

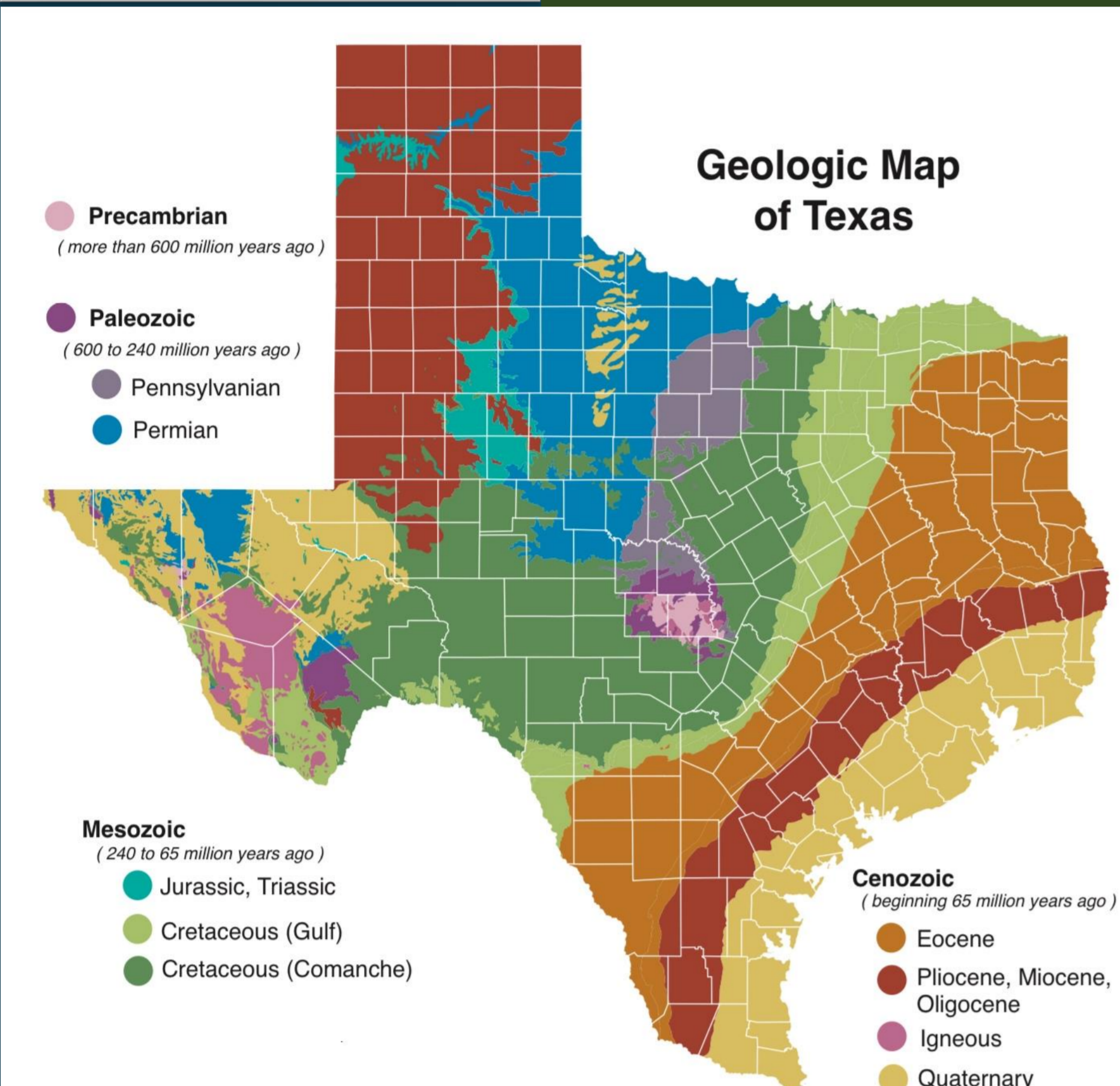


# FOSSIL AND RECENT OSTRACODS OF TEXAS

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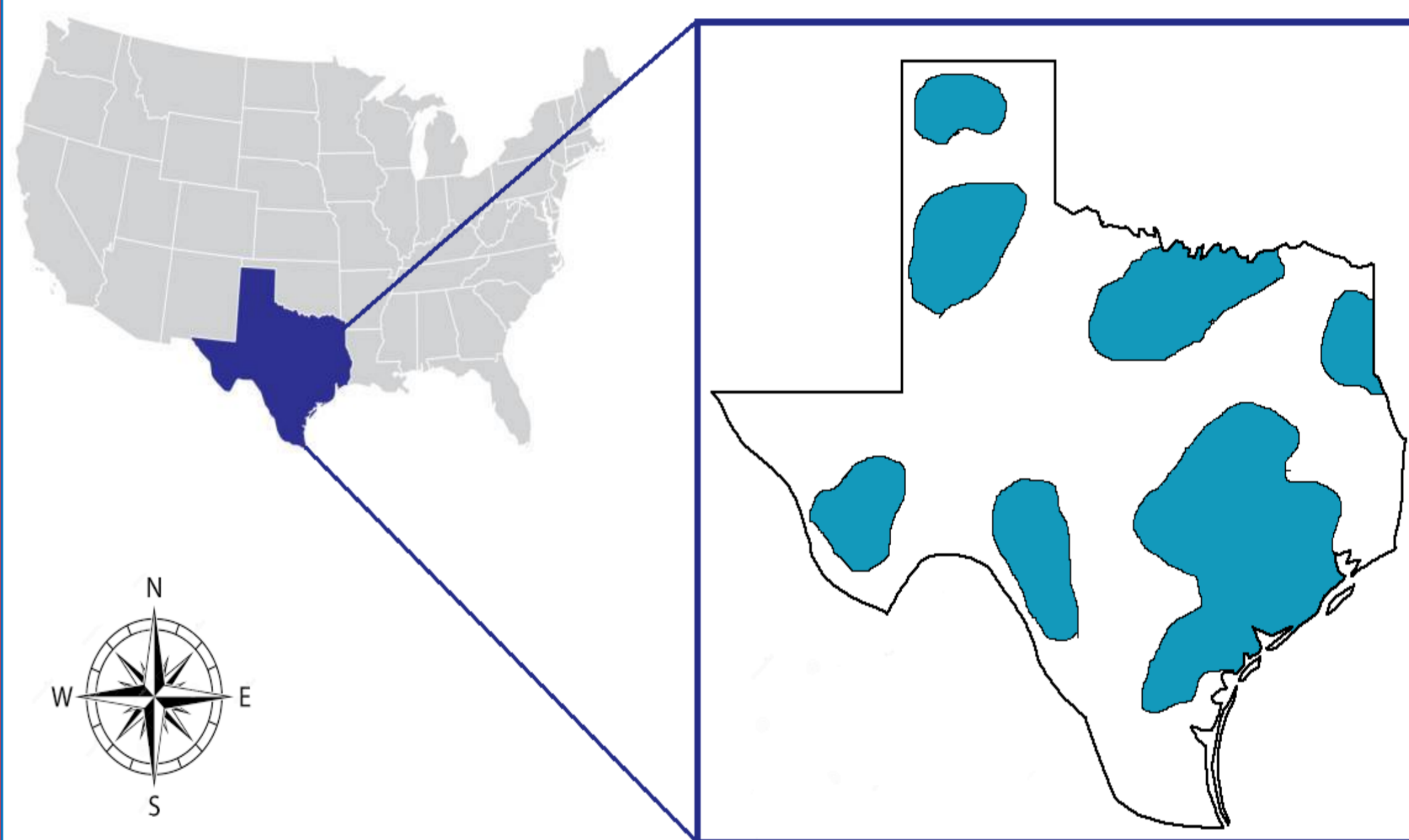


**Figure 1:** This geologic map shows where rocks of various geologic ages are visible on the surface of Texas, U.S.A. (from [texasalmanac.com](https://www.texasalmanac.com), 2021)

