathyraja papilionifera*, ISH 173-1971 (column I), and the three types, ISH 297-1978a+b and ISH 300-1978 (column II), as range after original description.

	I	II		II
TL, mm	426.0	217.0	-	681.0
disc, width	66.4	63.6	-	67.5
length	53.3	50.2	-	55.4
snout length, preorbital	13.7	11.2	-	17.1
preoral	14.3	12.4	-	16.9
prenasal	11.6	9.8	-	14.2
orbit, horizontal diameter	5.0	4.6	-	5.3
interorbital width	4.8	4.3	-	4.9
spiracle length	3.1	2.7	-	3.5
interspiracular width	7.7	7.5	-	8.0
orbit + spiracle length	5.8	5.1	-	6.0
D1, height	2.4	2.4	-	2.7
base length	3.8	3.5	-	4.0
D2, height	2.5	2.6	-	2.8
base length	3.5	3.4	-	3.7
interdorsal space	0.6	0.7	-	1.0
C, base length	2.6	2.6	-	4.5
tail, postdorsal length	2.7	3.1	-	4.5
height at V-tips	2.9	2.6	-	3.2
width at V-tips	4.5	4.1	-	5.2
height at D1-origin	1.2	1.3	-	1.4
width at D1-origin	1.7	1.8	-	2.2
lateral fold length	45.9	43.3	-	47.5
head length, ventrally	28.1	25.4	-	30.0
mouth width	8.2	6.5	-	7.4
internasal width	8.0	7.0	-	7.7
nasal curtain, length	4.6	4.2	-	4.6
width each lobe	1.9	2.3	-	2.6
space between lobes	5.9	3.2	-	4.1
gill slit length, 1st	1.0	1.0	-	1.1
3rd	1.2	1.1	-	1.3
5th	0.9	0.8	-	1.0
space between 1st gill slits	16.2	15.4	-	15.9
5th gill slits	12.3	11.6	-	12.3
V-length, anterior lobe, r.	10.2	11.0	-	12.0
posterior lobe, r.	14.8	14.5	-	16.1
clasper, postanus length	9.6			8.8
snout tip to centre of anus	48.4	43.6	-	50.1
to max. disc width	32.9	30.4	-	33.8
centre of anus to D1	41.4	38.2	-	44.2
to D2	45.7	43.3	-	48.2
to tail tip	51.4	49.9	-	55.8

	I	II		II
snout angle (°)	113.5	98.5	-	129.0
pseudobranchial folds l./r.	14/14		15 - 16/15 - 17	
Vtr	37	35	-	39
Vprd	75	74	-	78
P-rays l./r.	93+/95		95 - 96/95 - 96	
V-rays l./r.	25/25	22	-	27
tooth rows upper	35	35	-	38
lower jaw	32	34	-	36
cranial length, mm	101.0	43.0	-	167.0
nasobasal length, mm	48.5	24.5	-	74.5
rostrum, length	106.2	75.9	-	123.3
base width	25.8	29.5	-	32.7
max. cranial width	109.3	109.0	-	116.1
interorbital width	41.2	40.8	-	44.4
Width regio otica	63.9	57.1	-	68.2
min. width basal plate	29.5	28.9	-	34.7
max. width ant. fontanelle	32.0	29.9	-	31.4
scapulocoracoid length, mm	36.0	16.4	-	59.0
pre-msc-length, mm	12.0	5.5	-	17.4
post-msc-length, mm	24.0	10.9	-	42.0
max. width, pectoral girdle, mm	75.5	37.7	-	124.0
pelvic girdle, mm	46.4	22.4	-	72.5

light surrounding area and diameter about equalling a thorn's base length. Other light areas at inner orbits, on left nape, scapulae, sides of trunk, on left anterior pectoral and in front of D1 are apparent abrasions by the net. Underside of disc largely creamy-white in anterior half and centrally. An outer large and inner small blackish spot at right head margin was caused artificially by metal attachment of a field tag. Snout tip pale brownish, and a wedge-shaped brown blotch at each snout margin. Posterior front margins, outer corners and posterior margins broadly edged dark brown, with sharp inward limitation. Farther inward onto pectorals, an irregular band of paler brown spotting and blotching. Isolated pale brown spots lateral to left anterior gill slits and over right posterior scapula. Anterior pelvic lobes and claspers whitish, but posterior lobes broadly edged dark brown. The blotch around anterior anus somewhat paler brown and less characteristically butterfly-shaped than in the three types. Underside of tail with origin and short median stripe just behind pelvic tips whitish, as well as tail end from D1 origin with some lateral pale brown spots; most of tail length uniformly dark brown. Lateral tail folds brown over most of their length, except for semitransparent milky-white posterior section. (Fig. 1). The present ISH 173-1971 juvenile male corresponds in ventral colouration best with that of the juvenile female paratype ISH 297-1978b (Stehmann 1985: Fig. 2).

