

Supplementary Materials

Table S1. Sample collection information of 7 geographical localities of *L. (N.) beka*.

Group	Location	Date	Number	Phenotyped number
DL	121°53'E, 39°18'N	2021.04	40	/
YT	121°43'E, 38°28'N	2018.06	30	/
QD	121°04'E, 37°27'N	2021.04	36	15
LYG	119°48'E, 35°52'N	2020.10	30	/
NT	121°40'E, 32°21'N	2021.04	15	/
WZ	121°58'E, 28°41'N	2021.09	30	7
ND	120°11'E, 27°45'N	2021.04	30	8

Table S2. The optimal nucleotide substitution model of *L. (N.) beka* COI and 16S.

	COI	16S
ML	HKY+F+G4	HKY+F
BI	HKY+F+G4	HKY+F

Table S3. Morphological characters recorded on *L. (N.) beka*.

Variable	Ab- brevi- ation	Description	Standard Indices
Total Length	TL	Length of squid from the anterior of mantle to the tip of tentacle	\
Total Weight	TW	The weight of the squid	\
Dorsal Mantle Length	DML	Length of dorsal mantle from anterior to posterior extremes	\
Ventral Mantle Length	VML	Length of ventral mantle from anterior to the opening of mantle	\
Mantle Width	MW	Greatest width of mantle	MWI (MW/DML×100%)
Head Length	HL	Length of head from anterior margin of nuchal cartilage to the base of the arm I	HLI (HL/DML×100%)
Head Width	HW	Greatest width of head	HWI (HW/DML×100%)
Eye Diameter	ED	Diameter of eye	EDI (ED/DML×100%)
Fin Length	FL	Length of fins from the midpoint of an imaginary line joining anterior margin of fins to posterior extreme of mantle	FLI (FL/DML×100%)
Fin Width	FW	Greatest width of fins between lateral margins	FWI (FW/DML×100%)
Hectocotylus Length	HcL	Length of hectocotylus	HcL% (proportion of hectocotylyzed arm)
Arm Width	AW	Width of the base of the arm	AWI (AW/DML×100%)
Arm Length	AL	Length from the intersection of the two adjacent arms to the end of the arm	ALI (AL/DML×100%)

Table S4. Standardized data of *L. (N.) beka* Lineage A for morphological characteristics analyses (D: damaged).

No.	QDLB 2	QDLB 3	QDLB 4	QDLB 5	QDLB 7	QDLB 9	QDLB 12	QDLB 14	QDLB 15	QDLB 16	QDLB 19	QDLB 23	QDLB 26	QDLB 32	QDLB 34
Sex	♀	♀	♀	♂	♂	♂	♂	♂	♀	♂	♂	♂	♂	♂	♂
TL/mm	D	D	D	103.50	D	D	D	D	D	D	97.50	D	D	D	98.50
DML/mm	41.50	39.50	36.50	29.50	35.50	31.50	35.00	36.50	33.50	34.50	33.50	30.50	31.50	35.50	32.50
TW/g	1.93	1.69	1.32	1.23	1.40	1.14	1.15	1.26	1.08	1.17	0.98	1.16	1.00	1.04	0.96
VMLI	80.72	84.81	89.04	89.83	91.55	87.30	81.43	94.52	85.07	85.51	91.04	83.61	87.30	85.92	84.62
MWI	39.76	46.84	45.21	50.85	46.48	49.21	44.29	45.21	43.28	42.03	43.28	57.38	49.21	43.66	50.77
HWI	30.12	41.77	39.73	49.15	46.48	52.38	41.43	42.47	49.25	44.93	40.30	57.38	47.62	40.85	47.69
HLI	30.53	29.11	31.51	38.98	32.39	39.68	30.00	34.25	37.31	30.43	34.33	37.70	33.33	38.03	32.31
FLI	53.04	56.96	53.42	59.32	60.56	55.56	55.71	56.16	58.21	56.52	50.75	60.66	52.38	49.30	53.85
FWI	54.22	64.56	56.16	67.80	60.56	63.49	61.43	64.38	49.25	68.12	55.22	70.49	D	54.93	60.00
EDI	25.69	27.04	28.93	34.58	29.61	31.81	26.77	28.60	26.12	24.99	22.30	30.30	31.87	25.35	26.86
LALI4	49.40	53.16	50.68	55.93	57.75	55.56	50.00	42.47	58.21	53.62	55.22	50.82	47.62	49.30	50.77
RALI1	32.53	37.97	31.51	35.59	29.58	39.68	32.86	31.51	34.33	36.23	31.34	40.98	30.16	32.39	38.46
RALI2	39.76	51.90	53.42	55.93	46.48	49.21	44.29	45.21	58.21	50.72	43.28	54.10	55.56	46.48	63.08
RALI3	51.81	59.49	64.38	69.49	63.38	74.60	58.57	56.16	64.18	59.42	64.18	D	65.08	64.79	69.23
RALI4	0.00	53.16	50.68	55.93	54.93	57.14	50.00	45.21	55.22	53.62	52.24	50.82	52.38	52.11	47.69
HcL%	/	/	/	51.5	46.3	48.6	51.4	61.3	/	45.9	51.4	54.8	43.3	4.6	51.5

