	No. Cases	Score Median	Per cent. attaining Median of PI. & S.E.
12 and 13 years:			
Mixed Bloods	15	103	80 per cent.
Mexicans	145	85	60 per cent.
Plains & S. E.	8	76	—
Pueblo	46	64	40 per cent.
Navajo & Apache	12	52	10 per cent.
14 and 15 years:			
Mixed Bloods	39	110	80 per cent.
Mexicans	132	92	70 per cent.
Plains & S. E.	55	85	....
Pueblo	82	80	44 per cent.
Navajo & Apache	19	60	20 per cent.
16 and 17 years:			
Mixed Bloods	41	104	71 per cent.
Mexicans	28	91	54 per cent.
Plains & S. E.	60	90	....
Pueblo	95	78	34 per cent.
Navajo & Apache	30	77	23 per cent.
18 and 19 years:			
Mixed Bloods	31	114	60 per cent.
Mexicans	2	....	....
Plains & S. E.	53	88	....
Pueblo	26	71	30 per cent.
Navajo & Apache	24	77	40 per cent.

T. R. GARTH

UNIVERSITY OF TEXAS
JULY 8, 1922.

THE OPTICAL SOCIETY OF AMERICA

ABRIDGED MINUTES OF THE SEVENTH ANNUAL MEETING[1]

THE seventh annual meeting of the Optical Society of America was held at the National Bureau of Standards, Washington, on October 25, 26, 27 and 28, President Troland presiding.

One hundred and thirteen persons registered as in attendance at the meeting. Eighty-five of these were from outside Washington. The actual number attending at one time or another was probably about 150. The number in attendance at any one time at the sessions for the reading of papers ranged from about thirty to over one hundred.

[1] The complete minutes including abstracts of papers and descriptions of exhibits will appear in the January number of the *Journal of the Optical Society of America.*

An exhibit of optical instruments was held in connection with this meeting; and visitors were also given an opportunity to inspect the optical equipment of the Bureau of Standards.

The condensed program follows:

OCTOBER 25

Bureau of Standards laboratory exhibits open to informal visits.

Business meeting:

Reports of officers and general committees.

Reports of committees on nomenclature and standards.

OCTOBER 26

Glass Plant open to informal visits. Pot of optical glass being stirred.

General session:

Address of welcome: Dr. S. W. Stratton, director, Bureau of Standards.

Response: Dr. Leonard T. Troland, president, Optical Society.

Papers on miscellaneous optics.

Session on solar, stellar and planetary radiation:

Invited papers by Dr. C. G. Abbot and Dr. W. W. Coblentz.

Glass Plant open to informal visits.

Moulding, annealing and inspection of optical glass.

Illustrated address (by invitation): Professor W. J. Humphreys, U. S. Weather Bureau, on "The optics of the atmosphere."

Glass Plant open to visitors:

Pot of optical glass removed from furnace.

OCTOBER 27

First session on physiologic optics.

Second session on physiologic optics.

Special session on physiologic optics for papers by invitation of the committee.

OCTOBER 28

Session on photometry, colorimetry and optical pyrometry.

The exhibit of optical instruments, October 26, 27 and 28.

A synopsis of the proceedings, papers and special features of the meeting is given below:

1. *Business*

The report of the secretary and membership committee was read in part.

The president communicated an informal report from the treasurer, the formal report to be submitted at the end of the fiscal year.

The following reports of general committees were received informally:

Physiologic optics: F. K. Richtmyer, chairman.

Combination of *Journal* with *Instrument Makers' Journal:* J. P. C. Southall, chairman

Ways and means of preparing and publishing an English translation of Helmholtz's "Physiologic Optics": J. P. C. Southall, chairman.

Brief oral reports were made by the following progress committees (committees on nomenclature and standards):

Reflectometry: A. H. Taylor.
Spectroradiometry: W. W. Coblentz.
Visual refraction: A. Ames, Jr.
Wave-lengths: W. F. Meggers.
Photometry and illumination: E. C. Crittenden.
Optical glass: G. W. Morey.
Photographic materials: R. Davis.
Projection: L. A. Jones.
Pyrometry: C. O. Fairchild.
Refractometry: I. C. Gardner.
Spectrophotometry: K. S. Gibson.

