such as mild burning, light pain, or fullness, associated with urination or ejaculation. It is equally possible that such afferent impulses may be of significance in relation to micturition and ejaculatory reflexes. In males, the presence of specialized receptors in the prostatic region is of considerable interest since these receptors perhaps could serve to coordinate the seminal emission and ejaculatory mechanisms. Since this would not apply in females, perhaps reflexes relating to emptying the urethral contents might be involved.

However, since the cells also resemble some long-necked "goblet" cells, it is also reasonable to regard the epithelial cells under consideration as possibly serving some effector function, such as the selective elimination of some product of nerve metabolism, the release of some secretory product, or the performance of special resorptive duties relating to the nerves. It is of some importance to speculate upon these possibilities, but the mere description of the cells and their regional location justifies only mentioning them as useful clues for further investigation.

This discussion of the possible functional significance of the described neuroepithelial cells presents numerous problems that are yet subject to further study and clarification. The newly demonstrated cells are characterized by their positive reaction for cholinesterases, their typical unicellular neuroepithelial morphology, their anatomical relations to the pelvic nerve plexus, and their internal regional localization in the urethra and urogenital junction (*12*).

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Eye Movements during Active and Passive Dreams

Abstract. Independent confirmation is offered that the amount of rapid eye movement during dreaming is associated with the dream content.

It is now recognized that there exist two different and alternating categories of sleep. One has been called "hind-brain sleep" by Jouvet (*1*) and is accompanied by a low-voltage and fairly fast electroencephalographic (EEG) pattern, relaxation of certain neck muscles in cat (*1*) and human (*2*) and, perhaps most strikingly, by bursts of conjugate, rapid eye movements with subsequent recall by the subject that he has dreamed (*3*). Dement and Wolpert (*4*) reported evidence supporting their hypothesis that these eye movements were directional responses to the events of the dream. Yet rapid eye movements persist in cats after decortication (*1*). Also the fact that characteristic saw-toothed electroencephalographic waves tend to precede each burst of rapid eye movements appeared to us to cast doubt on the hypothesis; the presence or absence of these eye movements during "hind-brain sleep" of blind men, according to the retention or absence, respectively, of visual imagery (*5*), would support the hypothesis. One of us (*6*) has criticized Dement and Wolpert's report but is now pleased to report confirmation of one of their findings, namely a relation between profuse eye activity and an active dream fantasy.

One of us (R.J.B.), for an entirely distinct purpose, awakened eight volunteers from periods of rapid eye movement on 103 occasions during 37 nights. Dream recall occurred in 89 instances and was recorded on magnetic tape. The dream reports were subsequently all presented to the other of us (I.O.), who had never been present during the nocturnal recording sessions and who had never seen the relevant electroencephalographic or eye movement records. He classified the dream reports as "active" or "passive" according to the nature of the events described, and especially if he felt such events would have been accompanied by many shifts of gaze, had they occurred in real life.

Subsequently R.J.B. assigned code numbers to each electroencephalographic and eye movement record and presented each to I.O., who was entirely ignorant of the dream to which each record was related and distinctly skeptical of the likelihood of the association eventually found. The eye movement periods were classified by I.O. as "active" or "passive" according to the frequency and size of the eye movements which occurred throughout each 10 to 20 minute period prior to the time the subjects had been awakened, although the later in the period the movements did or did not occur, the greater the weight he attached. The whole set of records was then inspected again in a different order by I.O. and classified a second time. R.J.B. then selected the records of the 22 instances where divergent judgments had been made, and I.O. made a final classification of these periods of rapid eye movement.

The code was then broken. Fifty dream reports had been classified as "active" and in 42 instances the relevant period of rapid eye movement had been judged "active." Thirty-nine reports had been classified as "passive" and in 23 instances the relevant period was judged "passive."

It is therefore confirmed that there is a significant association ($\chi^2 = 16.18$; $P < .001$) between the nature of the dream content and the amount of movement of the eyes.