**Introduction:** The fossil record is our only trustworthy documentation of the chronological arrangement of past events over long-time periods (Benton and Pearson, 2001). Class Ostracoda is the most profusely preserved arthropod group in the fossil record from the Ordovician through to the Holocene period, within a wide range of paleoenvironments (e.g., seas, lakes, brackish inlets, etc.) (Matzke-Karasz and Smith, 2020). Moreover, fossil ostracods are generally represented only by their calcitic carapaces, but rarely, fossil ostracods can be included with preserved appendages or soft parts (Matzke-Karasz and Smith, 2020). Since Ostracoda is diverse and a widespread group in the world and also most of the species are sensitive to the changes in environmental conditions, they can be used as bioindicators to determine water quality, spatial and temporal changes in the environment (Külköylüoğlu and Yılmaz, 2006). The idea of using Ostracoda as bioindicators will greatly aid in the reconstruction of the past according to the current knowledge of fossil records.

Texas has a broad range of geologic history consisting of rocks from the Precambrian to the Holocene period (Fig. 1), therefore, the expectance of diverse scientific research about the fossil record of Ostracoda seems reasonable. Our aims in this study are, (1) to investigate Ostracoda species richness and diversity from the literature, (2) to compare marine and non-marine taxa, (3) sorting of the Ostracoda species according to their occurrence in the geologic time scale.

**Material and Methods:** Although it is not limited, our review study contains all relevant data known to us that are published in journals, published thesis and books from 1927 to 2021. According to the literature, we created a demonstration about sampling sites of fossil records of Ostracoda in Texas, U.S.A (Fig.2). Scientific studies about fossil ostracod taxa have been done on a relatively large scale in the mentioned area consistent with the investigated publishings.



**Figure 2:** Light blue colored areas shows the approximate sampling sites that have been published fossil ostracoda records in Texas, U.S.A

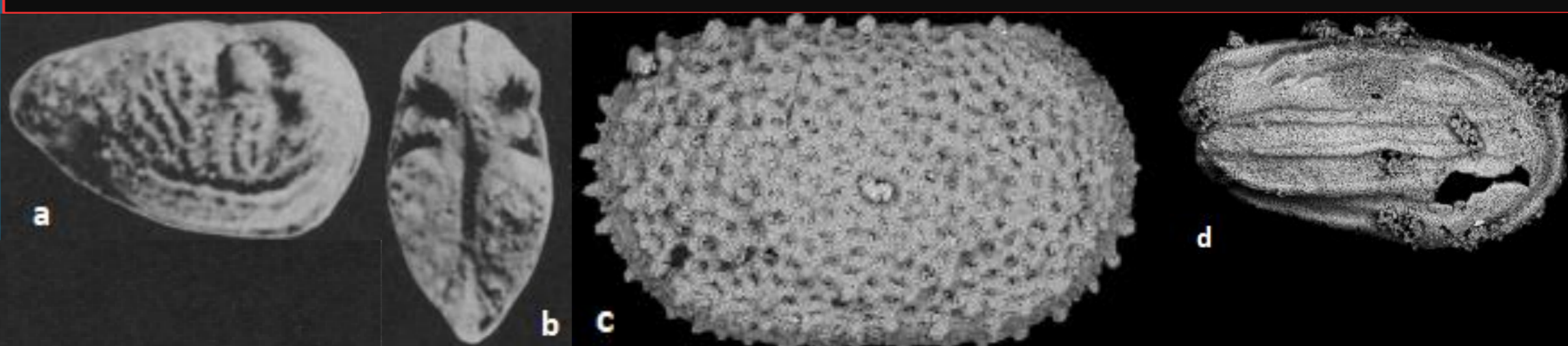
EON	ERA	PERIOD	EPOCH	Ma	
Phanerozoic	Cenozoic	Quaternary	Holocene	0.011	
			Pleistocene	Late 0.8 Early 2.4	
		Tertiary	Neogene	Pliocene	Late 2.4 Early 3.6
				Miocene	Late 5.3 Middle 11.2
					Early 16.4
			Paleogene	Oligocene	Late 23.0 Early 28.5
					Eocene
				Paleocene	Late 55.8 Early 61.0
		Mesozoic	Cretaceous	Late 65.5 Early 99.6	
				Jurassic	Late 145 Middle 161 Early 176
			Triassic	Late 200 Middle 228 Early 245	
				Permian	Late 251 Middle 260 Early 271
			Paleozoic	Pennsylvanian	Late 299 Middle 306 Early 311
					Mississippian
	Devonian			Late 359 Middle 385 Early 397	
				Silurian	Late 416 Early 419
	Ordovician			Late 423 Middle 428 Early 444	
				Cambrian	Late 488 Middle 501 Early 513