Snout skeleton and cranial structures (from radiograph): snout soft and vertically flexible due to very slender rostral shaft, which uncalcified in front of short and broad basal triangle and thus not reproduced in radiograph. Anteriormost propterygia of pectoral skeleton extended to nearly snout tip. Intermediate tissue of central snout area rather

thick and of gelatinous texture. Length of rostral shaft 51 % (43 % to 55 %) that of cranial TL and 1.1 (0.8 to 1.3) times the nasobasal length of neurocranium. Rostral base width 25.8 % (30 % to 33 %) of nasobasal cranial length and 23.6 % (26 % to 30 %) of maximum cranial width across nasal capsules; the latter width measurement is 1.1 (1.1 to 1.2) times the nasobasal cranial length. Greatest breadth of anterior cranial fontanelle 1.2 (about equal) times the rostrum base width; this fontanelle very broad and short, corresponding to shape of rostral base triangle and the illustration given in the original description (Stehmann 1985: Fig. 5), with its rear edge not fully shown in radiograph. Nasal capsules rather narrowly subrectangular, with nearly straight front and weakly concave rear edges; moderately expanded laterally, and their posterior edges somewhat oriented forward at 69° (70 to 71°) angle to longitudinal cranial axis. Interorbital region massive, its minimum width 41 % (41 % to 44 %) of nasobasal cranial length, and orbits indented as shallow trapezoids. Preorbital processes weakly developed, in contrast to prominent postorbital and pterotic processes being well separated from each other. Posterior cranial fontanelle only depicted in radiograph with its reverse drop-shaped rear part posterior to lower jaw. Jugal arches poorly developed and neither laterally, nor to the rear exceeding the contours of the occiput.

Scapulocoracoid (from radiograph) very elongated, with its total length being 47.7 % (44 % to 50 %) of maximum width of shoulder girdle and mesocondyle in obviously asymmetric position at one third (28 % to 34 %) pre-mesocondyle length of the element. The anterior bridge across anterior fenestra is well shown in radiograph, as well as about five postdorsal and somewhat higher count of postventral, relatively small foramina (cf. Stehmann, 1985: Fig. 6). Distribution of pectoral radials along scapulocoracoid: none (none) individually attached anterior to mesopterygium, which formed by five/six (5-6/5) basally fused radials, and 16/16 (15 to 19/16 to 18) attached individually posterior to mesocondyle, of which the posterior four to five only on the right side are fused basally (anterior 2-3).

Pelvis (from radiograph) corresponding very well with original description (Stehmann, 1985: Fig. 7), with straight anterior edge of the bar and posterior contour as a shallow trapezoid with straight median line. Maximum width 61.5 % (58 % to 63 %) that of shoulder girdle. Iliac regions moderately large, each perforated by two (2) obturatorial foramina. Prepelvic processes very long and slender, curved inward and with pointed tips. Posterior pelvic processes massive, short and with blunt tips. Iliac processes not well shown in radiograph but apparently massive, inward and forward curving hooks with blunt tips reaching nearly to level of posterior iliac foramina. Axis of maximum pelvis breadth a little posterior to rear edge of the bar.

As far as measurements of cranium, scapulocoracoid, pelvis and shoulder girdle could be obtained from radiograph, they are given in table 1.

Skeletal meristics: Vtr 37 (35 to 39), Vpr 75 (74 to 78), P-radials left/right 93+/95 (95 to 96), V to radials left/right 25/25 (22 to 27).