*QDLB: *L. (N.) beka* from Qingdao

Table S5. Standardized data of *L. (N.) beka* Lineage B for morphological characteristics analyses (D: damaged).

No.	NDLB 5	NDLB 7	NDLB 8	NDLB 9	NDLB 15	NDLB 17	NDLB 21	NDLB 26	WZLB1	WZLB3	WZLB7	WZLB1 6	WZLB2 3	WZLB2 8	WZLB3 0
Sex	♂	♂	♂	♂	♀	♀	♀	♀	♂	♂	♂	♀	♂	♀	♀
TL/mm	130.5	D	D	137.5	184.2	139.1	184.2	113.5	135.5	128.2	145.5	155.1	D	109.1	109.5
DML/mm	38.5	34.5	31.5	41.5	55.1	44.5	41.5	35.5	37.1	41.6	42.8	49.5	40.5	37.9	32.5
TW/g	2.74	2.7	2	3.22	9.2	4.98	3.94	2.93	4.64	5.67	6.25	7.86	3.4	2.85	1.65
VMLI	79.22	79.71	93.65	78.31	79.67	82.92	85.54	80.28	90.84	88.46	79.67	83.84	81.73	69.92	84.62
MWI	58.44	59.42	65.08	56.63	59.71	64.04	56.63	66.2	61.73	60.34	62.62	61.62	50.86	52.24	56.92
HWI	50.65	53.62	49.21	46.99	40.11	43.82	44.58	52.11	55.26	51.92	54.91	45.45	45.93	45.38	50.77
HLI	42.86	42.03	39.68	42.17	33.58	34.83	37.35	38.03	40.16	33.89	35.28	38.18	33.33	34.56	38.46
FLI	53.25	56.52	58.73	56.63	55.35	56.4	54.22	49.3	56.87	57.93	57.01	55.56	57.78	59.63	56.92
FWI	66.23	68.12	74.6	66.27	71.69	72.36	66.27	74.65	76.01	73.32	81.54	67.68	65.93	66.75	72.31
EDI	31.12	29.39	34.48	26.55	23.56	25.46	21.86	25.66	26.04	23.73	26.29	27.72	20.27	22.56	28.18
LALI4	94.81	68.12	65.08	75.9	54.63	56.85	51.81	54.93	81.4	71.63	75.93	67.68	63.95	55.94	56.92
RALI1	37.66	36.23	39.68	37.35	31.03	30.34	27.71	29.58	40.7	38.7	42.52	35.35	36.05	25.07	26.15
RALI2	76.62	62.32	55.56	63.86	51	46.07	42.17	43.66	73.85	64.66	68.93	55.56	58.02	46.17	41.54
RALI3	87.01	82.61	80.95	83.13	58.44	64.04	63.86	63.38	80.59	78.13	83.88	77.78	74.57	69.92	72.31
RALI4	79.22	71.01	61.9	73.49	56.62	55.73	56.63	54.93	77.09	60.34	71.26	64.24	67.9	56.73	60
HcL%	61.6	53.2	56.1	65	/	/	/	/	52.3	57.7	61.8	/	58.3	/	/

*NDLB: *L. (N.) beka* from Ningde; WZLB: *L. (N.) beka* from Wenzhou

Table S6. Mean genetic distances within (below diagonal) and between (diagonal) lineages and F_{st} (above diagonal) of *L. (N.) beka* based on COI and 16S.

	COI		16S	
	Lineage A	Lineage B	Lineage A	Lineage B
Lineage A	1.0%	0.900*	0.1%	0.952*
Lineage B	5.9%	0.2%	4.2%	0.1%

* Significant at $P < 0.05$

Table S7. Contribution and load of principal components on morphological characteristics of *L. (N.) beka*.

