

Supplementary material

Redescription of *Amphioctopus ovulum* (Sasaki, 1917) (Cephalopoda : Octopodidae) and comparative morphological analyses among three species of violet-ringed octopods

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Table S1. Specification of measurements and indices

Abbreviations	Indices	Specification
ML	Mantle length	Dorsal mantle length, measured from midpoint between eyes to posterior end of mantle.
TL	Total length	Measured from end of the longest arm to posterior end of mantle.
TWg	Total weight	Total weight of preserved specimen (in grams).
MWI	Mantle width index	Greatest dorsal width of mantle as a percentage of mantle length.
HWI	Head width index	Greatest width of head at level of eyes as a percentage of mantle length.
HMWI	Head mantle width index	Greatest width of head at level of eyes as a percentage of mantle width.
AMI	Arm mantle index	Arm length measured from mouth to tip arms as a percentage of mantle length.
AWI	Arm width index	Greatest arm width as a percentage of mantle length.
NSDI	Normal sucker diameter index	Greatest normal sucker diameter as a percentage of mantle length.
LSDI	Enlarged sucker diameter index	The first enlarged sucker diameter as a percentage of mantle length.
WDI	Web depth index	Measurement of deepest sector of web measured from mouth to midpoint of sector between arms as a percentage of mantle length.
ELI	Eye length index	Greatest eye length as a percentage of mantle length.
FLI	Funnel length index	Funnel length from the anterior funnel opening to the posterior border measured along the ventral midline as a percentage of mantle length.
FFI	Free funnel index	The length of the funnel from the anterior opening to the point of dorsal attachment to the head as percentage of funnel length.
RWI	Ring width index	Ring width measured by half diameter difference between inner and outer rings as percentage of mantle length.
LLI	Ligula length index	Ligula length measured from distalmost sucker to tip of arm as a percentage of hectocotylised arm length.
CaLI	Calamus length index	Calamus length as a percentage of ligula length.
HAMI	Hectocotylised arm mantle index	Hectocotylised arm length from proximalmost armature, or defined proximal point, to tip as percentage of mantle length.
HASC	Hectocotylised arm sucker count	Number of suckers on hectocotylised arm.
GC	Gill count	Number of gill lamellae per demibranch, excluding the terminal lamella.
OAI	Opposite arm index	Length of hectocotylised arm as a percentage of its fellow arm on the opposite side.
TOLI	Terminal organ length index	Length of terminal organ as a percentage of mantle length.
SpN	Spermatophore number	Number of spermatophores in spermatophore storage sac.
SpLI	Spermatophore length index	Length of spermatophore as a percentage of mantle length.
EgLI	Egg length index	Length of (mature) egg as a percentage of mantle length.
EgWI	Egg width index	Width of (mature) egg as a percentage of mantle length.

Table S2. Measurements, counts and morphometric indices of *A. rex* for morphological characteristics analyses

StM, stage of maturity; M, mature; S, submature; H, hectocotylus; –, not recorded