Considering the comparative description above and the more detailed data given in table 1 of all four specimens, there is no doubt about the specific identity of the ISH 173-1971 specimen as *Bathyraja papilionifera*. The fourth specimen with 426 mm TL comple-

ments the ontogenetic size range of the three types in being the second largest between the two smaller paratypes (217 and 394 mm TL) and the holotype with 681 mm TL. Its intermediate stage is well reflected by most of its morphometric proportions (table 1), with a few exceptions only. So are postdorsal tail length, although tail end not being damaged, height and width of tail at level of D1 origin, width of each nasal curtain lobe, length of right anterior pelvic lobe, and rostrum base width a little smaller than the lowest range value of the types; likewise are numbers of pseudobranchial folds and of lower jaw tooth rows somewhat smaller. On the other hand are mouth width, internasal width, nasal curtain isthmus width, interspace between first gill slits, and maximum width of anterior cranial fontanelle a little exceeding the upper range value of the types. However, none of these negative or positive divergences is beyond the allowance to be expected as individual, partly size-related natural variation even of a relatively deep living species.

Catch composition and remarks

Table 2 presents the catches of the three relevant FRV 'W. Herwig' stations in 1971 and 1978. The results are similar in species composition and small total catch, although the 1971 station was fished with the smaller 140-foot bottom trawl during southern hemisphere late summer, whereas both stations in 1978 were carried out with the larger 200-foot bottom trawl during early wintertime. Trawling time on the bottom was 30 minutes for all three stations.

Total catch of station 340/71 in 2.3 °C cold water was three baskets fish (ca. 150 kg), of which about 2.5 baskets were only *Macrourus carinatus/holotrachys* and *Antimora rosstrata*. Very little benthos by-catch was taken. Of the totally 19 species recorded, only three were rajids but seven primarily meso- to bathypelagic species probably picked up while hauling the net from 1000 m depth.

The total catch of station 693/78 in 3.03 °C cold water at comparable depth of 1040 to 940 m yielded also a moderate result of two baskets fish only (ca. 100 kg), of which roughly 1.5 baskets (61 kg) again were alone *M. carinatus/holotrachys*. However, there was an additional 0.5 basket of benthos, mainly *Flabellum* corals and pennatularias. Of the somewhat lower number of 17 species taken, only three were individual rajids but eight primarily meso- to bathypelagic species.

The following station 694/78 in 4.09 °C cold water at lesser depth of 660 to 690 m resulted likewise in three baskets total fish catch (ca. 150 kg) only, of which 1.5 (73 kg) were *M. carinatus/holotrachys* plus another 0.3 basket *Notothenia ramsayi*. Another 0.6 basket benthos was taken of mainly *Flabellum* corals again. This station yielded the lowest number of only 11 fish species, of which two were individual rajids and another two mesopelagic species.

The latter two 1978 stations were trawled at nearly the same latitude but only somewhat different depths on the SW Atlantic continental mid-slope, whereas the 1971 station fished the slope some 70 nautical miles farther north. This latitudinal difference does, however, not mean much at mid-slope depths of this area with regard to the fish fauna

Table 2: Comparative catch composition of FRV 'W. Herwig' capture stations for *Bathyrāja papilionifera*, ISH 173-1971 and two type localities in 1978, by numbers of each species taken.

Column I = WH sta. 340/71, 25.II.1971; 38°50' S, 54°25' W; 1000 m, T_b 2.3° C, 140-foot bottom trawl.

Column II = WH sta. 693/78, 26.VI.1978; M 40°23.9' S, 56°07.2' W; 1040-940 m, T_b 3.03 °C, S_b 34.170 ‰, 200-foot bottom trawl.

Column III = WH sta. 694/78, 26.VI.1978; 40°16.4' S, 56°13.2' W; 660-690 m, T_b 4.09 °C, S_b 34.137 ‰, 200-foot bottom trawl.

Column IV = + indicates actual reference specimens deposited in the former ISH collection at the Zoological Museum Hamburg.

