https://doi.org/10.24199/j.mmv.1982.43.02 8 October 1982

A TAXONOMIC REVISION OF *OCTOPUS AUSTRALIS* HOYLE, 1885 (OCTOPODIDAE: CEPHALOPODA), WITH A REDESCRIPTION OF THE SPECIES

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Abstract

Octopus australis Hoyle from South Eastern Australian waters is fully redescribed. Several species from New Zealand previously synonymised with it are recognised as distinct and their nomenclatural status is discussed.

Introduction

Octopus australis was described by Hoyle, based on one female and one immature specimen from Port Jackson, N.S.W. Subsequently, Massey (1916), Robson (1929), Benham (1942) and Dell (1952) have described material from New Zealand, which they have synonymised with *O. australis* Hoyle. Dell's synonymy includes *Polypus campbelli* Smith, 1902; *Polypus australis* Massey, 1916; *Polypus* cf *australis* Berry, 1918; and *Robsonella australis* Benham, 1942. Specimens from South Eastern Australian waters match closely with the brief type description, but differ to the descriptions of Smith, Massey, Robson, Benham and Dell. To clarify this situation, the type specimens of *O. australis* were borrowed from the British Museum for comparison with other Australian and New Zealand material.

The identity of the S.E. Australian species is confirmed as *Octopus australis* Hoyle, and a complete redescription is given. The New Zealand species *Polypus campbelli* Smith, *Polypus australis* Massey and *Robsonella australis* Benham are identified as a separate species group, and their nomenclatural status is discussed.

Measurements and Abbreviations

The measurements and abbreviations used are the same as given in Voss (1963), with the exception of head length. Head length (H.L.) is taken from the junction of the dorsal pair of arms to the midpoint between the eyes. Measurements are given in Table 1, indices are expressed in Table 2. Other abbreviations used are BM(NH)—British Museum (Natural History); NMV—National Museum of Victoria.

Octopus australis Hoyle, 1885

Plate 1—a, b Figures 1-2.

1885a *Octopus australis* Hoyle, p. 224.
1885b *Octopus australis* Hoyle, pp. 98-99.
1886 *Octopus australis* Hoyle, pp. 88-89, pl. 3, figs. 4-5.

Materials examined:

Sex	M.L. (mm)	Reg. No.	Location	Date coll.	Depth (m)
Holotype ♀	22	BM(NH)1889.4.24.28.9	Port Jackson, N.S.W.	April 1874	11-28
Paratype ♂	12	BM(NH)1889.4.24.28.9	Port Jackson, N.S.W.	April 1874	11-28
Other material					
♂	16	NMV F25247	Western Port Bay, Vic.	—	—
♂	21	NMV F30860	40°34′S, 144°46′E	4. 2.1981	68
♂	27	NMV F31265	37°55′S, 144°58′E	18. 3.1980	7
♂	37	NMV F31003	32°24′S, 133°30′E	23. 8.1973	49
♂	42	NMV F31265	37°55′S, 144°58′E	18. 3.1980	7

Sex	M.L. (mm)	Reg. No.	Location	Date coll.	Depth (m)
Materials					
♂	45	NMV F21911	38°02′S, 145°04′E	1961	11
♂	45	NMV F21911	38°02′S, 145°04′E	1961	11
♂	46	NMV F31267	32°24′S, 133°24′E	26.10.1973	40
♂	54	NMV F31002	39°38′S, 145°06′E	3. 2.1981	66
♂	56	NMV F21911	38°02′S, 145°04′E	1961	11
♂	67	NMV F31260	32°13′S, 133°52′E	27. 4.1973	8
♂	67	NMV F25436	38°07′S, 145°06′E	1964	–
♂	72	NMV F31002	39°38′S, 145°06′E	3. 2.1981	66
♂	73	NMV F31264	38°03′S, 145°06′E	7. 6.1978	–
♀	9	NMV F31263	38°55′S, 145°55′E	9.11.1972	12
♀	14	NMV F31262	35°23′S, 137°17′E	21. 1.1971	54
♀	17	NMV F25247	Western Port Bay, Vic.	–	–
♀	17	NMV F30927	40°50′S, 146°07′E	4. 2.1981	66
♀	19	NMV F25247	Western Port Bay, Vic.	–	–
♀	25	NMV F31265	35°55′S, 144°58′E	18. 3.1980	7
♀	28	NMV F31265	37°55′S, 144°58′E	18. 3.1980	7
♀	34	NMV F31265	37°55′S, 144°58′E	18. 3.1980	7
♀	34	NMV F31003	32°24′S, 133°30′E	23. 8.1973	49
♀	37	NMV F31265	37°55′S, 144°58′E	18. 3.1980	7
♀	37	NMV F31003	32°24′S, 133°30′E	23. 8.1973	49
♀	41	NMV F24485	37°51′S, 144°57′E	15. 1.1930	–
♀	44	NMV F25245	Western Port Bay, Vic.	1963	–
♀	47	NMV F24492	37°59′S, 145°01′E	10.11.1973	–
♀	49	NMV F31002	39°38′S, 145°06′E	3. 2.1981	66
♀	49	NMV F31002	39°38′S, 145°06′E	3. 2.1981	66
♀	62	NMV F31265	37°55′S, 144°58′E	18. 3.1980	7
♀	88	NMV F24437	38°13′S, 145°02′E	3.10.1957	–