Number	OUC- 201605 160309	OUC- 201706 200303	OUC- 201706 200304	OUC- 201706 200307	OUC- 201706 200308	OUC- 201706 203010	OUC- 201706 200312	OUC- 201706 200313	OUC- 201706 200314	OUC- 201605 160310
Sex	♂	♂	♂	♂	♂	♀	♀	♀	♀	♀
StM	M	S	S	S	S	S	S	S	S	M
TL	222.0	151.2	125.7	155.1	130.3	152.2	147.1	151.8	148.0	216.2
ML	60.2	34.1	35.9	43.1	34.8	41.2	41.0	44.0	44.8	55.6
MWI	68.3	71.1	77.8	72.1	77.1	73.2	70.7	77.3	71.1	76.8
HWI	35.0	36.8	36.1	30.2	34.3	29.3	29.3	29.5	26.7	33.9
HMWI	51.2	51.9	46.4	41.9	44.4	40.0	41.4	38.2	37.5	44.2
AMI1	193.3	207.9	205.6	162.8	191.4	197.6	182.9	172.7	155.6	155.4
2	201.7	244.7	233.3	214.0	214.3	212.2	192.7	213.6	173.3	201.8
3	206.7	268.4	/	230.2	/	258.5	224.4	220.5	206.7	208.9
4	245.0	292.1	236.1	255.8	254.3	268.3	256.1	240.9	231.1	269.6
NSDI	5.3	4.7	4.4	4.7	5.1	6.1	5.9	5.5	5.8	4.6
WDI	53.3	65.8	63.9	58.1	60.0	65.9	58.5	54.5	55.6	57.1
ELI	5.8	6.1	5.8	6.7	6.0	6.1	7.1	5.2	6.7	5.2
FLI	23.3	28.9	33.3	30.2	31.4	24.4	24.4	29.5	24.4	28.6
FFI	71.4	72.7	75.0	61.5	63.6	70.0	80.0	61.5	72.7	69.2
RWI	1.0	1.3	0.6	1.7	1.7	1.5	1.4	1.5	1.5	0.6
LSDI	8.7	7.1	6.9	8.1	7.4	–	–	–	–	–
LLI	2.6	4.1	3.0	3.4	3.5	–	–	–	–	–
HAMI	165.0	168.4	194.4	190.7	174.3	–	–	–	–	–
HASC	69H	85H	75H	79H	74H	–	–	–	–	–

Table S3. Measurements, counts and morphometric indices of *A. neglectus* for morphological characteristics analyses

StM, stage of maturity; M, mature; H, hectocotylus; –, not recorded

Number	OUC- 201709 110301	OUC- 201709 110302	OUC- 201709 110303	OUC- 201709 110304	OUC- 201709 110305	OUC- 201709 110306	OUC- 201709 110307	OUC- 201709 110308	OUC- 201709 110309	OUC- 201709 110310
Sex	♀	♀	♀	♀	♂	♀	♂	♀	♀	♂
StM	M	M	M	M	M	M	M	M	M	M
TL	281.1	251.8	225.2	261.4	214.2	243.9	256.1	280.2	281.7	231.3
ML	83.2	68.8	62.1	71.0	62.2	69.1	67.3	80.9	73.2	62.1
MWI	71.1	73.9	74.2	80.3	74.2	79.7	86.6	71.6	78.1	77.4
HWI	28.9	33.3	30.6	29.6	32.3	29.0	34.3	28.4	28.8	35.5
HMWI	40.7	45.1	41.3	36.8	43.5	36.4	39.7	39.7	36.8	45.8
AMI1	165.1	187.0	185.5	177.5	193.5	184.1	192.5	172.8	176.7	183.9
2	183.1	197.1	211.3	200.0	208.1	202.9	222.4	192.6	186.3	208.1
3	183.1	218.8	229.0	215.5	204.8	218.8	256.7	196.3	212.3	216.1
4	212.0	229.0	243.5	233.8	216.1	234.8	232.8	223.5	254.8	245.2
NSDI	3.5	3.8	4.0	4.1	4.4	4.1	4.6	4.0	4.0	4.7
WDI	42.2	52.2	46.8	49.3	48.4	47.8	55.2	44.4	49.3	53.2
ELI	6.1	7.1	8.4	6.6	6.8	6.5	9.7	6.8	6.2	7.4
FLI	25.3	29.0	25.8	31.0	30.6	29.0	28.4	25.9	28.8	29.0
FFI	57.1	60.0	56.3	59.1	52.6	55.0	57.9	57.1	52.4	55.6
RWI	1.2	0.6	1.5	0.8	0.7	1.0	1.1	0.8	0.9	0.8
LSDI	–	–	–	–	6.0	–	6.9	–	–	6.5
LLI	–	–	–	–	12.1	–	11.6	–	–	12.7
HAMI	–	–	–	–	179.0	–	189.6	–	–	171.0
HASC	–	–	–	–	67H	–	63H	–	–	60H