Variable	Load value			
	Principal component 1	Principal component 2	Principal component 3	Principal component 4
DML	0.085	-0.725	0.076	0.549
VMLI	-0.140	0.508	-0.004	-0.421
MWI	0.804	-0.401	0.238	-0.161
HWI	0.827	0.356	0.153	-0.249
HLI	0.658	-0.114	-0.501	-0.431
FLI	0.300	0.452	0.266	0.376
FWI	0.749	-0.241	0.555	-0.095
LALI4	0.821	-0.109	-0.370	0.244
RALI1	0.571	0.445	-0.118	0.270
RALI2	0.773	0.234	-0.292	0.328
RALI3	0.897	0.057	-0.318	0.010
RALI4	0.831	0.013	-0.128	-0.027
HW/HL	0.326	0.546	0.673	0.164
FW/FL	0.632	-0.482	0.441	-0.278
Eigenvalue	6.041	2.145	1.717	1.247
Contribution rate (%)	43.153	15.321	12.261	8.910
Total Contribution rate (%)	79.646			

Table S8. Discriminant results of Lineage A and Lineage B of *L. (N.) beka*.

Lineage	Number	Forecast classification		Accuracy (%)
		Lineage A	Lineage B	
Lineage A	15	15	0	100
Lineage B	15	0	15	100

