for all wave-lengths greater than .4 $\mu$ so that the second order ultra-violet might not overlap the continuous spectrum. The spectrum of the Nernst glower was too weak to affect the plates at .325 $\mu$ in the first order, and could not therefore have produced any effect below .650 $\mu$ by the overlapping of the second order. A 75-second exposure was usually given to the spark, then the screen was removed and a one-minute exposure given to the spectrum of the Nernst glower. The spark terminals were made very broad and chisel-shaped and their edges were placed parallel to the slit, a considerable length (about a centimeter), of which was thus illuminated. A large Leyden jar was connected across the spark gap.

An ingenious form of cell for holding the absorbing liquids is described in full. By means of it a wedge-shaped film of liquid was confined between quartz plates which could be set at any desired angle to each other and at any distance apart up to 6 mm. When properly placed before the slit the light coming to each successive point of the slit came through successively increasing thicknesses of the dye. Three exposures were usually made on each plate, their edges nearly in contact and the angle of the wedge and its position at each exposure was such that the three photographic strips showed, from the top of the first to the bottom of the last, the effect of a continuously increasing thickness of the absorbing film. The thickness at one edge was zero and at the other usually about .25 mm., although the thickness at the thicker edge varied over a considerable range.

The authors have anticipated the chief criticisms which might have been advanced against the book. In stating their "chief object" they disclaim any intention to attempt quantitative measurements or to make an exhaustive study of all known dyes. They have certainly investigated "a reasonably large number of compounds." Their statement that "only aqueous solutions of the aniline dyes have been investigated up to the present time" leads us to hope that the investigation will be continued both for other solvents and for other dyes, including some of the very important new photographic dyes which are not in their present list.

No attempt has been made to give to a high degree of exactness the positions of the absorption bands, and it is doubtful if either this or the relative strengths of the absorption bands could have been found satisfactorily with the commercial plates used. And it is perhaps because no attempt in this direction was intended that no data are given as to time of development, temperature of developing bath, etc.—nor are we told whether or not any attempt was made to secure uniformity in these respects.

The authors give ample warning that the photographic minimum in the Seed plates used may produce apparent absorption in the green. Without doubt there is much of interest in the red of many of these dyes, and it is to be regretted that the authors did not make use of some of the modern methods of plate bathing, or even of some of the later plates now obtainable commercially, both to secure a more uniform photographic sensitiveness throughout the spectrum, and to extend the observations into the red. As they point out, however, the slope of the limiting line at the red end of their plates indicates whether or not an absorption band is present in that region.

The book is very well printed and the plates seem to be excellent, although they do not seem to show all that may be seen on the original negatives, as is evidenced by a comparison of the tabulated data of some of the figures with the figures themselves, *e. g.*, in the case of potassium permanganate, Fig. 75, we are told that the negative shows seven absorption bands in and near the green. Only five of the seven can be detected in Fig. 74. The absence of typographical errors is noticeable. Under Fig. 99, however, we are referred to page 169, instead of, evidently, page 59.

Henry G. Gale
Ryerson Physical Laboratory

## *SOCIETIES AND ACADEMIES*

### THE OREGON STATE ACADEMY OF SCIENCES

The third annual meeting of the Oregon State Academy of Sciences was held at the

Oregon Agricultural College on January 17 and 18. Four sessions were occupied in the presentations of papers.

A reception was given to the academy members by the faculty of the Oregon Agricultural College on the evening of the seventeenth.

Papers were presented as follows:

"South African Flora," by Mary F. Farnham.

"Oysters in Oregon," by A. R. Sweetser.

"Future of Mining," by A. C. Terrill.

"Space and Number Systems," by H. B. Leonard.

"Theory of Electrons," by L. A. Robinson.

"Surface Tension applied to Ore Dressing," by H. M. Parks.

"The Birds of the Three Arch Rock Regions," by Wm. L. Finley.

"Apple Tree Anthracnose," by C. C. Cate.

"Notes on Trichoptera," by Annie Laura Hill.

"The Tides," by J. D. Lee.

Officers for the ensuing year were elected as follows:

*President*—A. R. Sweetser.

*First Vice-president*—A. T. Bohman.

*Second Vice-president*—A. B. Cordley.

*Recording Secretary*—C. E. Bradley.

*Treasurer*—C. O. Chambers.

*Trustees*—Dr. J. Withycombe, T. C. Bridwell and P. L. Campbell.

*Librarian*—A. W. Miller.