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Antarctic Peninsula Traverse

A 1700-km oversnow traverse was conducted in the Antarctic area south of the Bellingshausen Sea and George VI Sound from 30 November 1961 through 5 February 1962 for the purposes of (i) investigating the surface and bedrock topography by geophysical means and (ii) performing associated geophysical, geological, and glaciological studies (*1*). The route is shown in Fig. 1. Since the area covered was about 2600 km from the main United States base at McMurdo Sound, logistic support proved very difficult, but was capably carried out by the U.S. Navy and Air Force. The party traveled in

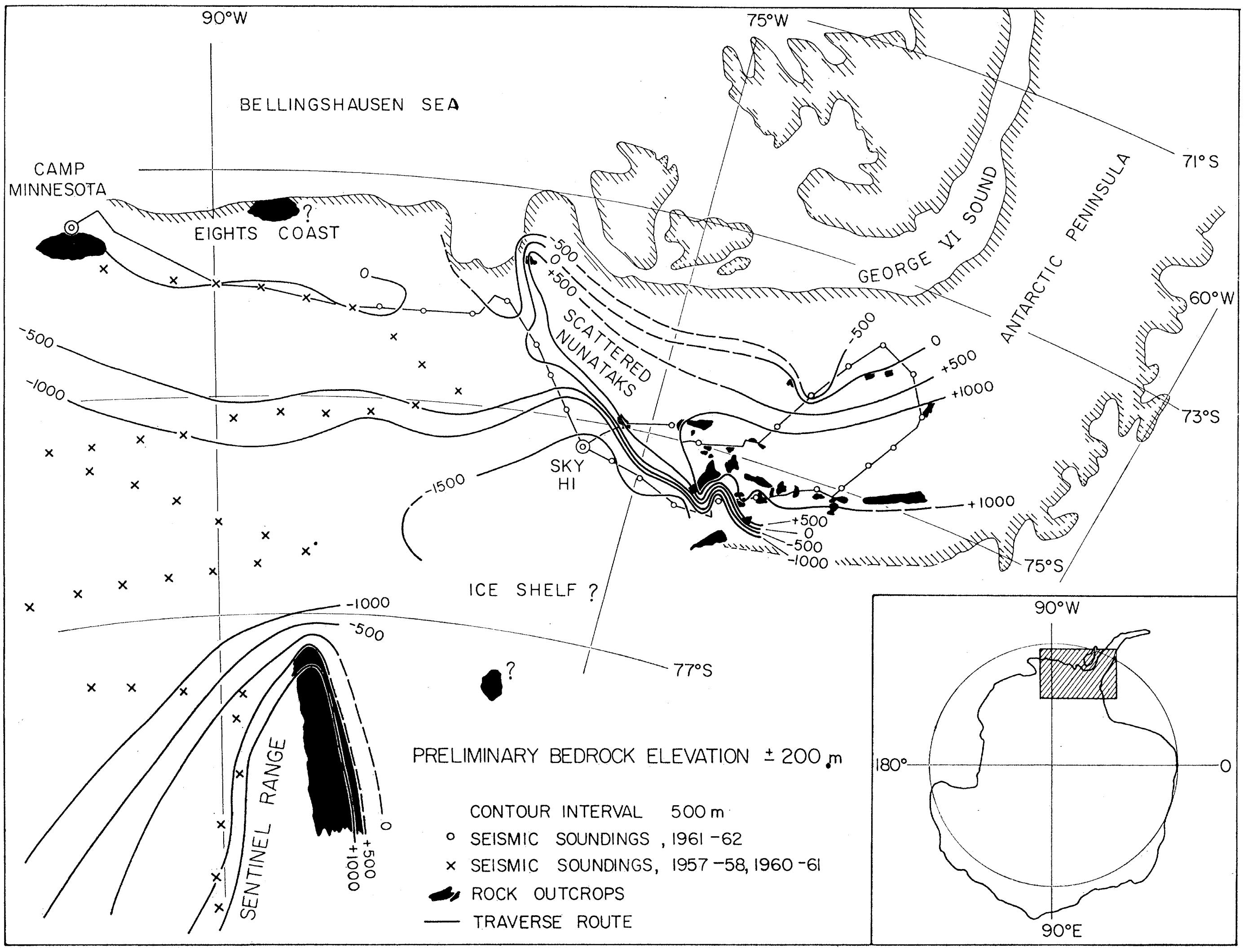

Fig. 1. Bedrock elevation map showing locations of seismic soundings and rock outcrops.

three Sno-Cats delivered by air to Camp Minnesota, the terminus of the Ellsworth Highland Traverse (1960–61). Supplies and fuel were replenished in December at Sky-Hi, a small scientific station of the U.S. Antarctic Research Program; the party returned to this point at the termination of the field season.

