which fertilize the ova within 4 h, that is, become functionally capacitated, are those which have lost their acrosomes. Rather, the capacitated sperm must be those in a stage earlier than this terminal state. Electron micrographs have shown that rabbit and hamster sperm in the female genital tract undergo a gradual swelling of the acrosomal cap, followed by a patchy vesiculation between the outer acrosomal membrane and the plasma membrane as the sperm enters the zona pellucida of the ovum[2,6,7]. One or more such subtle changes, invisible by the light microscope, may be the physical basis of capacitation.

Some sperm were capacitated in medium 199 alone, so that follicular factors do not seem to be absolutely essential for the capacitation process; although they may be required to accelerate it, or render it more efficient. We do not know whether this effect occurs by direct action on the sperm, or indirectly by provision of the appropriate environment for an endogenous process. We have observed that sperm collected directly from the epididymis exhibit fairly progressive movement. After 6 h in medium 199, or in follicular fluid, this changes to a bobbing motion of the head. This type of movement is clearly suitable, and perhaps also critical, for zona penetration. Further studies are in progress to correlate this change with the capacitation process.

R. B. L. GWATKIN
O. F. ANDERSEN

Merck Institute for Therapeutic Research,
Rahway, New Jersey.

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Gonadal Development and Reproductive Activity of the Cichlid Fish *Tilapia leucosticta* (Trewavas) in an Equatorial Lake

THE most important external factors that influence gonadal development and reproductive activity are daylength and temperature[1]. In temperate zones both factors show dramatic changes in the annual cycle. In the tropics, daylength shows much less significant variation than it does in the temperate zones and temperatures are generally quite high throughout the year. These variations are even less in the equatorial zone. The most prominent seasonally varying climatic feature is usually rainfall. Its influence on the reproductive activity of tropical fish has not been clearly determined.

Previous studies on the cichlid fishes of the genus *Tilapia* have failed to clarify the role of external factors (particularly rainfall) in their reproduction[2-4] because of insufficient data. A study from January 1968 to April 1969 on the gonadal and reproductive pattern of *T. leucosticta* in an equatorial lake (Lake Naivasha, Kenya) has revealed marked seasonal fluctuation of temperature and sunshine in addition to those of rainfall. July and August are cold months (occasionally temperatures are below 0° C), dry and with least sunshine (computed as mean h/day of maximum sunshine from traces made by a Casella bimetallic actinograph). No brooding females were recovered in these months and both mature males and females had uniformly retarded gonads. Gonadal development and slight breeding activity followed the temperature and sunshine rise in September, though November (with rainfall and poor sunshine) had reduced reproduction.

The period December to March is marked by high temperatures, no rainfall and a sustained rise in the mean hours of maximum sunshine. There is also a simultaneous rise of gonadal development uniformly in all the mature fish of both sexes. This culminates in a sharp annual peak of gonadal development in February and a subsequent one of breeding in late February to early March. Conditions of high temperature and practically no rainfall were repeated in 1968 and 1969, but the sunshine patterns were only available for 1969 in this period. From weather data obtained before and during the study, the period December 1967 to mid-February 1968 was particularly dry and had very high temperatures and almost certainly extended periods of maximum sunshine. This was reflected in a much higher peak of gonadal development in mid-February 1968 than was seen in February 1969. Peak breeding was noticed in late February and early March 1968, coincident with the onset of the rains. Subsequent heavy rains appear to have checked further gonadal development and breeding. In 1969, when conditions of relatively high temperatures and good sunshine prevailed to the end of April (when the study ended), peak breeding was again coincident with the start of the rains, but unusually poor rains resulted in a second peak of gonadal development and reproductive activity in late April 1969.

Good sunlight and high temperatures seem to be essential prerequisites of satisfactory gonadal development in *T. leucosticta* and breeding is stimulated by—but can certainly proceed without—rainfall. Thus *Tilapia* in equatorial ponds enjoying high intensities of both light and temperature have highly stimulated gonads[5] and reproduce continuously[5,6] without rainfall. This study supports the earlier suggestion that both light and temperature are critical in the gonadal development of *Tilapia*[5]. It nevertheless seems that in natural conditions (as against artificial pond conditions) the onset of the rains coincides with the onset of peak breeding where light and temperature had previously stimulated gonadal development. The mechanism whereby the onset of the rainfall can stimulate breeding in *Tilapia* or its adaptive significance remains unclear.

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MOHAMED HYDER

Department of Zoology,
University College,
Nairobi, Kenya.

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Experimental Model for Studying the Effect of Electric Current on Bone *in vivo*

SEVERAL groups have shown[1-4] that electromechanical effects in mineralized tissues are the consequences of a classical piezoelectric phenomenon, when both direct and converse effects are present.

To correlate this biophysical phenomenon with physiological processes, many have tried to study the effects of electric current on bone *in vivo*.