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THE ANTHROPOLOGICAL SOCIETY OF WASHINGTON

THE paper of the 412th meeting was by Dr. George Byron Gordon, Free Museum of Science and Art, Philadelphia, on "An Ethnological Survey of the Kuskokwim River, Alaska." Dr. Gordon said that in continuation of his Alaskan explorations begun in 1905 he visited during the summer of 1907 the region of the upper Kuskokwim River, and embarking on that stream, descended its whole length to the mouth in Bering Sea. The upper river for 200 miles he found to be untenanted by man, and it appears that there is a corresponding scarcity of animal life. The first habitations reached were abandoned, and in one house five dead bodies were lying as though overtaken with a sudden pestilence, and later it was ascertained that virulent pneumonia had swept the valley, almost exterminating the natives. Lower down the river an uninhabited village was reached, and Dr. Gordon observed that the people were of Eskimo type, but spoke a Tinne Indian dialect. Their houses are of logs, stood up in arch-shape and covered with earth. Assembly or club-houses of large size exist here, and there are numerous caches, graves and salmon-drying racks. The caribou, on which the natives depended, have left their former range and do not now visit the Kuskokwim. Dr. Gordon visited the Eskimo village at the mouth of the river and secured photographs, measurements and other data concerning the people. The inroads of disease among the natives, says Dr. Gordon, are frightful, and in a few years it is possible that the inhabitants of this region will be exterminated by maladies introduced by whites. Dr. Gordon said, in answer to a question by Mr. Robinson, that the timbers of the old houses on the upper Kuskokwim had been cut with ivory and stone tools. The discussion of Dr. Gordon's highly interesting paper was participated in by Messrs. Heye, Robinson, Hrdlicka and others.

WALTER HOUGH,
*General Secretary*

THE PHILOSOPHICAL SOCIETY OF WASHINGTON

THE 642d meeting of the society was held on January 4, 1908, President Bauer in the chair.

By invitation, Mr. Percival Lowell read a very interesting paper on the subject of "The Recent Discoveries at Flagstaff in Saturn's Rings." In June, 1907, a new phenomenon was observed in Saturn's rings, at Flagstaff. At this time the plane of the planet's rings was directed towards the earth and the interesting thing was the band. The dark chord or core seen in the band at this time was the phenomenon that had not been previously known or observed. The same phenomenon was again seen in October last by all of the observers at Flagstaff, and careful measurements were made of the band, the dark medial chord and of the positions (in terms of the planet's radius) of the several luminous appendages.

It was shown by the speaker that the observed width of the band was too great to be explained by the rings' shadow or by their penumbra and it was stated that its width could be accounted for by supposing the existence of matter outside of the plane of the rings, or in effect by tores or thickenings of the rings; the dark medial core of the band being the projection of the ring proper. It was explained in what way the tores could have been produced and in what part of the rings they should occur. In this connection it was shown how the separations of the rings were produced by the planet's satellites; and it was stated that one should expect that the tores should occur just inside of the paths of the satellites. By observation the tores were found to be just where celestial mechanics would put them under the disturbing influence of the satellites.

In reviewing the conclusions as to the constitution of the rings, and the disintegration that must be taking place as evidenced by the positions of the tores, the ultimate disappearance of the rings was predicted.

R. L. Faris,
*Secretary*

## *DISCUSSION AND CORRESPONDENCE*

### AGE OF A COOLING GLOBE

To the Editor of Science: In my paper on a cooling globe in Science for February 7, pages 231 and 232, the depth of the level of isostatic compensation is stated as 71 miles or 140 kilometers. This last should be 114 kilometers. The blunder arose in copying, and the correct value was used in the computations.

George F. Becker

### THE EARTH AS A HEAT-RADIATING PLANET

To the Editor of Science: Of the many far-reaching consequences resulting from the discovery announced in Science for November 22 and December 20, 1907, perhaps no one fact stands out more clearly and strongly than this—*The inherent heat of the earth still plays an important if not controlling part in all terrestrial phenomena* (as, for instance, in the formation of ocean and atmospheric currents, in cloud formation, and the increase in temperature with increase of cloudiness, etc.), *for it now seems certain that without this inherent heat radiation the terrestrial atmosphere could not exist.*

With a surface which, even at its lowest known temperature, is still more than 200° C. above the temperature of surrounding space (ocean temperatures at great depths being about 270° above) and with the temperature increasing with the depth below the surface, there can no longer be much reasonable doubt as to the facts concerning the past or future history of the earth, so far as effects due to temperature changes are concerned.

The earth is now, and has been for ages, radiating heat into space, shrinking in size, and, with a constantly decreasing surface temperature, growing colder.

The mean absolute surface temperature of the earth is, let us say, 300° C. If we regard this as made up of an inherent surface-temperature of 200° C. and a stored or trapped heat equivalent to a temperature of 100° C., the radiation into space is such that the moon, for example, receives about one twenty-seventh as much heat from the earth as it does from the sun.

The sun's influence is rendered overpoweringly conspicuous because this influence is zonal and varyingly differential, thereby obscuring to a great degree the nearly constant but large effect of inherent earth-radiation.

The earth's desert areas are increasing and the glaciers are retreating not because the sun's influence has seemingly become predominant, but because the earth has, even during known historical time, grown sensibly colder.

At any given time in the history of the earth, an ice age was inaugurated at a given place whenever the snow-fall during the colder months of the year was so great that the snow could not all be melted during the warmer months of the year. But since the earth is continually growing colder the supply of moisture, through evaporation from the water surface of the earth, is continually growing less, so that *finally even the land areas in the polar regions will be completely bare,* and the upper limit of the atmosphere will then practically coincide with the surface of a solidly frozen ocean.

With the modifications, resulting from the