proximately 80 percent the intensity of that coming from above.

The filters in the two duplicate experiments were placed with their planes of polarization perpendicular to each other to unmask any unforeseen influences, such as light reflected within, or leaking into, the experimental box.

When the test cultures that were illuminated with polarized light were inspected 3 days after fertilization, one saw not only a profusion of bipolar forms, but also a striking tendency of the rhizoids to develop horizontally and in the plane of vibration (PP, Fig. 1) of the electric vector. A portion of a shadowgraph of one of the test cultures is shown in the bottom section of Fig. 1. Portions of shadowgraphs of the controls are shown in the top and middle sections of Fig. 1.

A quantitative measurement was then made of the orientation with respect to PP of all the 171 rhizoids developed by 124 embryos that were selected as a representative sample of the two test cultures. The distribution of the angles between these rhizoids and PP showed a single sharp maximum at 0°. Of these 171 rhizoids, 118, or 69 percent, lay within 10° of PP; 167, or 98 percent, within 45° of PP; and none between 80° and 90° of PP. (In a randomly oriented population, 11 percent would lie within 10° of PP, 50 percent within 45°, and 11 percent between 80° and 90°.)

This experiment, in which two cultures were exposed to polarized light, one to unpolarized light, and one to no light, was twice repeated. It was apparent upon inspection that the rhizoids in the two confirmatory experiments showed the same marked tendency to develop in the plane of polarization.

The percentage of bipolar forms was measured in all the cultures. In the six exposed to polarized light, between 27 and 53 percent of the embryos were bipolar; in the three exposed to unpolarized light, between 4 and 12 percent were bipolar; in the three exposed to no light, between 1.3 and 3.2 percent were bipolar.

It would be premature to discuss the relative roles of the light's intensity, spatial pattern, and polarization in effecting the development of these bipolar forms. Nevertheless, the fact that up to 50 percent of these bipolar forms can be produced by some type of temporally constant illumination strongly implies that the polarity of the *Fucus* egg arises epigenetically rather than being determined by the rotation of a preformed asymmetric structure such as the nucleus. These phenomena are being investigated further.

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References and Notes

1. C. M. Child, *Patterns and Problems of Development* (Univ. of Chicago, 1941), p. 423.
2. Prepared from reagent-grade salts of Na^+, K^+, Ca^{++}, Mg^{++}, Cl^-, SO_4^{--}, and HCO_3^- dissolved in glass-distilled water in proportions taken from H. U. Sverdrup *et al., The Oceans* (Prentice-Hall, New York, 1942), Table 35, p. 173.
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Catheptic Activity in Tissues of Tumor-Bearing Rats

If cathepsins play a catabolic role *in vivo,* one might expect in tumor-bearing animals an elevated cathepsin concentration in such tissues as muscle which are undergoing proteolysis, while no increases would be expected in tissues that are enlarging (liver, spleen, and tumor). On the contrary, catheptic activity was found to be increased in the livers of many cancerous rats (*1*). However, these cathepsin assays were conducted at the customary but nonphysiological *p*H of 3.5. In the present study (*2*), cathepsin concentrations of several tissues in normal rats and in rats bearing Walker-carcinoma-256 implants have been measured at both *p*H 3.5 and 7.5.

The cathepsin assay technique employed was essentially the Snoke-and-Neurath (*3*) modification of Anson's (*4*) method. The tissues were homogenized in a glass homogenizer with 5 volumes of 2 percent potassium chloride. (Minced muscle was dispersed in a Waring blendor.) After centrifugation, 2 ml of the resulting extract was added to 5 ml of substrate. The hemoglobin substrates at *p*H 3.5 and 7.5 were Anson's (*4*) substrates for cathepsin and trypsin, respectively. Two-milliliter samples of the digestion mixture were pipetted into 5 ml of 5-percent trichloroacetic acid at 0 and 20 minutes. After the samples had been centrifuged the difference in optical density at 280 mμ of the supernatant solutions of the 0- and 20-minute samples was used as the measure of proteolysis.

Table 1. Cathepsin concentrations of various tissues of normal and tumor-bearing rats. Concentrations are in Anson's cathepsin units $\times 10^3$ per gram of tissue. There were six rats in each group.

Tissue	Assayed at *p*H 3.5		Assayed at *p*H 7.5	
	Normal	Tumor	Normal	Tumor
Liver	0.74	0.89	1.32	1.30
Kidney	0.80	1.36	1.28	1.31
Spleen	2.21	1.78	2.30	1.85
Muscle	0.23	0.26	0.24	0.27
Tumor		0.75		0.76

Table 1 shows the average cathepsin concentrations of several tissues of normal and tumor-bearing rats. The values found at *p*H 3.5 for liver, kidney, and spleen were similar to those of Maver, Dunn, and Greco (*1*) with the exception of an increase in kidney cathepsin in the tumor-bearing rats. Muscle cathepsin of the tumor-bearing rats did not reflect the rapid proteolysis that, presumably, was occurring in this tissue. Surprisingly, the cathepsin levels at *p*H 7.5 were fully as high as those obtained at *p*H 3.5 At this *p*H, there were no differences between the two groups of rats. The cathepsin level in the tumors was found to be intermediate. Recently, catheptic activity was found to increase markedly in spontaneously regressing Flexner-Jobling carcinomas (*5*). This evidence would favor a catabolic role for cathepsins *in vivo.*

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References and Notes

1. M. E. Maver, T. B. Dunn, A. Greco, *J. Natl. Cancer Inst.* 9, 39 (1948).
2. This work was aided by grants from the American Cancer Society and its Iowa Division.
3. J. E. Snoke and H. Neurath, *J. Biol. Chem.* 187, 127 (1950).
4. M. L. Anson, *J. Gen. Physiol.* 22, 79 (1938).
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Rate of Postglacial Rise of Sea Level

The results of careful studies of peat and shell material from Velsen in North Holland reported by van Straaten (*1*), and radiocarbon measurements on this material by deVries and Barendsen (*2*) have led to a fairly adequate knowledge of the approximate sea stand as a function of time for the Dutch coast over the past 8000 years. These authors represent their results by a figure showing radiocarbon age of shell and peat versus depth of the sample horizon relative to the present strand line. The same is shown in this report (*3*) in Fig. 1; we have added measurements from other localities for comparison. Most of the added measurements were made by the Magnolia Petroleum Laboratory, Houston, Tex., on material that was obtained from bays, barrier islands, and the continental shelf of the Texas and Louisiana coasts (*4*). The sources of other dates are indicated in the figure caption.

With the exception of several dates that were determined by the Lamont Geological Observatory, the measurements appear to show approximately equal rates in the rise of the sea level at