

## SURVIVAL

For Cycads to have propagated themselves for over 50 million years, with little change in basic character, is something to be marvelled at. One may speculate on the reasons for this phenomenon. On the basis that the strength of a chain is the strength of the weakest link, it is obvious that the ancestors of modern Cycads had no really weak link, or, if they did, it was compensated for in another direction. This does not imply that there has been no change in the species from one era to another, but that new forms or species have evolved as and when environmental changes created a sufficiently strong stimulus. The stock possessed the genetic factors required for adaptation to the changing environment throughout the long period of survival.

Temperature fluctuation was probably the most testing factor in the earlier phase of survival and species today suffer less permanent damage than most other plants under wide fluctuations of temperature. After the evolution and spread of the grasses and the advent of generally drier conditions within the environment, Cycads were put to the critical test of fire. To meet this new hazard, the stems of *Encephalartos* species already possessed the protection of persistent leaf-bases and scales to a thickness of 1–3 inches. This protective covering has withstood the test of fire periodically for many centuries.

As with many perennial herbs and bulbs in grassland, fire may now act as a stimulus to fresh growth. This is illustrated by an account by Mr. V. L. Pringle of Bedford in the Cape Province:—"I have been very interested this season in the behaviour of the Cycads (*Encephalartos cycadifolius*) which grow in these mountains. In August last year I burnt down some stretches in the mountain which had become overgrown with coarse grass and all the Cycads, of which there are hundreds, had their leaves burnt off. They soon came out in full leaf and are now looking better than ever before—and there is scarcely one in hundreds which has not fruited. I notice that where others grow, which were not burnt, there is no sign of any fruit as yet. The good rains at the end of July might have helped them but it has been dry through September–October–November. The only explanation which I can see is that the burning has stimulated the plants".

Here it may be added that *Stangeria*, which is no doubt similarly responsive to the stimulus of fire, but whose stems do not have the protection of leaf-bases, is restricted to one species with a subterranean stem.

The kernel or endosperm surrounding the embryo has proved poisonous in all species of *Encephalartos* which have been reliably tested. *Encephalartos* is not an exception in the Family in this respect, which suggests that the toxicity of the seed has also had a significant bearing on the persistence of the family throughout the ages.

What may be regarded as a weak link in the life history of the Cycads, at least under South African conditions, is the lack of a real resting period in the seed and its slow germination. If fertilization takes place, the embryo develops slowly and steadily so long as favourable conditions prevail, but it takes a period of six to nine months before the first root appears and two or three months longer before the growth of the first leaf. If, however, any unfavourable circumstance should arise during this period to check the development of the embryo, it is very likely to die.

The succulent tap root of the seedlings seems to be attractive as food for certain animals, such as rodents, for relatively few of the seedlings which do germinate in the wild state, ever reach maturity. On the other hand the possible life-span of individual plants can be reckoned in hundreds or thousands of years, which period should be long enough to ensure some natural regeneration in the absence of interference by man.