Serratolamna serrata (Agassiz) (Pisces, Neoselachii) from the Maastrichtian (Late Cretaceous) of Jamaica.

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Abstract - Three teeth of the shark *Serratolamna serrata* (Agassiz) from the Guinea Corn Formation (Central Inlier) represent the first recorded occurrence of fossil sharks within the Cretaceous of Jamaica. This occurrence increases the known palaeogeographical distribution of *S. serrata*, which appears to have been global. This species is largely known from the Upper Maastrichtian, which helps confirm the stratigraphical position of the Guinea Corn Formation.

INTRODUCTION

The Late Cretaceous represented a period of extensive radiation within the Neoselachii ('modern' sharks and rays) (Cappetta 1987a). This resulted in the establishment of diverse shark and ray communities within the latest Cretaceous, with sharks probably filling all of the niches that they occupy within modern oceans (e.g. Siverson 1992). These assemblages are well known from numerous Maastrichtian localities across North America, northern Europe and North Africa. Shark faunas from other parts of the world are less well known.

GEOLOGICAL SETTING

(See figs 1-3) Selachian material was collected from Unit D of Mitchell (1999). 200k of rock were passed through a 250 micron sieve. Specimens are housed in the Geological Museum at the University of the West Indies (UWIGM). For more details see original text.

Other vertebrate material was associated with the three shark teeth, but was rare. Other fish material is represented by a single indeterminate crushing tooth of an actinopterygian fish. The presence of a finely reticulate surface ornament suggests that this probably represents a pharyngeal tooth of a teleost , rather than the tooth of a pycnodont or semionotid.

SHARK TEETH

All shark teeth collected belong to a single species. They are all damaged to some degree, but are generally well preserved.

Order Lamniformes
Family Cretoxyrhinidae Glickman, 1958
Genus Serratolamna Landemaine 1991
Serratolamna serrata (Agassiz 1843)

Material: Three incomplete teeth; two upper? lateral teeth of adults, one anterolateral? tooth of a juvenile.

Description: The main cusp is at least twice as high as wide and slopes somewhat to the posterior. This is flanked on both sides by smaller lateral cusplets. These are all considerably shorter than the main cusp, and decrease in size laterally. These cusplets, in particular the innermost pair of, slightly project laterally. Only one tooth shows both posterior and anterior cusplets, and has three of each. The other adult tooth has three anterior cusplets, whilst only two are seen on the juvenile tooth. All cusps are compressed, the labial (outer) face being more convex than the lingual (inner) face, the base of which may be flat or faintly concave. A very well developed cutting edge is present over all cusps. No surface ornament or serrations are present on any cusps. On the labial face of the tooth, the enameloid covering of the cusps has an abrupt contact with the upper surface of the root, whereas on the lingual face a thin veneer of enameloid extends over the upper part of the root. The root is relatively deep and compressed, and may be wider than the crown. The root is divided into two lobes, which are expanded basally. The central part of the labial face of the root is slightly swollen. This is cut by a nutritive groove with a central foramen, although this does not extend to the top of the root. Smaller foramina are present over both faces of the root, but are poorly preserved.

Discussion: The genus *Serratolamna* was originally erected to include a range of Late Cretaceous taxa possessing multiple lateral cusplets (Landemaine 1991). This included several species that are clearly not related to *S. serrata*, the type species (Case and Cappetta 1997) and should be retained within other genera. It is unclear whether *Cretolamna maroccana* (Arambourg, 1935), *C. caraibaea* (Leriche, 1938) and *C. biauriculata* (Wanner, 1902) should be included into *Serratolamna*, although Case and Cappetta (1997) retain *C. maroccana* and *C. biauriculata* in *Cretolamna*, presumably due to their lack of a distinct root axial groove.

