Nevertheless, Giegengack and Grauch state that "almost nothing is known of the chronology of climatic change at latitudes of 8°45′ (north or south) anywhere in South America." Presumably, this relative lack of information also qualifies Giegengack and Grauch's arguments. A study of the glacial geology of the upper Santo Domingo River valley, which was in preparation at the time our report was being written (*1*) and which is now in print (*9*), has produced good evidence for correlating at least the last glacial retreat with that of the Sabana de Bogotá and other areas in the Cordillera Oriental of Colombia (*4, 7*). Radiocarbon dates (Table 1) performed on samples from two profiles of highly carbonaceous sediments within the Victoria morainal loop (probably representing glacial lagoon deposits), *overlying* fluvioglacial deposits and *underlying* the present soil, indicate that the glaciers had retreated before about 9000 years ago and represent a minimum age of the moraine.

In the Cordillera Oriental of Colombia, the lowest Würm Glacial snowline reached an elevation of about 3200 to 3000 m (*4*, p. 306). Valley glaciers probably advanced to lower elevations, and morainal remains were found at approximately 2700 m. This is almost exactly the situation found in the northern flank of the Sierra de Santo Domingo. Above 3000 m, glacial features in the Sierra de Santo Domingo (as around the Sabana de Bogotá) are well developed and fresh. These data also support our conclusion that Late Glacial events in the Venezuelan Andes may be correlated with those in the Cordillera Oriental of Colombia.

Undoubtedly, the Quaternary tectonic history of the upper Santo Domingo River valley is more complex than that outlined in our report (*1*), Giegengack and Grauch's comment, and this reply. There is, however, good reason to conclude that right-lateral strike-slip movement along the Boconó fault was predominant at least in postglacial times and that it is probably related to the interaction between two major lithosphere plates (Caribbean and Americas plates). This conclusion, and that concerning the probable rate of movement, remained unchanged.

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Endothelial Projections in Schlemm's Canal

Smith, Ryan, Michie, and Smith (*1*) reported finding endothelial projections on the endothelium of dog pulmonary artery. They comment, "the size and density of the projections suggest that they may function to direct an eddying flow of plasma along the endothelial surface."

In an ongoing study of more than 50 human eyes, I have noted such projections on the endothelium lining Schlemm's canal. Aqueous humor leaves the eye via the trabecular meshwork and canal of Schlemm to drain into the blood stream. As noted by Smith *et al.* (*1*) the endothelial projections are 0.2 to 0.8 μm in average size with a range from 0.1 to 0.5 by 0.5 to 3.0 μm. Figure 1 is a composite scanning and transmission electron microscopic view of these projections. These projections are of general interest in that there is little, if any, flow along the length of Schlemm's canal, and the protein content of human aqueous humor is 50 mg/100 ml (*2*) compared

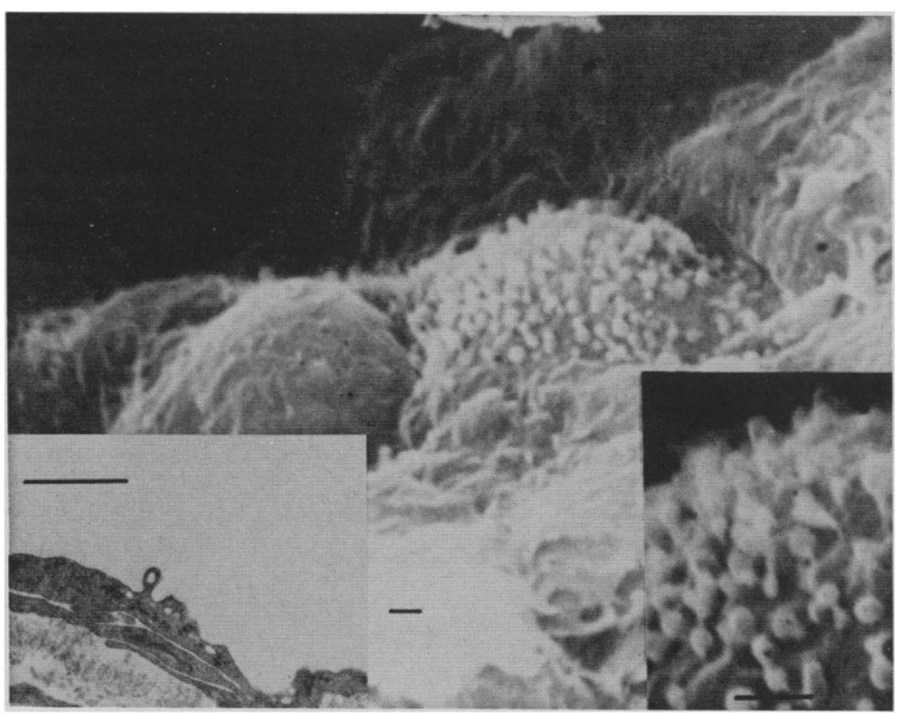

Fig. 1. Schlemm's canal from a 74-year-old man with normal eyes. The tissue was fixed in formalin and osmium tetroxide, prepared in a Pearce tissue drier, and examined in a Cambridge stereoscan microscope. The marker indicates 1 μm. The background view is looking into the canal, which was cut along its longitudinal axis. The trabecular meshwork is below. The projections are about 0.2 by 0.8 μm in size. They are more numerous on the endothelial cell in the center than on the others in the field. Also seen are 0.2 μm openings in the endothelial cells to the right and in the background. In the upper portion, some of the projections are caught in relief demonstrating their bulbous shape. The insert on the lower right is a higher magnification view of the central cell. To the left is a transmission electron microscopic view of a projection showing a micropinocytotic vesicle within it.

to 7000 mg/100 ml in human plasma (*3*). The flow of aqueous humor is across the lumen, from inner to outer wall. The inner wall has openings that are 0.1 to 1.0 μm in diameter, the outer wall has large openings up to 80 μm which lead to the veins in the episclera.