**Figure 3:** The chart shows the Geologic Timeline as Eon, Era, Period and Epoch classification. Ma: Millions of Years

Period - Epoch	No. Of Taxa
Holocene Epoch	41
Pleistocene Epoch	10
Pliocene Epoch	3
Miocene Epoch	8
Oligocene Epoch	4
Eocene Epoch	186
Paleocene Epoch	15
Cretaceous-Tertiary Periods	82
Cretaceous Period	232
Jurassic Period	15
Permian Period	50
Pennsylvanian Period	73

**Table 1:** The number of fossil taxa and their geologic timelines.

**Results and Discussion:** We found that there are about 117 non-marine ostracods and 674 fossil taxa. All fossil taxa belong to 144 genera while 43 genera cover all nonmarine species. 19 of 674 taxa were considered nonmarine fossil ostracods but there are only five fossil species also listed in the recent ostracods. The oldest taxa (73 taxa) were dated back to the Pennsylvanian period (ca. 310 mya) of the Paleozoic era followed by Middle Permian (50 taxa), Upper Jurassic (15 taxa), Cretaceous (232 taxa), Cretaceous-Tertiary (82 taxa), Paleocene (15 taxa), Eocene (186 taxa), Oligocene (4 taxa), Miocene (8 taxa), Pliocene (3 taxa), Pleistocene (10 taxa) and Holocene (41 taxa) (Table 1). It should be taken into account that 45 taxa have been seen in more than one time period. Our detailed review of the literature search exhibited that there is no ostracod reported from the Triassic period. Results indicate ostracod species richness and diversity are apparently very high in Texas but deserve more attention for future studies.



**Figure 4:** A few examples of photographs (a,b) and SEM micrographs (c,d) belongs to Fossil Ostracoda; a-b, (From Jurassic Period) Right valve and dorsal view of a male *Hutsonia vulgaris* Swain, 1946. c, (From Permian Period) External view of a right valve *Roundyella lebaensis* Krömmelbein, 1958. d, (From Permian Period), *Glyptopleura* sp., external view of a right valve. (From Swain, 1946 and Tarnac, 2021)

**References**

- Benton, M. J., & Pearson, P. N. (2001). Speciation in the fossil record. *Trends in Ecology & Evolution*, 16(7), 405-411.
- Külköylüoğlu, O., & Yılmaz, F. (2006). Ecological requirements of Ostracoda (Crustacea) in three types of springs in Turkey. *Limnologia*, 36(3), 172-180.
- Matzke-Karasz, R., & Smith, R. J. (2020). A review of exceptional preservation in fossil ostracods (Ostracoda, Crustacea). *Marine Micropaleontology*, 101940.
- Swain, F. M. (1946). Upper Jurassic Ostracoda from the Cotton Valley group in northern Louisiana; the genus *Hutsonia*. *Journal of Paleontology*, 119-129.
- Tarnac, A., Forel, M. B., Nestell, G., Nestell, M., & Crasquin, S. (2021). Middle Permian ostracods (Crustacea) from the Guadalupe Mountains, West Texas, USA. *European Journal of Taxonomy*, 770, 1-60.
- Texas State Historical Association (TSHA), Texas Almanac <https://www.texasalmanac.com> (04.07.2022)