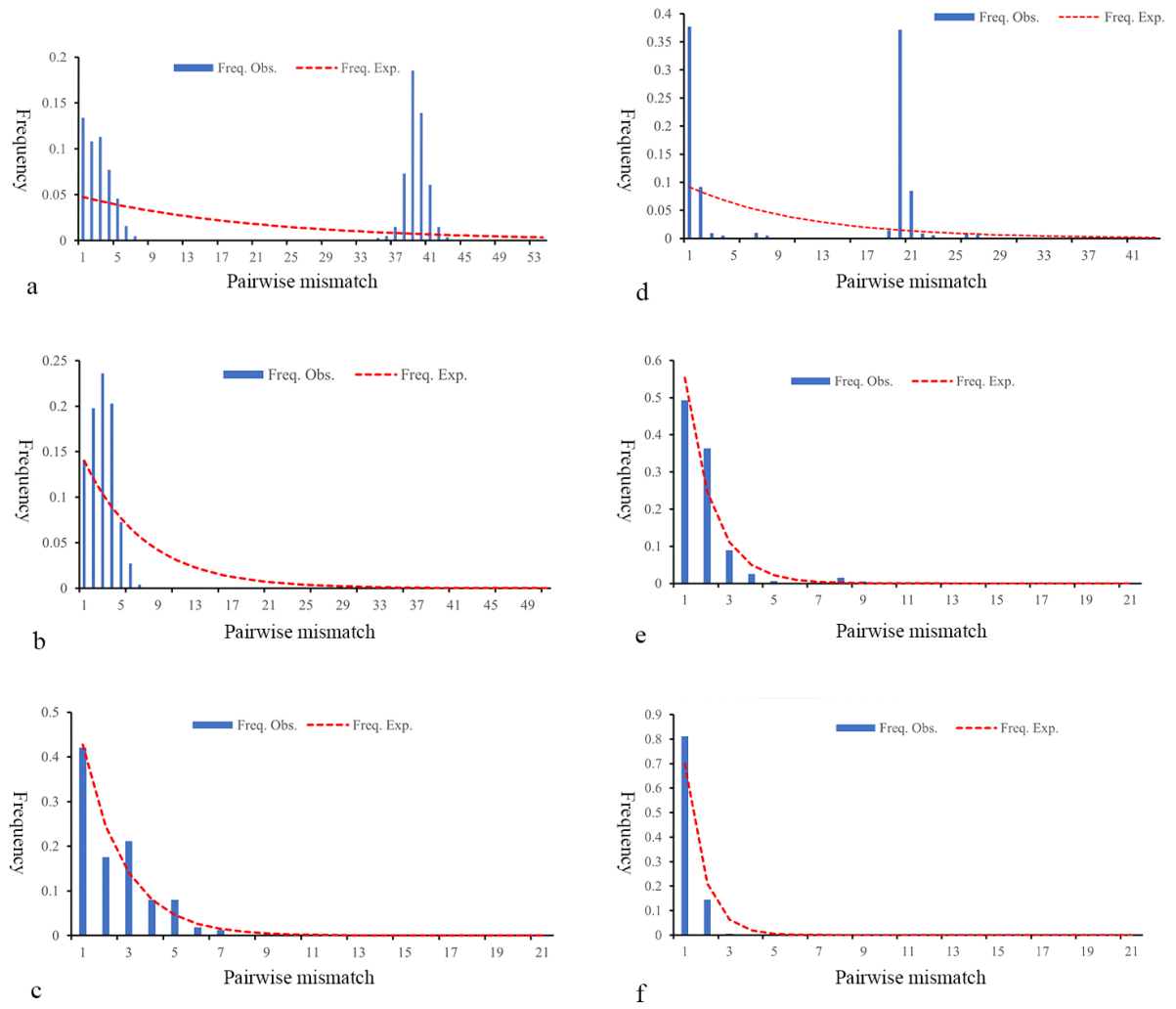


Figure S1. Mismatch distribution based on COI and 16S of *L. (N.) beka*.

a. Total populations (COI); b. Lineage A(COI); c. Lineage B(COI); d. Total populations (16S); e. Lineage A (16S); f. Lineage B (16S)

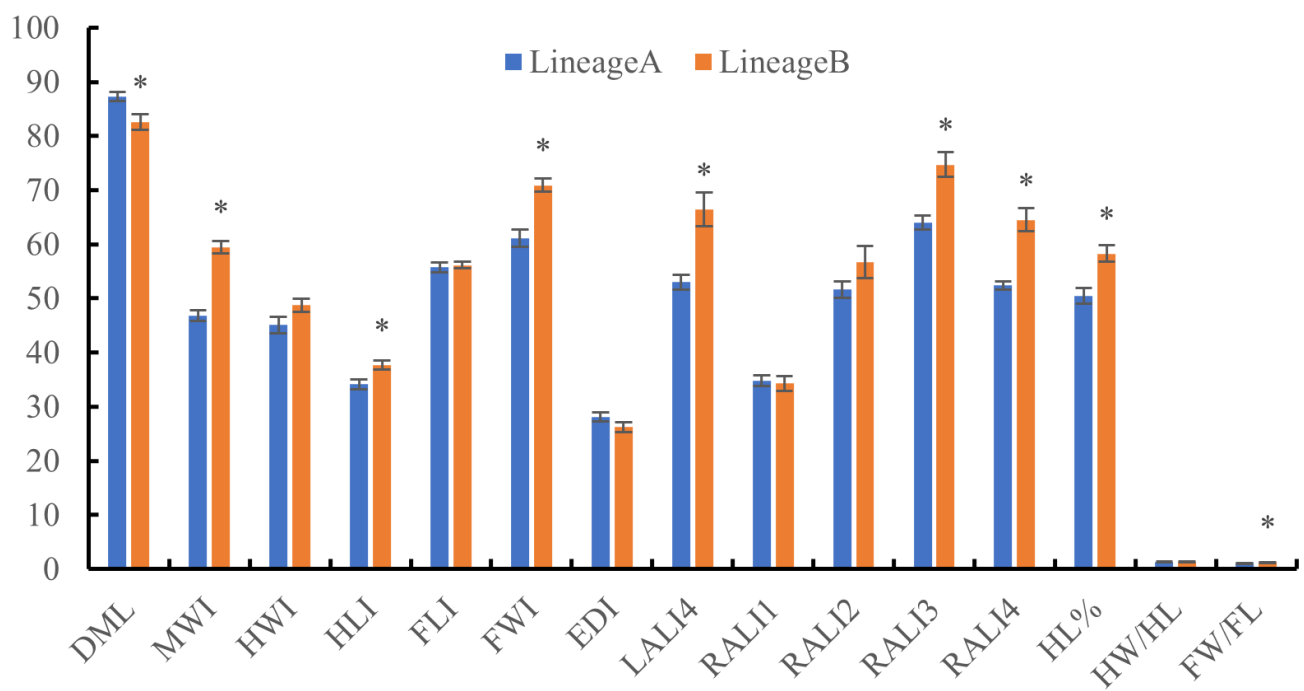


Figure S2. Statistical chart of 15 body size traits of two lineages of *L. (N.) beka* (Lineage A and Lineage B). Abbreviations: DML, dorsal mental length; MWI, mental width indice; HWI, head width indice; HLI, head length indice; FLI, fin length indice; FWI, fin width indice; EDI, eye diameter indice; LALI4, left fourth arm length indice; RALI1, right arm 1 length indice; RALI2, right arm 2 length indice; RALI3, right arm 3 length indice; RALI4, right arm 4 length indice; HL%, percentage of total arm length of left arm 4 that is modified by hectocotylization; HW/HL, ratio of head width to head length; FW/FL, ratio of fin width to fin length.