Diagnosis

Size up to 90 mm M.L., arms long, mantle sculpture fine dorsally, smooth ventrally, lateral integumental ridge usually present. 7-8 gill lamellae in outer demibranch; funnel organ with closely opposed, occasionally partially fused VV units. Hectocotylised arm 58-75% of A_{LIII} length; ligula robust, 12-18% of arm length, with double row of fine papillae along median oral excavation.

Description

Mantle globular, quite broad, well demarked from head; mantle aperture wide; head narrow; eyes small, protuberant (Fig. 1a, Plate 1b). Funnel free for about half its length; funnel organ with two closely opposed V shaped units, ventral and dorsal limbs of approximately equal lengths; units may be partially fused medially (Figs. 1, b-d).

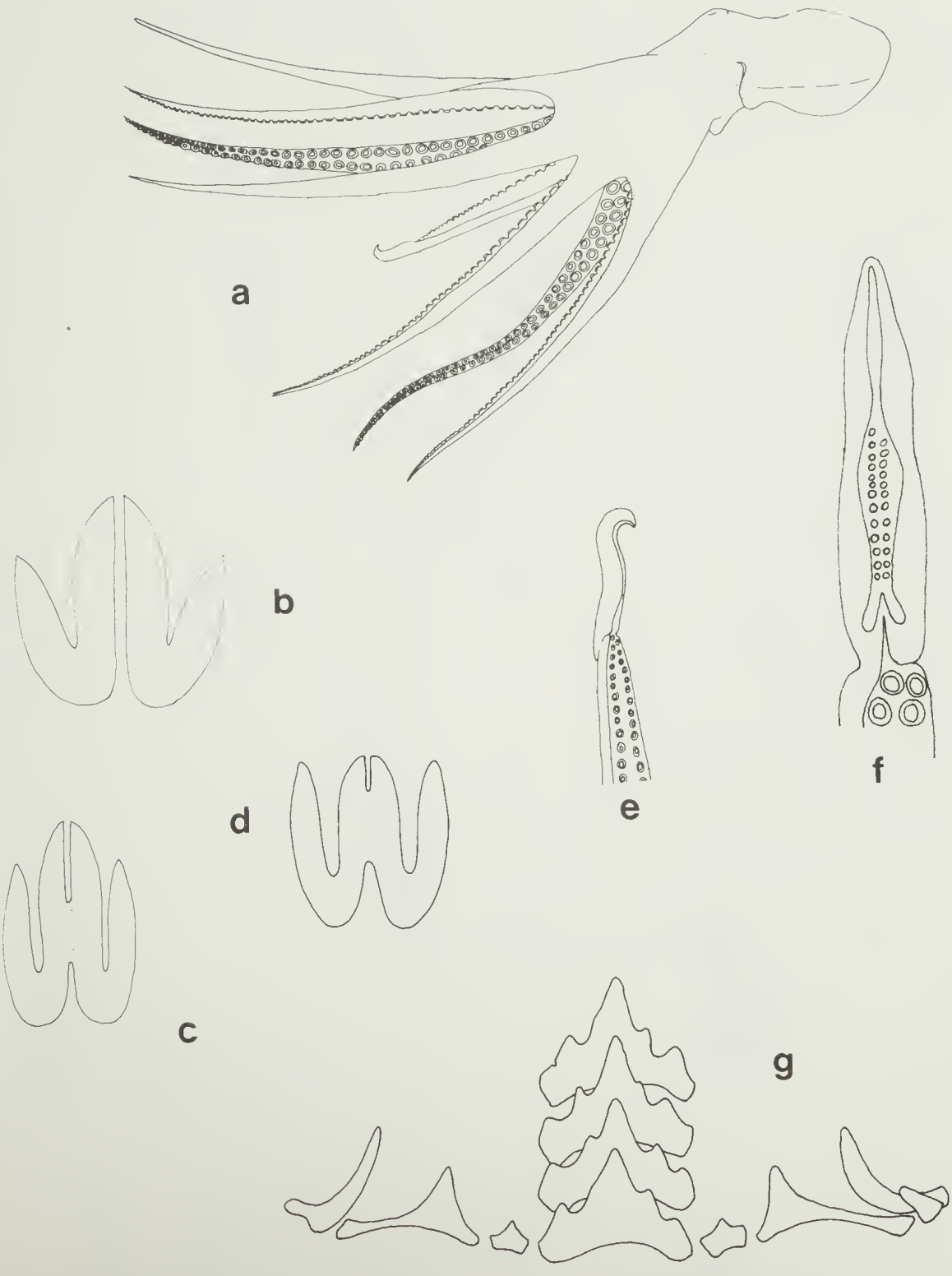
Arms long, subequal, tapering to fine tips; suckers moderate in size, no enlarged suckers in males. Web shallow, extends up the ventral side of the arms for almost their entire length. Web formula D.C.B.E.A. to C.D.B.A.E., dorsal and ventral sectors always shallowest.

