

Ages of Tertiary rocks at Uloa and Umkwelane, Zululand, and their geomorphological significance

SIR, — Professor J. J. Frankel has sent me shark material from the Uloa-Sapolwana area (collected by Dr R. R. Maud and Mr E. Frankel) which has increased the fauna by one species and confirmed the suspected identification of another. The seven shark species found are : *Carcharodon megalodon*, *Carcharodon sulcidens*, *Isurus benedeni*, *Odontaspis taurus*, *Hemipristis serra*, *Isurus hastalis* and *Galeocерdo cuvier*. The range of these species is as follows:

Carcharodon megalodon is found from the Oligocene to the Pleistocene. Known Lower Miocene specimens from California may represent a small form; this seems to be also true of the Oligocene specimens described from Europe.

Carcharodon sulcidens was reported by Aggasiz from the Upper Miocene and is known from the Upper Miocene to the Plio-Pleistocene of California. It is very close to the living *Carcharodon carcharias*. The Middle Miocene record of *C. sulcidens* from Sharktooth Hill is a definite error. In fact, I know of no Middle Miocene or older record of this species

Isurus benedeni is known from the Oligocene to the Pliocene. It is quite rare in the Miocene beds of this country, but is fairly common in the Pliocene beds of Baja California.

Odontaspis taurus is a common shark today off the coast of South Africa near Durban, as well as in many other parts of the world. The living species is most likely derived from a very closely related species complex. The fossil teeth from Zululand are badly water-worn, yet resemble more closely those of the Recent shark than those of any Lower Miocene forms with which I am familiar.

Hemipristis serra specimens are known from the Miocene through the Pliocene. The range is not through the Cretaceous as quoted by Davies (1964, p. 12). The genus as a whole only ranges from the Eocene to the Recent. The Eocene species are quite small. The specimens of *H. serra* from Sapolwana are very large and may represent a new species. Large forms are known from the Calvert Middle Miocene but are more common in the Upper Miocene and Pliocene.

Isurus hastalis ranges from the Miocene to the Plio-Pleistocene. It is found in the Miocene from Sharktooth Hill and the Pleistocene from California and Baja California.

Teeth of *Galeocерdo cuvier* in Davies's collection are represented by badly water-worn specimens so that there is some question as to the species, but with the material sent out by Professor Frankel there is no doubt that this is the Recent species. *G. cuvier* is known from questionable Upper Miocene to the Recent. It is replaced in the Lower and Middle Miocene by the easily distinguished *Galeocерdo aduncus*.

The Uloa-Sapolwana shark fauna is still poorly known; most shallow water fossil faunas usually contain about 25 species for sharks, but as yet only seven are known from this bed. The combination and abundance of forms is similar to that of sharks from the Gloria formation in Baja California, which is Pliocene in age.

Certainly there is no major reason why it should not still be Upper Miocene, but a Lower Miocene age for this fauna is, in my view, not a possibility.

REFERENCES

- Davies, D. H. 1964. The Miocene Shark Fauna of the Southern St. Lucia Area. *Investig. Rept. No. 10., S. Afri. Ass. Marine biol. Research*, 16pp.
 King, Lester, 1969. The Ages of Tertiary Rocks at Uloa and Umkwelane, Zululand, and their Geomorphological Significance. *Geol. Mag.* 106, 206-208.

Los Angeles County Museum of Natural History
 900 Exposition Boulevard
 Los Angeles, California 90007
 U.S.A.

Shelton P. Applegate

30th September 1969