



## Morphology and size variation of a portunoid crab from the Maastrichtian of the Americas



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### ABSTRACT

The portunoid crab *Ophthalmoplax Rathbun, 1935*, is known from late Cretaceous deposits of Africa and the Americas. A review of 76 specimens from many localities in North and South America reveals that the genus is represented by only two species — one in Africa (recently described) and the other in the Americas. *Ophthalmoplax brasiliiana (Maury, 1930)* was distributed along the Atlantic and Gulf coasts of the Americas throughout the Maastrichtian — from Brazil to North Carolina. In early Maastrichtian deposits of North America (~69.0 Ma), the species is represented by local populations of medium-sized individuals, and by the late Maastrichtian (~67.0 Ma), populations of larger individuals became abundant. This size increase may be related to a decrease in ocean water temperatures. Populations of medium-sized individuals are found again in the latest Maastrichtian (~66.2 Ma), below strata with ejecta deposits in Coahuila, Mexico, and in the uppermost Owl Creek Formation, Mississippi. This size decrease is possibly linked to an increase in seawater temperature occurring just below the K/P boundary, when *Ophthalmoplax* became extinct.

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## 1. Introduction

*Ophthalmoplax Rathbun, 1935*, was established primarily on reasonably complete specimens from the Maastrichtian of the northern Gulf of Mexico — one from Mississippi and more than a dozen from Texas. Based on isolated movable fingers and a fixed finger, Rathbun (1935) also erected *Ophthalmoplax comancheensis* from the Albian Pawpaw Formation of Texas. Adkins (1928) had earlier considered this same material to be callianassoid, a position with which we concur. The fixed and movable fingers of typical *Ophthalmoplax* are more robust and spiny, and the occlusal teeth are more numerous and massive, all inconsistent with the hypodigm of *O. comancheensis*.

*Ophthalmoplax Rathbun*, the American content of which was reviewed most recently by Schweitzer et al. (2007), has been found in Maastrichtian (67.0–66.2 Ma) deposits at many locations in

northern South America and southern North America. It is also known from the late Campanian of Morocco (Ossó-Morales et al., 2010).

We examined 76 nearly complete Maastrichtian specimens from localities distributed throughout the American range, paying particular attention to size differences in relation to age. In this paper, we re-examine the current content of *Ophthalmoplax* (e.g. Schweitzer et al., 2010) and recommend synonymy of all included American species (except *O. comancheensis*) under the senior name — *Ophthalmoplax brasiliiana (Maury, 1930)*. We also discuss a possible temperature-dependent explanation for changes in mean size among *Ophthalmoplax* populations distributed throughout the Maastrichtian.

## 2. Systematic paleontology

### 2.1. Material examined

Material used in this study is deposited at the following institutions: BNHM — Natural History Museum of Basel, Switzerland;

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**Table 1**

Sizes and distribution of *Ophthalmoplax brasiliana* in lithostratigraphic units of South and North America. E. Ma. = early Maastrichtian, L. Ma. = late Maastrichtian, Lt. Ma. = latest Maastrichtian. Medium specimens possess lengths of 30–52 mm and widths of 35–61 mm, and large specimens possess lengths of 44–120 mm and widths of 50–123 mm.