Although data reduction and analysis are just commencing, several significant results are already apparent. Reflections from bedrock at the base of the ice sheet were obtained at 26 locations (Fig. 1). Eleven mountains and nunataks were visited, and geologic specimens were collected. Extensive mountains exist in areas previously unexplored; some of these mountains are those shown farther south on existing maps. The outcrops indicated by question marks have been seen from the air but their exact location is uncertain. Preliminary data with an estimated accuracy of only ± 200 m were used for the bedrock elevation. Reflection stations from the Ellsworth Highland and Sentinel traverses (*2, 3*) were used in the western area.

Figure 1 shows that the Antarctic Peninsula and its southern extension appear to be an island separated from the Sentinel Mountains to the south by a deep sub-sea-level area. This depression is a continuation of Byrd Basin (sub-glacial) to the southwest and probably extends south and east to the Filchner Ice Shelf. If the ice were removed, the Ross and Weddell seas would be connected by this channel. The base of the Antarctic Peninsula may be only about 200 km across, instead of about 400 km as shown on existing maps. The subglacial rock surface south of George VI Sound is high and rugged, rising to the south where mountains project through the ice. In the area south of Eights Coast the rock surface is generally about at sea level.

The snow surface is lower than 500 m above sea level in the area between the Sentinel Mountains and the southern extension of the Antarctic Peninsula, as measured during air reconnaissance of the area preparatory to the traverse. The snow surface south of the Eights Coast is about 1000 m in elevation and rises to over 2000 m in the area north of the mountains and east of Sky-Hi.

There is a transition in geology from the volcanic rock previously reported in the Jones Mountains at Camp Minnesota (*4*) to an assemblage of intrusive, extrusive, metamorphic, and sedimentary rock in the mountains east of Sky-Hi. Samples of fossiliferous marine sandstone were collected at one location. The wide variety of rock types and the almost continuous line of mountains extending north and east as seen on flights and on the ground indicate a general lithologic and structural relationship to the mountains of the Antarctic Peninsula farther north.

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12 April 1962

Action Spectrum for Developmental Photo-Induction of the Blue-Green Alga Nostoc muscorum

Abstract. The dark-grown cyanophyte requires a brief exposure to light from the 650 mμ region of the spectrum before it can complete its developmental cycle. Induction is reversed by exposure to green light. A blue protein, presumably allophycocyanin (absorption maximum, 650 mμ) has been demonstrated in aqueous extracts of the cyanophycean cells.

The photosynthetic, filamentous blue-green alga *Nostoc muscorum* A can be grown in complete darkness with either glucose, sucrose, or fructose as a carbon source (*1*). In darkness, this microorganism grows slowly as a mass of undifferentiated cells. These cells occur as a transient phase of development during normal growth in the light and are termed the aseriate stage. When dark-grown cells are exposed to weak illumination, differentiation occurs, resulting in the synchronous development of specialized cells and filaments as well as a greatly increased rate of growth (*2*). The finding that a short exposure to weak white light produced development during a subsequent dark period was interpreted as evidence of a nonphotosynthetic process (*3, 4*).

This conclusion has been substantiated by determination of the spectral requirement for developmental induction. For this determination, homogenized, washed suspensions of *Nostoc muscorum* A trichomes were seeded in modified Fogg's medium (*3*) containing 1 percent sucrose and 0.9 percent agar and then poured aseptically as thin layers into Carrel flasks. Aseriate microcolonies were allowed to develop in complete darkness in a moist chamber at 24°C for 10 to 15 days. At the end of this period, the flasks were loaded in darkness into individual light-tight boxes which could be used for exposing the aseriate microcolonies to measured quantities of light energy at different wavelengths.

Each box was equipped with a holder for optical filters, a device for positioning the Carrel flask, and a mirror which could serve in one position as a shutter and in the other position as a means to direct light toward the seeded agar. Each box was fitted with a removable back which could be replaced with a thermopile for measuring intensity of light energy. The response of the thermopile, calibrated in microwatts per square centimeter, was obtained on a recording instrument after amplification. The operation and design of this apparatus was modified from the system described by Jaffe (*5*).