2. *Special Papers*

The following papers were given by special invitation:

Apparatus and results of solar radiation work: C. G. ABBOT, Smithsonian Institution.

Thermocouple measurements of stellar and planetary radiation: W. W. COBLENTZ, Bureau of Standards.

The optics of the atmosphere: W. J. HUMPHREYS, U. S. Weather Bureau.

Photic orientation in organisms: S. O. MAST, Johns Hopkins University.

Electrical response of the retina to stimulation by light: E. L. CHAFFEE and W. T. BOVIE, Harvard University.

On reflex visual sensations: FRANK ALLEN, University of Manitoba.

3. *Contributed Papers*

The following are the titles of papers offered by members and others, and actually presented at this meeting:

Reflection of ultra-violet by flowers: F. K. RICHTMYER, Cornell University.

Some unusual halos: W. J. HUMPHREYS, U. S. Weather Bureau.

The excitation of spark spectra of rubidium and cæsium in a low voltage arc: F. L. MOHLER, PAUL D. FOOTE, A. E. RUARK and C. C. KLESS, Bureau of Standards.

Some observations on the transformation of thermal radiant energy into electric current in molybdenite: W. W. COBLENTZ, Bureau of Standards.

Extraordinary diffraction of X-rays: L. W. MCKEEHAN, Bell System Laboratories.

Simple equipment for detecting the errors of screws: WILMER SOUDER, Bureau of Standards.

Refraction of a thin pencil by any refracting surface; generalized meridional and sagittal formulas: E. D. ROE, JR., Syracuse University.

The dioptrometer, an apparatus for measuring the power of the commercial lenses: HENRY F. KURTZ, Bausch & Lomb.

The measurement and specification of optical characteristics in projector performance: G. W. MOFFITT, Frankford Arsenal.

The practical application of parabolic surfaces in lens construction: W. B. RAYTON, Bausch & Lomb.

Some recent contributions to psycho-physiological optics: L. T. TROLAND, Harvard University.

A photo-electric theory of color vision: JANET HOWELL CLARK, Johns Hopkins University.

A theory of color vision: ELLIOT Q. ADAMS, Nela Research Laboratory.

The fundamental facts of color-sensation, being the minimal requirements of a color sensation theory, with illustrations in color: CHRISTINE LADD-FRANKLIN, Columbia University.

The visibility of radiant energy: K. S. GIBSON and E. P. T. TYNDALL, Nela Research Laboratories, Bureau of Standards.

On the luminosity ratios of the spectral complementaries, and the subjective saturation of the spectrum: R. H. SINDEN, Johns Hopkins University.

Further studies of the Abney effect: L. T. TROLAND and C. H. LANGFORD, Harvard University.

A critical study of the Snellen letters and the "illiterate" E tests for the acuteness of vision of school children, and a proposed substitute for these tests: J. M. MCCALLIE, Board of Education, Trenton, N. J.

A comparison of the Fechner and Munsell scales of luminous sensation value: ELLIOT Q. ADAMS, Nela Research Laboratories.

The theory of flicker photometry: C. E. FERREE, Bryn Mawr.

Comparative studies of equality of brightness and flicker photometry with special reference to the lag of visual sensation: GERTRUDE RAND, Bryn Mawr.

Progress on the determination of normal gray light: IRWIN G. PRIEST, Bureau of Standards, Munsell Color Company.

The effect of various conditions upon the determination of the normal stimulus of gray: IRWIN G. PRIEST and CASPER L. COTTRELL, Munsell Color Company, Bureau of Standards.

New tables and graphs for facilitating the computations of spectral energy distribution by Planck's formula: M. KATHERINE FREHAFER, Bureau of Standards.

Graphical aids to the transformation of color measurements from one system to another: HERBERT E. IVES, Western Electric Company.

A color match photometer for illuminants: HERBERT E. IVES, Western Electric Company.

Comparative color measurements of illuminants by trichromatic and monochromatic analyses: HERBERT E. IVES, Western Electric Company.

The colorimetry and photometry of daylight and incandescent illuminants by the method of rotatory dispersion: IRWIN G. PRIEST, Bureau of Standards, Munsell Color Company.

A hemispherical photometric integrator: FRANK BENFORD, General Electric Company.