Serratolamna serrata has been recorded from many parts of the world (e.g. Herman 1977), and may be one of the most widely distributed Cretaceous shark taxa. Despite this wide palaeogeographical range, *S. serrata* appears to have been a short lived taxon, being restricted to the Maastrichtian. This is unlike the closely related *Cretolamna appendiculata* (Agassiz, 1843) which ranges from Albian to early Eocene (Cappetta and Case 1999). *S. serrata* is well known from the Maastrichtian of North America (e.g. Case 1979, Case and Cappetta 1997), Belgium and Holland (e.g. Leriche 1929, Herman 1977), France (e.g. Landemaine 1991), Morocco (e.g. Noubhani and Cappetta 1997), Egypt (Wanner 1902), Angola (Herman 1977) and Brazil (Reboucas and Santos 1956). Where it has been differentiated, these occurrences appear to be restricted to the Upper Maastrichtian. This Upper Maastrichtian age is further reinforced by the absence of *S. serrata* from some very rich Lower Maastrichtian faunas, such as in Egypt (Cappetta 1991) and Belgium (Herman 1977). Records of this species in Campanian sediments from Egypt (e.g. Priem 1914) and Israel (Raab 1963) are probably due to poor dating of the sediments; the Israeli assemblage also containing other taxa otherwise only recorded in the Maastrichtian. Other Campanian and earlier records of *S. serrata* (e.g. Leriche 1902, Welton and Farrish 1993) are probably due to mis-identification of species of *Cretolamna* (Case and Cappetta 1997). It is therefore evident that the presence of this species is a good indicator for Maastrichtian, and probably Upper Maastrichtian, age.

PALAEOBIOLOGY

The seemingly global distribution of *Serratolamna serrata* suggests that it must have been an extremely cosmopolitan species. This wide distribution would not, however, necessitate long ocean crossings, and the southern Atlantic and Tethyan oceans would have been relatively narrow during the Maastrichtian. *S. serrata* appears to have been present within a range of palaeoenvironments, including the cratonic chalk seas of northern Europe, offshore mudstones of the American interior seaway and condensed phosphatic mudstones on the Tethyan margin of North Africa. It has been recorded found within a range of both carbonate and clastic sediments, both within broadly neritic settings and more inshore environments, as is represented by this occurrence.

Serratolamna is only known from isolated teeth, fossil skeletal material of sharks being generally very rare (Cappetta 1987b). The only member of the Cretoxyrhinidae for which skeletal material is well known is *Cretoxyrhina mantelli* (Agassiz, 1843)(Shimada 1997). This was a large shark, probably reaching over 6 metres in length, not dissimilar to the extant *Carcharodon carcharias* (great white shark), and to a lesser extent other members of the Lamnidae, in general form (Shimada 1997). This body form suggests that *C. mantelli*, and by analogy other cretoxyrhinids, was an active nectic predator. The small teeth of *S. serrata* suggest a far smaller shark, with a tearing-type dentition (of Cappetta 1987). Comparison with analogous taxa with a comparable dentition, such as some extant species of *Carcharias*, suggests that probably reached less than 1.5 metres in length. This is smaller than any extant lamnids, although it is within the size range of smaller species of *Carcharias*.

Many extant sharks, especially members of the Lamnidae (mackeral sharks) and Carcharhinidae (requiem sharks) are very widely distributed (see Compagno,1984 for more details). These species may be present throughout the tropics, such as *Carcharias leucas* (bull shark) and *Galeocerdo cuvier* (tiger shark) or throughout tropical and temperate seas, such as *Prionace glauca* (blue shark) and *Isurus oxyrinchus* (shortfin mako). These wide-ranging species include taxa generally regarded as oceanic (*P. glauca*), inshore (*G. cuvier*) and cosmopolitan (*C. leucas*).

The distribution of *S. serrata* suggests that it represented a widely distributed form, possibly living as an active pelagic predator in neritic and inshore environments. This wide distribution was also shown by other Cretaceous lamniformes such as *Cretolamna appendiculata* and *Cretoxyrhina mantelli* (e.g. Herman 1977). Other taxa, such as *Cretolamna moroccana* and *Scapanorhynchus texanus* (Roemer, 1852) appear to have shown strong endemicity, being retricted to the North African shelf and the North American cratonic seaway respectively.

CONCLUSIONS

The presence of *Serratolamna serrata* within the Maastrichtian of Jamaica adds to the known palaeographical distribution of this wide-ranging species, which has not previously been recorded from the Caribbean or Central American region. This represents the first record of shark remains within the Jamaican Cretaceous, and by analogy with occurrences of *S. serrata* elsewhere, helps confirm the age of these rocks as Maastrichtian, and probably Upper Maastrichtian, in age.

