anxiety or in the aversiveness of ambient noxious stimuli. This hypothesis (*1*) can be reconciled with many observations about essential hypertension (*26*).

B. R. DWORKIN
R. J. FILEWICH
N. E. MILLER
N. CRAIGMYLE

Rockefeller University, New York 10021

T. G. PICKERING

Cardiovascular Hypertension Center, New York Hospital–Cornell Medical Center, New York 10021

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13. The attenuation of this reflex indicates the extent of the denervation [H. S. Smyth, P. Sleight, G. W. Pickering, *ibid.* **24**, 109 (1969)].
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15. A hole was made in the skull by using a dual-bar Kopf stereotaxic instrument with the incisor bar at 10.00 mm. A stainless steel Formvar-insulated electrode 0.0127 cm in diameter with 0.5-mm exposure at the tip was entered at an angle of 9° anterior from vertical to prevent cerebellar damage, with deGroot coordinates 1.3 mm anterior-posterior and 2.4 mm lateral [L. J. Pellegrino and A. J. Cushman, *Stereotaxic Atlas of the Rat Brain* (Appleton-Century-Crofts, New York, 1967)]. As the electrode was lowered during implantation, under light anesthesia, a suprathreshold current was passed at various depths within the nucleus (8.3 to 9.0 mm from the incisor bar). At the point of the largest algesic response, the electrode was cemented in place. Scalp retraction, drilling of skull holes, and so on, were accomplished under deep anesthesia. Rats will learn to run, press a lever, or stop drinking (even though water-deprived for 24 hours) to escape from 20- to 45-μA stimulation, and higher intensities elicit nonperseverating squeals, activity, and freezing. Trigeminal nucleus stimulation is similar to foot or tail shock, but gives closer control of the stimulus parameters and relatively constant thresholds.
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18. Phenylephrine concentrations were 3.0 or 5.0 mg/ml; a bolus was 2.0 to 8.0 μl.
19. Randomization test for matched pairs, two-tailed, $N = 10$.
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12 February 1979; revised 30 April 1979

Floras and Oxygen

McLean (*1*, p. 1061) claims that "the importance of terrestrial plants in the overall world productivity in the geologic past has not been recognized" in earlier papers on the control of atmospheric oxygen, and that this greater primary productivity means that the control of the partial pressure of oxygen must occur predominantly on land. The first claim is false (*2*, *3*), and the second is inadequately supported.

Like some earlier investigators, McLean fails to consider the necessary (*3*) concentration-dependent regulation of oxygen. Photosynthesis, like any reaction, produces no net change in oxidation. Almost all the oxygen from photosynthesis later reoxidizes the carbon reduced photosynthetically. Any net change in free oxygen is equal to the difference between the amount of reduced carbon buried and the amount of previously buried carbon that is oxidized. (Other reactions are coupled to this or are now minor.) The way in which the regulation occurs is not yet clear in detail, but most nonephemeral reduced carbon is deposited in ocean sediments. Much of this reduced carbon comes from the land. Therefore, to the extent that regulation of free oxygen occurs by way of the deposition of reduced carbon, we must look to marine processes. Even a sudden excess deposition of 10^{12} metric tons of reduced carbon in coal swamps left by a retreating sea would decrease the partial pressure of oxygen by less than 0.0005 atm. To the probably smaller extent that regulation occurs by erosion, by oxidation of detrital carbon before it is redeposited, we must look primarily to the continents. But McLean's argument is irrelevant to either case. With respect to regulation, we must focus on the sinks of free oxygen rather than on their sources.

With respect to temporary changes in free oxygen, an increase in land area by eustatic regression should give a somewhat greater net input after the reoxidation of unburied carbon. However, regression would also increase erosion and therefore the amount of previously buried carbon available to be reoxidized. From the inadequate data I know, either effect might predominate.

LEIGH VAN VALEN

Department of Biology, University of Chicago, Chicago, Illinois 60637

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12 June 1978; revised 10 April 1979

0036-8075/79/0921-1301$00.50/0

Van Valen's first point is incorrect. Neither he (*1*) nor Ryther (*2*) discussed terrestrial plant productivity of the geologic past per se.