Age	Unit-locality	Size	Specimen	Gender	Length	Width
E. Ma.	Potreriillos-NE Mexico	Medium	IGM5204	Female	30	35
E. Ma.	Potreriillos-NE Mexico	Medium	CPC-854	Female	40	38
E. Ma.	Ripley-Mississippi	Large	USNM73793	Female	57	66
E. Ma.	Ripley-Mississippi	Medium	MMNS IP-2436	Female	42	45
E. Ma.	Peedee-East Coast L.-NC	Medium	NCSM 11699	Female	45	60
E. Ma.	Peedee-East Coast L.-NC	Medium	NCSM 11700	Female	40	55
L. Ma.	Gramame-Brazil	Large	DNPM1065	Male	99	120
L. Ma.	Gramame-Brazil	Large	DNPM3203	Male	90	100
L. Ma.	Gramame-Brazil	Large	MN 4526-I	Male	120	140
L. Ma.	Gramame-Brazil	Large	MN 4527-I	Male	95	120
L. Ma.	Gramame-Brazil	Medium	MEdParaíba	–	52	61
L. Ma.	Mito Juan-Venezuela	Large	BNHM147	–	100	110
L. Ma.	Puerto Romero-Colombia	Large	USNM517703	Male	94	107
L. Ma.	Puerto Romero-Colombia	Large	USNM601	Male	90	110
L. Ma.	Cerro Grande-NE Mexico	Large	CPC-855	Female	93	99
L. Ma.	Cerro Grande-NE Mexico	Large	CPC-856	Female	63	74
L. Ma.	Cerro Grande-NE Mexico	Large	CPC-857	Female	76	78
L. Ma.	Cerro Grande-NE Mexico	Large	CPC-858	Male	70	70
L. Ma.	Cerro Grande-NE Mexico	Large	CPC-859	Female	90	100
L. Ma.	Cerro Grande-NE Mexico	Large	CPC-860	–	89	94
L. Ma.	Cerro Grande-NE Mexico	Large	CPC-861	Female	73	85
L. Ma.	Cerro Grande-NE Mexico	Large	CPC-862	Male	94	98
L. Ma.	Cerro Grande-NE Mexico	Large	CPC-863	Male	79	83
L. Ma.	Cerro Grande-NE Mexico	Large	CPC-864	Male	80	83
L. Ma.	Cerro Grande-NE Mexico	Large	CPC-865	Female	78	82
L. Ma.	Cerro Grande-NE Mexico	Large	CPC-866	Male	65	73
L. Ma.	Cerro Grande-NE Mexico	Large	CPC-867	Male	70	72
L. Ma.	Cerro Grande-NE Mexico	Large	CPC-868	Male	76	78
L. Ma.	Cerro Grande-NE Mexico	Large	CPC-869	Female	60	64
L. Ma.	Cerro Grande-NE Mexico	Large	CPC-870	Male	80	99
L. Ma.	Cerro Grande-NE Mexico	Large	CPC-871	Male	78	90
L. Ma.	Cerro Grande-NE Mexico	Large	CPC-872	Male	95	109
L. Ma.	Cerro Grande-NE Mexico	Large	CPC-873	Male	63	69
L. Ma.	Cerro Grande-NE Mexico	Large	CPC-874	Male	79	61
L. Ma.	Cerro Grande-NE Mexico	Large	CPC-875	Male	92	114
L. Ma.	Cerro Grande-NE Mexico	Large	CPC-876	Male	110	123
L. Ma.	Cerro Grande-NE Mexico	Large	CPC-877	Male	76	91
L. Ma.	Cerro Grande-NE Mexico	Large	CPC-878	Male	89	79
L. Ma.	Cerro Grande-NE Mexico	Large	CPC-879	Male	66	80
L. Ma.	Cerro Grande-NE Mexico	Large	CPC-880	Female	72	89
L. Ma.	Escondido-Texas	Large	UT21262	Male	87	99
L. Ma.	Escondido-Texas	Large	UT21258	–	44	50
L. Ma.	Peedee-Island C.M.-NC	Large	NCSM 11701	Female	77	82
L. Ma.	Peedee-Island C.M.-NC	Large	NCSM 11702	Female	78	82
L. Ma.	Peedee-Island C.M.-NC	Large	NCSM 11703	Male	78	80
L. Ma.	Peedee-Island C.M.-NC	Medium	NCSM 11704	–	32	36
L. Ma.	Peedee-Island C.M.-NC	Large	NCSM 11705	Male	76	81
L. Ma.	Peedee-Island C.M.-NC	Large	NCSM 11706	–	77	81
L. Ma.	Peedee-Island C.M.-NC	Large	NCSM 11619	–	80	100
L. Ma.	Peedee-Island C.M.-NC	Large	NCSM 11620	Female	55	60
L. Ma.	Peedee-Island C.M.-NC	Medium	NCSM 11621	–	50	45
L. Ma.	Peedee-Island C.M.-NC	Large	NCSM 11622	Male	80	90
L. Ma.	Peedee-Island C.M.-NC	Large	NCSM 11623	Male	80	85
L. Ma.	Peedee-Island C.M.-NC	Large	NCSM 11624	–	55	60
L. Ma.	Peedee-Island C.M.-NC	Large	NCSM 11625	–	70	80
L. Ma.	Peedee-Island C.M.-NC	Large	NCSM 11626	Male	60	75
L. Ma.	Peedee-Island C.M.-NC	Large	NCSM 11627	Male	70	80
L. Ma.	Peedee-Island C.M.-NC	Large	NCSM 11628	–	70	80
L. Ma.	Peedee-Island C.M.-NC	Large	NCSM 11629	–	60	70
L. Ma.	Peedee-Island C.M.-NC	Large	NCSM 11630	–	80	75
L. Ma.	Peedee-Island C.M.-NC	Large	NCSM 11631	–	60	70
L. Ma.	Peedee-Island C.M.-NC	Large	NCSM 11632	–	60	65
L. Ma.	Peedee-Island C.M.-NC	Large	NCSM 11633	–	75	80
L. Ma.	Peedee-Island C.M.-NC	Large	NCSM 11634	–	75	90
L. Ma.	Peedee-Island C.M.-NC	Large	NCSM 11635	–	65	85
L. Ma.	Peedee-Island C.M.-NC	Large	NCSM 11636	Male	70	80
L. Ma.	Peedee-Island C.M.-NC	Large	NCSM 10204	–	80	83
Lt. Ma.	Las Encinas-NE Mexico	Medium	CPC-881	Female	32	38
Lt. Ma.	Las Encinas-NE Mexico	Medium	CPC-882	–	39	46
Lt. Ma.	Las Encinas-NE Mexico	Medium	CPC-883	Male	36	38
Lt. Ma.	Las Encinas-NE Mexico	Medium	CPC-884	Female	41	44
Lt. Ma.	Las Encinas-NE Mexico	Medium	CPC-885	Male	49	54
Lt. Ma.	Las Encinas-NE Mexico	Medium	CPC-886	Female	40	45
Lt. Ma.	Owl Creek-Mississippi	Medium	MMNS IP-4009	Male	38	46

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