Third right arm of males hectocotylised, 58-75% length of its opposite member; spermatophoral groove well developed but without any conspicuous thickening of the interbrachial web. Ligula large (Figs, 1e, f), deeply excavated, usually curved orally; medially two rows of very small papillae are present along the excavation. Calamus short, acutely pointed.

Gills moderate in length, outer demibranch with 7-8 primary lamellae, plus a terminal lamella.

Reproductive system of males typical of the genus; penis (Fig. 2a) long with a single coiled diverticulum on the right hand side, genital aperture subterminal, on right hand side. Spermatophores (Fig. 2, b-e) long, thin; horn with 2-3 coils close to oral end, oral cap expanded. Female reproductive system without distinctive features; eggs large, length 9-14 mm, attached singly by a stalk approximately 8 mm in length; each clutch of 80-130 eggs (Tait 1980).

Fig. 1. *Octopus australis* Hoyle, 1885, *a.* Ventral view, male, NMV F31267, 46 mm M.L. *b-d.* Funnel organs. *b.* Holotype, female, 22 mm M.L. *c.* NMV F31265, female, 28 mm M.L. *d.* NMV F31265, male, 42 mm M.L. *e-f.* Ligula. NMV F31267, 46 mm M.L. *g.* Radula. Holotype.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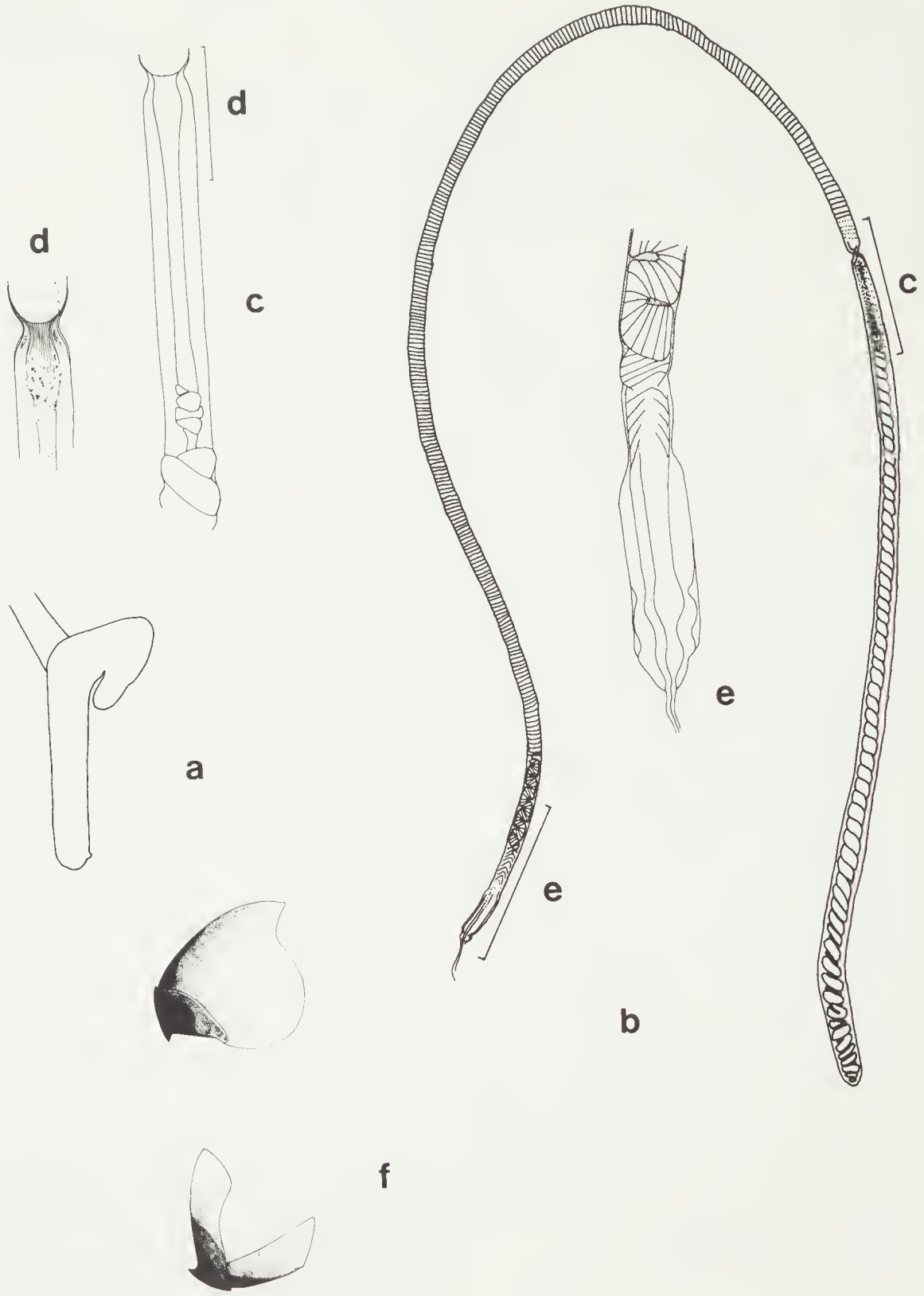
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f

Alimentary canal of normal octopodan type; crop with an anterior caecum of about 10% of its length; posterior oesophegus short; posterior salivary glands elongate, connect to buccal mass by a common duct, ducts to crop separate. Stomach bipartite; caecum strongly coiled; ducts to stomach and caecum originate separately from hepatopancreas, intestine without conspicuous differentiation. Ink sac large, embedded in surface of hepatopancreas, connected to intestine near anus by a short duct.