	I	II	III	IV
<i>Bathyrāja brachyrops</i>		1		
<i>Bathyrāja griseocauda</i>	2			
<i>Bathyrāja multispinis</i>			1	+
<i>Bathyrāja papilionifera</i>	1	2	1	+
<i>Psammobatis</i> sp.		1		
<i>Raja doellojuradoi</i>	1			+
<i>Nemichthys</i> sp.#	1			
<i>Bathylagus tenuis</i> #	3			+
<i>Bathylagus gracilis</i> #		9		+
<i>Stomias boa</i> #	10			+
<i>Idiacanthus atlanticus</i> #	2			+
<i>Protomyctophum choriodon</i> #		1		+
<i>Electrona subaspera</i> #			1	+
<i>Gymnoscopelus bolini</i> #	1	1		+
<i>Gymnoscopelus boops</i> #		1		+
<i>Gymnoscopelus braueri</i> #		1		+
<i>Gymnoscopelus hintonoides</i> #	1			+
<i>Gymnoscopelus piabilis</i> #		1		+
<i>Lampadena notialis</i> #			1	+
<i>Lampanyctus</i> sp. #		2		
<i>Metelectrona ventralis</i> #	2			+
<i>Macrourus carinatus/holotrachys</i> **	2b.*	105	128	
<i>Antimora rostrata</i>	80	17		
<i>Laemonema kongi</i>			3	+
<i>Lepidion ensiferus</i>	21	4		
<i>Halargyreus johnsonii</i>	1			+
<i>Austrophycis marginata</i>			11	
<i>Cottunculus granulosis</i>	2		1	
<i>Paraliparis hubbsi</i> #		1		+
<i>Epigonus robustus</i>	1			+
<i>Oidiphorus brevis</i>	2			+
<i>Dissostichus eleginoides</i>	2	3	5	
<i>Notothenia ramsayi</i>			20kg	
<i>Paradiplospinus gracilis</i>	8	3	1	+
<i>Icichthys australis</i>		1		
total number of species	19	17	11	
portion of midwater species #	7	8	2	

* 2 baskets = about 100 kg.

** These large Macrourus were originally identified as *M. whitsoni*, until Iwamoto (1990) summarised more recent taxonomic studies that *M. whitsoni* only occurs at Antarctic latitudes south of the Antarctic Convergence, whereas *M. carinatus* and *M. holotrachys* inhabit continental SW and SE South American waters north of the Convergence, partly sympatrically. Hence, *Macrourus* catches of these three stations were probably a mixture of both the latter species (counted as one), with presumably higher percentage of *M. carinatus*.

composition, except for the benthos bycatch obviously depending on very different bottom substrate. Neither do seasonal differences, as here given between summer 1971 and early winter 1978, have much influence on the catch composition. The range from about 700 to 1000 m is much below the thermocline and the seasonal intermixing of the water column. The two major current systems in the SW Atlantic, of which the cold Falkland/Malvinas Current is flowing north on the southern shelf and slope, continuing farther north along the slope only, and the warm Brazil Current flowing south onto the northern Argentine shelf, also have no seasonally varying influence at mid-slope depths. Furthermore, the catch efficiency of the 140-foot and 200-foot bottom trawls differs little for slope hauls, as has been shown by Merrett *et al.* (1991:334) in a NE Atlantic analytical study. The relatively large number of meso- to bathypelagic species making up about one fifth to one half of the species per haul, though each represented only singly or by a very few specimens, is not unusual in bottom trawl hauls on continental slopes. Where the largely horizontally oriented meso- to bathypelagic oceanic fish fauna 'strikes' semivertical continental slopes, its species with then pseudo-benthopelagic occurrence are regularly taken also by bottom trawls. However, their numbers will normally remain small because of limitations by the gear's relatively small mouth opening and to some degree also by mesh size, as compared with commercial midwater trawls. Apart from the more or less accidental occurrence of midwater species, there is no striking difference in catch composition between the three hauls. The distinctly lower number at the about 700 m horizon is mainly explained by the lack of part of the deep-water on the one, and upper slope species on the other hand. The slight discrepancy between both stations at the about 1000 m horizon may rather be due to the obviously different nature of the bottom substrate as reflected by the benthos by-catch.

Certainly more striking is in general the poverty in species diversity on the SW Atlantic continental slope, as compared with the principal faunal composition to be found at other Atlantic slope regions and beyond. So are on the deeper slope off Argentina sharks and holocephalans totally missing, likewise of the bony fishes totally or largely, e.g., the otherwise quite dominant alepocephalids, platytroutids, various anguilliforms, beryci-forms, and various pleuronectiforms; even macrourids are represented by relatively few species only though partly by large biomass of a species.

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