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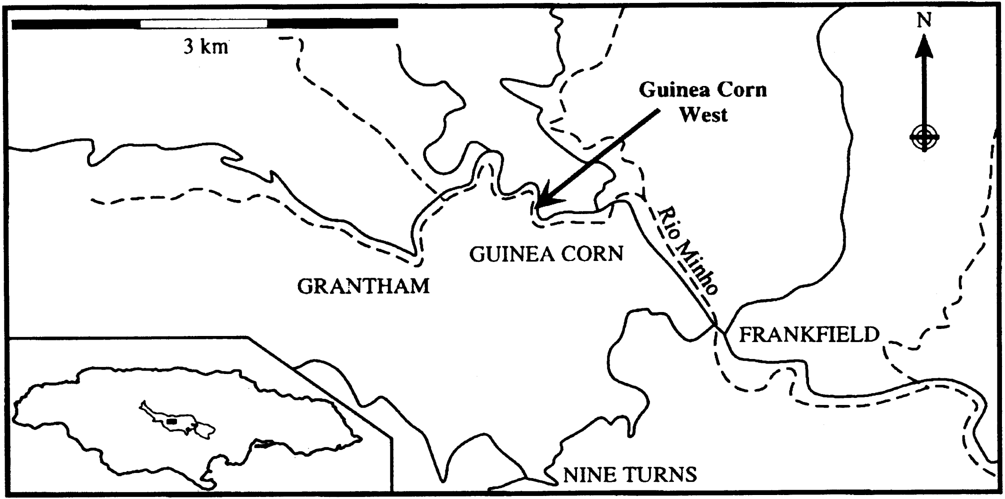

Figure 1. Location of Guinea Corn West section in the Central Inlier, Jamaica.

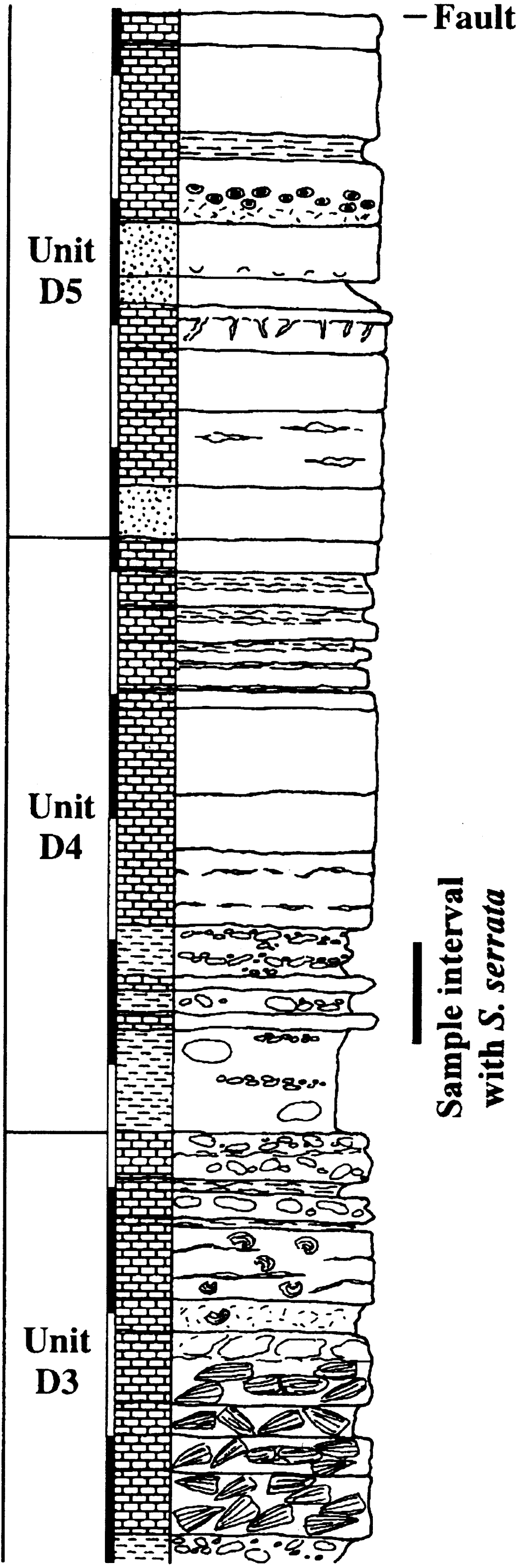

Figure 2. Log showing sampling interval. Scale bar in metre intervals. See Figure 3 for key.