Beaks (Fig. 2f) typically octopodan; dorsal rostrum curved, wings transparent in small individuals; ventral beak with very blunt rostrum, wings with small anterior protuberances.

Radula (Fig. 1g) with B_{3-4} seriation (holotype B_4); rhachidian tooth asymmetrical, 1-2 cusps on each side; first laterals with one sharp cusp, second laterals with one cusp, third laterals long, straight or slightly curved; marginal plates oblong, elongate.

Dorsal mantle surface covered by fine tubercles, supraocular cirri often present, ventral surface smooth. Depending on condition of preservation, a ventro-lateral integumental ridge may be present (Fig. 1a, Plate b), most evident adjacent to mantle aperture, often disappearing posteriorly. In live animals this may be extended into a shallow web, or evident only as a fine, light coloured line.

Colour of preserved specimens brown to purplish dorsally, ventral surface cream. Faint pair of roughly circular ocelli present in some specimens posterior to the eyes; each ocellus comprises a dark ring with a lighter centre; they are most apparent in live animals and fade during preservation.

Males have spermatophores in the Needhams Sac when larger than 20-25 mm M.L. (10-13 g), and may reach 70-80 mm M.L. (250 g). Females have large, white and translucent eggs in the ovary when larger than 30-40 mm M.L. (40-60 g), and do not usually grow beyond 50 mm M.L. (100 g).

Fig. 2. *Octopus australis* Hoyle, 1885. *a.* Penis. NMV F31002, 72 mm M.L. *b-e.* Spermatophore. NMV F31002, 54 mm M.L. *b.* Whole spermatophore. *c.* Cement body. *d.* Oral end of cement body. *e.* Oral end. *f.* Beaks. NMV F31002, female, 49 mm M.L.