With these facts in mind, perhaps what has been seen in both dog artery and human canal of Schlemm is a structure common to many endothelial cells. These projections may take part in the exchange of fluid across the endothelial cell by increasing surface area, rather than having an effect on the longitudinal flow of fluid. Their frequency was much greater in the dog pulmonary artery than in the Schlemm's canal in the human, which might relate to a more rapid rate of flow of fluid across the endothelial wall in the lung than in the eye.

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Stability of Enriched Aquatic Ecosystems

In a recent report (*1*) Rosenzweig has suggested, on the basis of several mathematical two-species interaction models, that undesirable "instability should often be the result of nutritional enrichment." Although his arguments may confirm this prediction in the case of his two-species model, the extrapolation of his prediction to natural ecosystems appears to us unwarranted, both on experimental and on other grounds.

During the past year we have been engaged in adding 100 tons (90 metric tons) of fertilizer to a 12,000-acre (4,850-hectare) oligotrophic lake (mean depth, 200 m) located on Vancouver Island. Nutrients were added in solution at a rate of 5 tons per week from June to October 1970. Detailed results of the effect of this addition will be reported elsewhere (*2*), but the essential features of our experiment will be given here because they demonstrate a beneficial effect of nutrient enrichment in contrast to Rosenzweig's generalized conclusion.

The rate of nutrient addition to our lake was calculated, from phytoplankton growth rates of the natural flora, to produce an effect equivalent to a doubling of the standing stock of phytoplankton every 7 days. The total annual input of nutrients was further adjusted to double the amount of available inorganic nitrogen in the euphotic zone and to increase the amount of available phosphate by a factor of about 5; with these additions the natural ratio of nitrogen to phosphorus in the lake water was changed from approximately 70 : 1 to 30 : 1. Our purpose was to increase the productivity of the natural flora and fauna in the lake but to avoid a condition of undesirable eutrophication or a change in the diversity of food organisms leading to the production of up to 4×10^6 to 8×10^6 sockeye salmon less than 1 year of age in the lake. These objectives were substantially achieved in that the water clarity throughout the period of enrichment remained little changed (the secchi disk disappeared from view at a depth of water of 11 ± 2 m), the standing stock of primary producers remained unchanged (chlorophyll a, 0.4 ± 0.2 mg/m^3) except for a brief period immediately after the first addition of nutrients in June 1970, and the species composition of the zooplankton was little affected. However, the rate of primary production was at least double that recorded in 1969, the year before fertilization, and the standing stock of zooplankton was increased by a factor of about 8. The mean weight of the fish increased by approximately 40 percent as compared with values for the previous year (*3*). Thus it has been possible to enrich artificially a large body of water without causing either undesirable eutrophication or the elimination of species as suggested by Rosenzweig (*1*). The principal food organisms selected by the young salmon were as follows: *Epischura* (June to August 1970), *Holopedium* (September 1970 to February 1971), and *Bosmina* (March to May 1971). The salmon's ability to feed on each of these species was in itself a negation of Rosenzweig's prediction, since, in spite of increased production, trophic stability was maintained in that the diversity of food organisms was substantially the same before and after nutrient enrichment.

Quite apart from our own experiment, natural enrichments of aquatic systems occur throughout the world and these result in higher productivity. Upwelling along the Peruvian coast and in the Antarctic are two outstanding examples of natural enrichments.

A modified version (*4*) of an existing model (*5*) was used to compute sequences of stocks and production of phytoplankton and zooplankton occur-

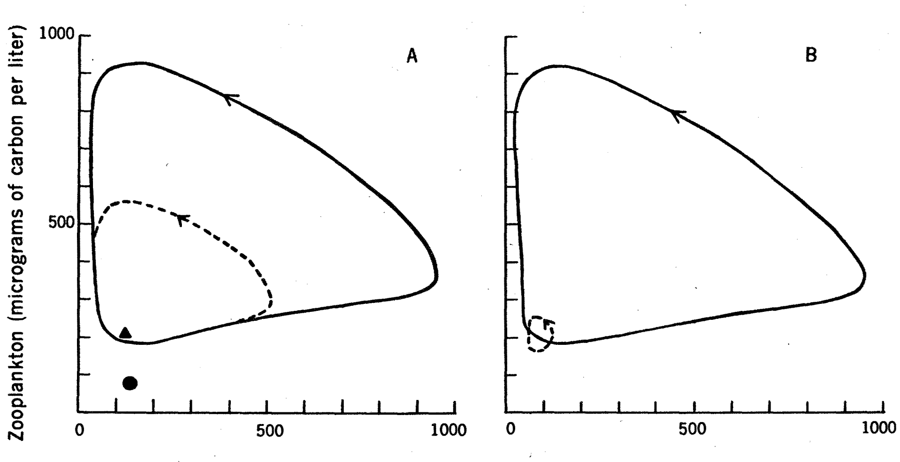

Fig. 1. Zooplankton concentration as a function of phytoplankton concentration through steady-state oscillation. For (A), k is equal to 14 percent per day and r is equivalent to a doubling time of 3 days. Phosphate concentrations ($\times 10^{-6}$ gram atom of phosphate phosphorus per liter) are as follows: (solid circle) 0.4; (triangle) 0.8; (dashed line) 1.2; (solid line) 1.50. For (B), the phosphate phosphorus concentration is 1.5×10^{-6} gram atom per liter and r is equivalent to a doubling time of 3 days. The values of k are: (solid line) 14 percent per day; (dashed line) 22 percent per day.