Cretaceous ammonites

from M. K. Howarth

AMMONITES are an extinct group of Cephalopods that flourished during the Mesozoic era 240 to 65 million years ago. Their world-wide distribution and speed of evolution, reflected in distinctive shell features, makes them the most useful macrofossils in the Mesozoic for relative dating of rocks. Rock divisions representing time intervals as small as about one-third of a million years can be recognized.

Ammonites from coastal exposures of Upper Cretaceous rocks in Zululand and Pondoland in South Africa are splendidly illustrated in a recent work by Klinger & Kennedy*. Abundant representatives of the subfamily Texanitinae were found in two areas 350 miles apart. Careful stratigraphical collecting showed that in each case there are complete series of transitions between the same four successive species, two of the ancestral *Texanites*, two of the successor *Submortoniceras*. Although the four species showed very high variability in both areas, there are small consistent differences between the same species in the two areas that are held to be of subspecific rank. It seems that the two populations were sufficiently isolated geographically to maintain these subspecific differences, but contact between them was enough to ensure that they evolved in parallel in specific and generic characters.

In the past ammonite systematics became unnecessarily complicated as generic and specific divisions were multiplied without any agreed method of control. This description of South African Upper Cretaceous ammonites is a good example of the new methods that have been applied during the past 25 years, involving accurate stratigraphical collecting and the use of single bed assemblages as a control to the species classification. It has been found repeatedly that the considerable morphological variation that has to be admitted to ammonite species, embraces many species and even genera of past ammonite systematists.

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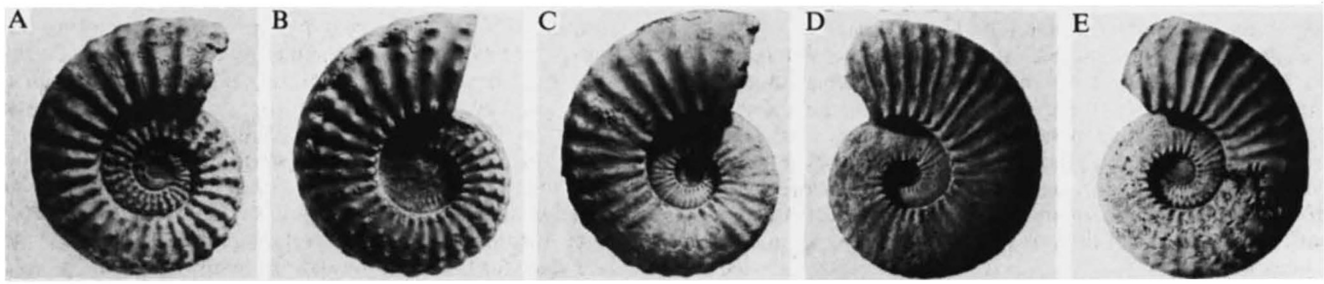
A — *Texanites presoutoni* sp. nov.; B — *Texanites soutoni* (Baily); C — *Submortoniceras woodsi* (Spath); D — *Submortoniceras condamyi* (Collignon); showing progressive evolution from A, the oldest, to D, the youngest. E — *Submortoniceras woodsi (Spath).*



show that it is almost certainly the muscle that induces acetylcholine synthesis in the Schwann cell. The identity of the inducing factor(s) is, here, as elsewhere, unknown.

It is an exasperating fact that while the chemical mediators of induction in embryos remain unknown, most of the known and characterized growth factors discovered through assays *in vitro* have no well established role *in vivo*. The most recently discovered of these factors is a component of the brain and pituitary that causes proliferation of Schwann cells and astrocytes *in vitro*[14]. Brockes has now raised a monoclonal antibody against it, which will make it possible to purify and sequence it; and to discover what, if any, its function is *in vivo*. □

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Solar oscillations

from H.B. van der Raay

KNOWLEDGE of the Sun, our closest star, is based on observations of its surface properties. The temperature, magnetic field and constituents of the outer layers can be deduced by spectroscopy and, combining these data with estimates of size and mass, a model of the Sun's properties can be formulated. The model fits not only the observed surface properties but also predicts interior characteristics such as density and temperature. From these parameters and rates for the nuclear fusion reaction which converts hydrogen to helium and provides the energy output of the Sun the number of solar neutrinos associated with the nuclear burning may be readily found. An experimental verification of the standard solar model thus became possible. Unfortunately, as is well known, the experiment designed to detect these solar neutrinos failed to record the numbers predicted.

An alternative way to probe the solar interior is by the detection of solar oscillations in a manner analogous to terrestrial seismology. The pressure waves associated with the oscillations, especially if of long period, penetrate deeply into the solar interior and convey information about the internal structure. Here again observations and predictions from the standard model appear contradictory. Does this imply that the theory is incorrect or is it the interpretation of the observations that is at fault?

Long period oscillations of the sun were discovered by Birmingham[1] and Crimean[2] groups, working independently, in 1976. Both groups measured the line of sight Doppler shifts of certain Fraunhofer absorption lines and, since observations were made on the integral solar disk, concluded that these observations corresponded to simple radial oscillations of the sun. The measured period of 160 minutes raised an immediate conflict with the standard solar model since if these were simple radial oscillations the longest period predictable was approximately 60 minutes. The Cambridge theorists[3], however, pointed out that the observations could be interpreted in terms of more complex *g* mode oscillations.

Since these early observations, studies of line of sight velocities of the solar surface have continued. The Crimean group have found evidence that the 160 minute oscillation has persisted to the present day

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