By "control" (*3*) I imply the "power to guide or manage" (Webster) and suggest that dominant land productivity has exerted control on atmospheric CO_2/O_2 ratios over the late Phanerozoic. Transport of reduced carbon and its history relating to marine "sinks" hinge upon the dominant land productivity that "controls" the amount of reduced carbon accumulating in the sinks. The predominance of land-derived particulate organics over marine-derived particulate organics in many marine rocks is well known. Times of maximum land exposure, and thus maximum land productivity, would be times of maximum transport and burial of terrestrial organics, causing imbalance in the carbon burial-weathering cycle and fluctuations in the atmospheric partial pressure of oxygen (pO_2).

Van Valen's (*1*) concentration-dependent regulation of oxygen (CDRO) lacks confirmation from the geologic record; Tappan's (*4*) work on pO_2 versus photosynthesis levels suggest that pO_2 may have fluctuated substantially at times; analysis of her work is basic to an evaluation of the CDRO.

Although most plant materials (cellulose, other polysaccharides, and lignin) often decompose quickly as a result of biological and chemical attack, vast amounts of sporopollenin (oxidative copolymers of carotenoid or carotenoid esters bound together in a matrix, or both) (*5*) in the reproductive spore walls of most modern and fossil vascular and nonvascular plants survive transportation and burial, and even recycling from older into younger sediments (*6*). Chemical maceration of many Precambrian and younger sediments indicates the vastness of this organic carbon reservoir that has remained unoxidized since formation.

Relatively slow regressional rates would allow terrestrial ecosystems to migrate with regressing seaways, stabilizing the lands and preventing massive erosion and consequent exposure of much reduced carbon to oxidation. Even the late Maestrichtian regression, which was ten times the general rate (*7*), was only 800 km per million years.

DEWEY M. MCLEAN
Department of Geological Sciences, Virginia Polytechnic Institute and State University, Blacksburg 24061

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26 June 1979; revised 27 July 1979

An Adaptation of the Jet Stream Microelectrode Beveler

The jet stream microbeveler reported by Ogden *et al.* (*1*) provides an easy and elegant way to bevel ultrafine glass microelectrodes for the injection of substances into cells. We have adapted their design to bevel electrodes used in dye injection and voltage clamp experiments in *Limulus* ventral photoreceptors, and we report a modification of their apparatus that is particularly simple and easy to use.

Abrasive particles (120-grit silicon carbide from Buehler Ltd.) (*2*) were washed and placed with a spin bar and saline solution in a small beaker above a magnetic stirrer. Electrodes (*3*) were lowered into the saline in the upper part of the beaker at an oblique angle and beveled to the desired impedance (*4*) by swirling the abrasive solution. This method provides good electrical contact and continuous control of the beveling rate (governed by the speed of the stirrer) while eliminating the need for a source of pressure and large volumes of fluid. Electrodes beveled by these means were found to have a true bevel with tips a few tenths of a micrometer in diameter as determined by transmission electron microscopy.

D. WESLEY CORSON
STEVEN GOODMAN
Laboratory of Sensory Physiology, Marine Biological Laboratory, Woods Hole, Massachusetts 02543
ALAN FEIN
Laboratory of Sensory Physiology, Marine Biological Laboratory and *Department of Physiology, Boston University School of Medicine, Boston, Massachusetts 02215*

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3. We regularly bevel conventional (20- to 40-megohm, 2.5*M* KCl) and dye-filled (100- to 300-megohm, 200 m*M* phenol red) electrodes, using the beveler.
4. We are able to continuously monitor the impedance of the electrode by placing it in an active bridge circuit. We find it convenient to lower the impedance of the KCl-filled electrodes by a factor of 2 to 3. The dye-filled electrodes usually need more beveling, and their impedance is typically reduced by a factor of 3 to 5. When the desired impedance is attained, we can rapidly stop the beveling by switching off the stirrer.
5. Supported by grants from the National Institutes of Health and the Rowland Foundation.

8 June 1979