Distribution

The collections of the National Museum of Victoria contain specimens of this species from New South Wales, Victorian, Tasmanian and South Australian waters, to depths of 70 m.

Discussion

The confusion relating to the identity of *Octopus australis* Hoyle is due largely to the lack of a mature male type specimen. Although their external morphology is somewhat similar, New Zealand and Australian species may be readily separated by the form of the hectocotylus. Details of the funnel organ, radula, surface sculpture and number of gill lamellae of the holotype indicate that it is conspecific with the Australian material studied.

Of the four species synonymised with *Octopus australis* Hoyle in Dell (1952), detailed descriptions exist for three. Robson (1929) redescribed the holotype of *Polypus campbelli* Smith, from Campbell Island (N.Z.) as having a W-type funnel organ, 10 lamellae in each gill demibranch, enlarged suckers in the male and a L.L.I. of only 8.5%. Massey's (1916) *Polypus australis*, from New Zealand, has a L.L.I. of 11%, a W type funnel organ and symmetrical seriation of the radula. *Robsonella australis*, also from New Zealand, was described by Benham (1942) and Dell (1952). It has a W type funnel organ, stronger cusps on the radula than *O. australis* Hoyle, and eggs of only 2.5-2.8 mm in length (Brough 1965). Further, I have remeasured the five mature males described by Benham and one other from 38°10′S, 147°49′E (NMV F31259) and these have the hectocotylus indices given in Table 3.

TABLE 3

Hectocotylus indices of *Robsonella australis* Benham

	n	mean	S.D.(n − 1)	range
HcAl	5*	77.5	3.5	73-81
LLI	6	8.1	1.5	6-10
CLI	6	39.1	7.4	33-53

* A_{LIII} of one specimen regenerating.

These are quite distinct from the corresponding indices given for *O. australis* Hoyle in Table 2. Therefore, all the New Zealand species previously considered to be synonyms of *O. australis* Hoyle appear to be separate and distinct. The description of *Polypus* cf *australis* from South East Australia, by Berry (1918), is not detailed enough to confirm his tentative identification.

Robson (1929) synonymised *Polypus campbelli* Smith and *Octopus australis* Hoyle by comparing, in part, the ligula of each. Robson's material included the types of *O. australis* Hoyle and Massey's *Polypus australis*. As a mature male type is lacking, Robson's synonymy was therefore based on Massey's material, already shown to be distinct from *O. australis* Hoyle. Furthermore, Robson's description of the radula of the *O. australis* holotype could not have been from the types, as both type specimens had buccal masses intact when loaned by the British Museum.

Nomenclatural Status of the New Zealand Species

The New Zealand species *Polypus australis* Massey and *Robsonella australis* Benham are both junior homonyms of *Octopus australis* Hoyle. This follows the renaming of the genus *Polypus* as *Octopus* by Robson (1929), and the regrouping of *Robsonella* under *Octopus* by Pickford (1955). If the synonymy of these two species and *Polypus campbelli* Smith, as given in Benham (1942) and Dell (1952) is correct, then *Octopus campbelli* (Smith) is the correct senior synonym. However, the differences in the radula of *P. australis* Massey and the enlarged suckers in male *P. campbelli* Smith make it probable that these species and *R. australis* Benham are distinct from each other. *Robsonella australis* Benham and *Polypus australis* Massey must then be renamed to prevent the occurrence of two homonyms of *Octopus australis* in close geographic proximity. A review of this New Zealand species group is urgently required to remove this problem.

Acknowledgements

I wish to thank Dr. C. C. Lu, Curator, Department of Invertebrate Zoology, National Museum of Victoria, for his advice and reading of the manuscript. For providing material either by loan or donation I gratefully acknowledge: Mr. F. Naggs, British Museum (Natural History); Dr. A. C. Harris, Otago Museum, New Zealand and the National Museum of Victoria Bass Strait Survey. Funding for the Bass Strait Survey was generously provided by A.M.S.T.A.C. Thanks also to Mrs. J. Andrewartha who provided the illustrations and Mrs. L. Anderson for typing the manuscript.