Table S4. Comparison and summary of morphological characteristics of three violet-ringed octopuses

	<i>Polypus ovulum</i> (Sasaki 1917, 1929)	<i>Amphioctopus cf. ovulum</i> (Kaneko <i>et al.</i> 2008)	<i>Amphioctopus ovulum</i> (this study)	<i>Octopus sp.5</i> (Norman and Hochberg 1994) <i>Octopus sp.1</i> (Norman and Sweeney 1997)	<i>Octopus rex</i> (Nateewathana 1997; Nateewathana and Norman 1999)	<i>Amphioctopus cf. rex</i> (Kaneko <i>et al.</i> 2008)	<i>Amphioctopus rex</i> (Sreeja <i>et al.</i> 2012)	<i>Octopus neglectus</i> (Nateewathana 1997; Nateewathana and Norman 1999)	<i>Amphioctopus cf. neglectus</i> (Kaneko <i>et al.</i> 2008)	<i>Amphioctopus neglectus</i> (Sreeja <i>et al.</i> 2012)
<i>n</i>	16	2	10	NA	10	3	10	10	3	10
ML	to 40 mm	45, 50 mm	48–61mm	45 mm	to 76 mm	56–94 mm	75–93 mm (♂); 87–112 mm (♀)	to 64 mm	49–52 mm	55–61 mm (♂); 55–74 mm (♀)
Gill (or demibranch) Stripes	15–17 lamellae a few broad, darker, broken stripes on the dorsal surface of head and body	7–8 lamellae per demibranch a few dark broad short lines	15–17 lamellae narrow dark longitudinal line along the dorsal edges of arms 1–3	18 lamellae narrow dark longitudinal line along the dorsal edges of arms 1–3	8–9 lamellae (usually 8) narrow dark stripe along dorso-lateral surface of arms 1–3	7–8 lamellae per demibranch NA	8–9 lamellae per demibranch narrow dark stripe along dorso-lateral face of arms 1–3	7–8 lamellae (usually 7) NA	7–8 lamellae per demibranch NA	8 lamellae per demibranch narrow dark stripe along dorso-lateral face of arms 1–3
AF	4 > 3 > 2 > 1	4 > 3 > 2 > 1	4 > 3 > 2 > 1	4 = 3 > 2 > 1	4 > 3 > 2 > 1	4 > 3 > 2 > 1	4 > 3 > 2 > 1	4 > 3 > 2 > 1	4 > 3 > 2 > 1	4 > 3 > 2 > 1
WF	NA	D > C > B > E > A	D > C > E > B > A	D > C = E > B > A	D > E > C > B > A	D > E > C > B > A or D > C > E > B > A	D = E > C > B > A	D = E > C > B > A	D > E > C > B > A	D > E > C > B > A
Diverticulum	swollen, elliptical and well marked	well developed and coiled	swollen, coiled, and well marked	NA	single small coiled	round and small	NA	single coiled	single non-coiled	NA
Spermatophores	49–61 mm, opaque part 23–27 mm, 230–270 coils of sperm cord	NA	56 mm, opaque part 21 mm, ~240 whorls (in single male)	25mm, 55.4% ML, few (5 in storage sac), 95 whorls	~25 mm, length of 45–60% of mantle length (SpLI: 44.6–58.2; SpWI: 1.8–2.2; SpRI: 42.2–48.5)	NA	NA	~20 mm, 35 to 40% of mantle length (SpLI: 34.8–39.8; SpWI: 2.2–3.2; SpRI: 22.4–50.0)	NA	NA
Cirri	two cirri clearly made out, the anterior is always much the smaller	two cirri present above each eyes; small papillae present above and under each eye	two cirri above each eye, the posterior clearly made out, the anterior much smaller	primary papillae on dorsal mantle	single small papilla present over each eye	small single papilla present above each eye	single slightly enlarged supraocular papilla present over each eye	1–2 cirri over each eye	small papillae present above and under each eye	1–2 supraocular papillae present over each eye

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