Wratten and Corning cut-off filters were used in preliminary experiments. Schott interference filters were used to obtain data for the final action spectrum. Light intensity could be controlled by means of a transformer in series with the incandescent light source or by means of neutral density filters.

After exposure, the Carrel flasks were incubated in complete darkness for 4 days. The potency of each exposure was determined from a differential count of the developing microcolonies and the aseriate microcolonies in each flask. The potency was scored as percentage development of microcolonies from a total count of 80 to 100 microcolonies in each flask. Table 1 shows that percentage development of microcolonies is roughly proportional to the intensity and the duration of exposure to red light.

Table 1. Relationship of duration and intensity of illumination to development of microcolonies. Carrel flasks containing seeded agar were incubated 15 days in darkness prior to exposure, and 4 days in darkness after exposure. The primary light source was a water-cooled tungsten lamp. The infrared component was removed by filtering through ferrous sulfate solution. Schott interference filters were used to produce light of different wavelengths.

Time (min)	Intensity (μw/cm^2)	Development (%)
	Wavelength 658 mμ	
0	0	0
2	26.5	15
5	26.5	23
10	26.5	69
20	26.5	100
	Wavelength 615 mμ	
20	0	0
20	6.5	8
20	13.0	31
20	26.0	63

The action spectrum for photoinduction of development (Fig. 1) displays a single sharp peak of activity at 650 mμ. At this wavelength 1.6×10^5 ergs of light energy were required for 50 percent induction in the system employed. The 650 mμ peak does not coincide with the absorption maxima of any of the major photosynthetic pigments which are present as abundantly in the dark-grown as in the light-grown cells of *Nostoc muscorum* A (*4*). Photosyn-

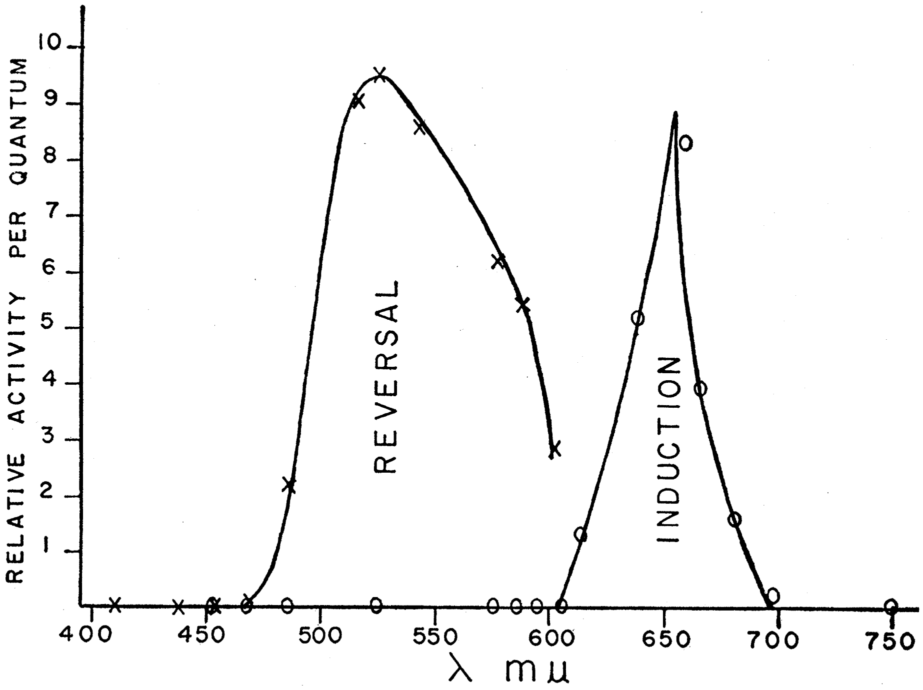

Fig. 1. Action spectra for developmental photocontrol. Circles, Developmental induction in seeded agar after exposure to a light intensity of 25 μw/cm^2 for 10 minutes. X's, Reversal of developmental induction. After exposure to a saturating dose of active red light, flasks were re-exposed at an intensity of 38 μw/cm^2 for 10 minutes.