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TABLE 1

Measurements (in mm) of *Octopus australis* Hoyle

BM(NH) 1889.4.24.28.9
NMV F25247
NMV F30860
NMV F31265
NMV F31003
NMV F31265
NMV F21911
NMV F21911
NMV F31267
NMV F31002
NMV F21911
NMV F31260

NMV F25436
NMV F31002
NMV F31264
NMV F31263
NMV F31262
NMV F25247
NMV F30927
NMV F25247
BM(NH) 1889.4.24.28.9
NMV F31265
NMV F31265
NMV F31265
NMV F31003

NMV F31265
NMV F31003
NMV F24485
NMV F25245
NMV F24492
NMV F31002
NMV F31002
NMV F31265
NMV F24437

Sex	♂	♂	♂	♂	♂	♂	♂	♂	♂	♂	♂	♂
M.L.	12	16	21	27	37	42	45	45	46	54	56	67
Tot. L.	38	47	86	107	170	184	158	163	220	280	200	245
MW	10	12	17	21	29	31	33	27	35	48	35	36
H.L.	3	5	9	10	17	16	17	15	22	20	17	22
H.W.	8	10	12	16	18	21	21	18	27	26	22	23
A_{RI}	20	30	54	72	119	115	—	113	160	190	138	142
A_{LI}	22	30	60	69	120	121	100	110	155	202	120	163
A_{RII}	26	33	63	77	119	115	106	134	158	—	—	179
A_{LII}	24	32	59	76	105	—	106	114	156	230	163	—
A_{RIII}	23	30	51	59	97	101	108	108	96	146	121	138
A_{LIII}	23	31	65	—	140	135	—	—	141	229	—	155
A_{RIV}	22	27	54	70	—	123	118	118	157	202	138	162
A_{LIV}	25	30	56	70	152	125	101	115	172	210	142	150
HcAL	23	30	51	59	97	101	108	108	96	146	121	138
Lig. L.	0.8	3.6	4.0	8.3	16.2	17.5	13.3	14.5	17.0	19.0	19.3	20
Cal. L.	0.1	0.7	0.9	2.1	3.6	3.3	2.8	2.7	3.3	3.4	3.1	4.0
Web A	6	8	13	15	19	23	24	17	33	36	21	28
Web B_R	7	9	16	17	23	26	27	27	39	41	28	32
B_L	7	9	17	17	20	28	23	27	35	47	30	35
Web C_R	8	9	18	16	22	29	35	28	37	45	33	36
C_L	8	9	17	17	22	33	32	28	38	48	32	37
Web D_R	7	10	17	18	22	33	35	30	34	44	37	35
Web D_L	7	10	15	16	25	28	27	29	40	45	33	37
Web E	7	8	11	14	20	24	24	25	32	37	27	27
Web Form.	CBDEA	DCBAE	CDBAE	CDBAE	DCBEA	CDBEA	CDBAE	DCBEA	DCBAE	CDBEA	DCBEA	CDBAE
S normal	1.2	1.5	1.9	2.7	3.3	3.6	3.6	4.0	4.5	4.8	4.5	4.8
Sp. L.	—	—	—	—	—	—	36.0	31	—	49	45	42
Sp. R.L.	—	—	—	—	—	—	16.5	14	—	20	13	18
Sp. R.W.	—	—	—	—	—	—	1.6	1.1	—	1.0	1.3	1.3
Penis L.	2	3	3	—	10	—	16	17	14	13	16	17
Gill No.	8	7	7	7	7	8	7	7	8	7	8	7