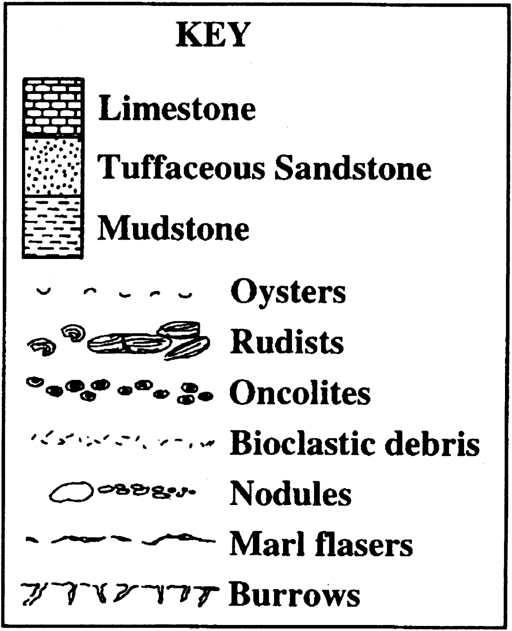

Figure 3. Key to symbols used in log

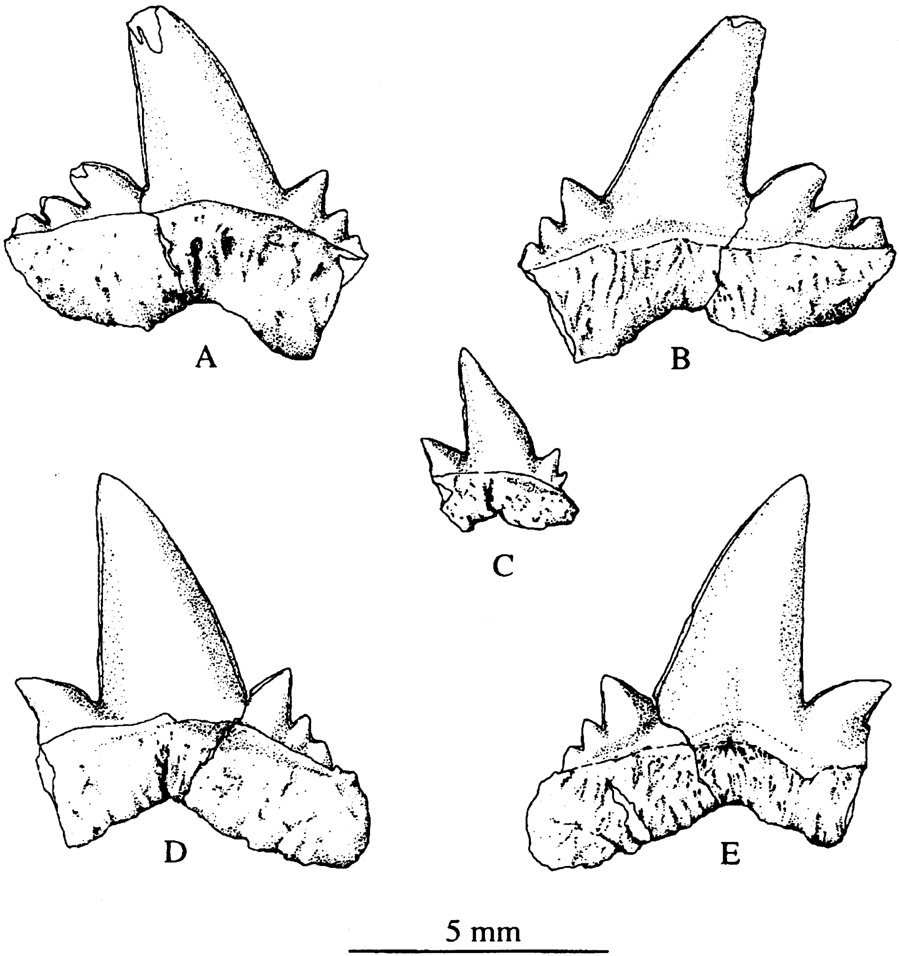

Figure 4. Camera lucida figures of teeth of the shark *Serratolamna serrata* from the Guinea Corn Formation. A-B (UWIGM.2000.1), A - labial view, B - lingual view; C (UWIGM.2000.2), labial view; D-E (UWIGM.2000.3), D – labial view, E, lingual view.