Sex	♂	♂	♂	♀	♀	♀	♀	♀	♀	♀	♀	♀	♀
M.L.	67	72	73	9	14	17	17	19	22	25	28	34	34
Tot. L.	250	395	285	29	57	57	75	57	87	88	82	121	140
MW	49	65	37	9	12	14	14	14	19	19	26	22	24
H.L.	20	22	24	3	7	6	7	8	7	10	11	13	12
H.W.	29	34	25	7	10	11	10	12	13	15	16	18	16
A_{RI}	172	326	201	15	37	31	—	—	47	56	65	—	86
A_{LI}	175	—	—	16	38	33	52	37	50	59	65	78	79
A_{RII}	187	325	202	18	37	32	35	43	55	62	—	85	—
A_{LII}	206	368	229	19	40	35	43	44	58	—	76	86	109
A_{RIII}	—	205	162	18	39	37	57	40	59	59	65	86	101
A_{LIII}	205	352	215	18	43	36	50	42	58	65	76	76	110
A_{RIV}	—	285	190	18	33	36	53	41	—	61	—	83	101
A_{LIV}	186	300	—	18	39	34	53	—	54	59	73	80	92
HcAL	—	205	162										
Lig. L.	—	27.6	21.8										
Cal. L.	—	3.5	2.6										
Web A	38	55	40	5	10	9	10	10	11	10	15	19	16
Web B_R	39	60	42	6	10	10	11	10	15	13	18	22	18
B_L	50	61	50	6	12	10	11	10	16	14	18	22	19
Web C_R	38	60	44	6	10	12	12	11	17	19	19	25	20
C_L	65	60	50	6	12	11	14	12	18	17	20	26	21
Web D_R	40	54	46	6	12	10	12	12	17	17	16	24	23
D_L	55	55	52	6	11	11	14	13	16	17	20	22	24
Web E	38	43	40	5	11	9	11	9	14	14	16	18	18
Web Form.	CDBAE	BCDAE	DCBAE	DCBAE	DCBEA	CDBAE	DCBEA	DCBAE	CDBEA	CDBEA	CDBEA	CDBAE	DCBEA
S normal	6.7	7.1	5.4	0.7	1.3	1.6	1.4	1.7	2.4	2.3	2.5	2.8	2.3
Sp. L.	—	—	41										
Sp. R.L.	—	—	16										
Sp. R.W.	—	—	1.4										
Penis L.	16	19	19										
Gill No.	8	7	7	8	7	7	7	7	7	7	8	8	7

Sex	♀	♀	♀	♀	♀	♀	♀	♀	♀
M.L.	37	37	41	44	47	49	49	62	88
Tot. L.	152	208	180	162	168	215	250	149	248
MW	31	33	24	31	27	37	44	40	32
H.L.	11	13	15	14	11	11	14	18	19
H.W.	20	21	18	21	18	20	25	23	24
A_{RI}	86	136	115	109	100	147	177	120	132
A_{LI}	94	140	—	109	—	148	175	122	109
A_{RII}	108	159	130	126	119	162	191	141	156
A_{LII}	108	156	129	119	113	159	—	133	156
A_{RIII}	112	146	131	125	115	162	201	140	166
A_{LIII}	106	147	134	117	124	161	198	136	163
A_{RIV}	106	132	135	—	113	158	186	126	154
A_{LIV}	107	158	—	118	125	157	179	134	162
HcAL									
Lig. L.									
Cal. L.									
Web A	20	23	21	26	21	25	35	26	26
Web B_R	26	31	19	26	28	31	41	29	38
B_L	27	31	25	30	28	28	35	29	35
Web C_R	29	35	29	29	30	35	45	28	48
C_L	27	34	29	29	28	35	47	36	50
Web D_R	26	33	26	32	27	34	40	29	46
D_L	25	35	30	25	35	39	46	34	42
Web E	23	25	21	23	21	30	31	27	30
Web Form.	CBDEA	CDBEA	DCBAE	DCBAE	DCBAE	DCBEA	CDBAE	CDBEA	CDBEA
S. normal	2.9	3.4	3.1	3.2	3.1	3.7	4.6	3.8	4.6
Sp. L.									
Sp. R.L.									
Sp. R.W.									
Penis L.									
Gill No.	8	7	7	7	7	7	7	8	7

TABLE 2

Means, Standard Deviations and Ranges of Indices of *Octopus australis* Hoyle

	Males				Females			
	n	mean	S.D.(n – 1)	range	n	mean	S.D.(n – 1)	range
MWI	15	73.3	11.8	51-90	19	75.8	15.2	36-100
HLI	15	35.3	6.6	23-48	19	33.5	7.2	22-50
HWI	15	48.8	9.5	34-62	19	53.0	12.4	27-77
ALI	15	78.5	6.9	68-93	19	75.4	7.7	65-95
WDI	15	24.2	4.8	16-32	19	26.8	3.2	22-32
SI (normal)	15	8.9	0.1	7-10	19	8.1	1.3	5-11
HcAI	6	68.2	6.6	58-75				
LLI	11	14.7	1.9	12-18				
CLI	11	18.5	3.9	12-25				
PLI	10	28.5	4.6	23-37				
SpL (mm)	6	40.7	6.4	31-49				
SpLI	6	73.1	12.8	56-91				
SpRI	6	39.3	6.4	29-46				
SpWI	6	3.1	0.6	2.0-3.9				

Explanation of Plate

PLATE 1

Octopus australis Hoyle, 1885. Holotype, female, 22 mm M.L. *a.* Dorsal view. *b.* Lateral view.


a


b