Improvements in photometric equipment for integrating spheres: A. H. TAYLOR, Laboratory of Applied Science, Nela Research Laboratories.

A variable aperture rotating sectored disc: HERBERT E. IVES, Western Electric Company.

The registering microphotometer of the Mount Wilson Observatory: EDISON PETTIT and SETH B. NICHOLSON, Mt. Wilson Observatory.

Color mixing and comparing apparatus: HERMANN KELLNER, Bausch & Lomb.

Disappearance of the filament in improved forms of the disappearing-filament optical pyrometer: C. O. FAIRCHILD and W. H. HOOVER, Bureau of Standards.

The relation between the hiding-power and reflection coefficients of white pigments and paints: A. H. PFUND, Johns Hopkins University.

On the ratio of intrinsic brightness to illumination: JAMES E. IVES, U. S. Public Health Service.

Preliminary data on the color of daylight at Washington: IRWIN G. PRIEST, Bureau of Standards, Munsell Color Company.

The shrinkage of photographic films during development: H. L. CURTIS, Bureau of Standards.

A special sensitometer for the study of the photographic reciprocity law: LOYD A. JONES, Eastman Kodak Company Research Laboratory.

An instrument (densitometer) for the measurement of high photographic densities: LOYD A. JONES, Research Laboratory, Eastman Kodak Company.

An adaptation of the thalofide cell to the measurement of photographic densities: A. L. SCHOEN, Research Laboratory, Eastman Kodak Company.

On the relation between time and intensity in photographic exposure: LOYD A. JONES and EMORY HUSE, Research Laboratory, Eastman Kodak Company.

Preliminary note on the spectral energy sensitivity of photographic materials: LOYD A. JONES and A. L. SCHOEN, Research Laboratory, Eastman Kodak Company.

The following are titles of papers which were on the supplementary program and whose authors did not respond when the papers were called:

The horopter, cyclophoria and apparent vertical meridian (preliminary report): CHARLES SHEARD, American Optical Company.

Aspherical lens systems: L. SILBERSTEIN, Eastman Kodak Company.

The paper by Hermann Kellner entitled "Motion analyser" on the advance program was not read. In place of it, Dr. Kellner communicated a paper on stereoscopic vision, abstract of which has not been submitted.

Dr. Frank Benford communicated informally the substance of a paper on the plotting of spectrophotometric data which he had presented at the convention of the Illuminating Engineering Society in September.

4. *Exhibit of Optical Instruments*

The following is a list of exhibitors, together with their exhibits.

1. MUNSELL COLOR COMPANY

Munsell color tree.
Atlas of the Munsell color system.
Two enlarged atlas charts.
Neutral value scale, chroma scales.
Munsell daylight photometer.
Munsell crayons.
Munsell water colors.
Color index.
Disc spinning motor for use with Maxwell discs.

2. KEUFFEL & ESSER COMPANY

Holophane lightmeter.
Aerial sextant.
Prismatic gunsight turret telescope.
Expedition plane table.
Engineer's Y level.
Engineer's mountain and mining transit.
Engineer's transit.
Triangulation theodolite.
Spy glass, U. S. Navy pattern.
4-inch ship's telescope.
Anti-aircraft telescope.
Stadimeter.
Color analyzer.

3. ORDNANCE DEPARTMENT, U. S. ARMY

Instruments of the fire control systems of mobile artillery, observation and laying.

Instruments used in the observation and tracking of targets for securing data for precision fire of seacoast batteries.
Observation and computing instruments for use with anti-aircraft batteries.

(Frankford Arsenal Optical Laboratory)

Instrument for the examination of optical glass (designed by G. W. Moffitt).
Universal prism testing instrument (designed by G. W. Moffitt).

4. U. S. COAST AND GEODETIC SURVEY

Astronomical transit (Bamberg).
Theodolite (Troughton & Simms).
Repeating theodolite (Berger).
Precise level.
Vertical circle.
Vertical collimator.
Navigating sextant.
Electric signal lamp.
Heliograph (heliotrope).
Theodolite-magnetometer.
Dip circle.
Magnetograph.

5. BAUSCH & LOMB OPTICAL COMPANY

Large constant deviation spectroscope.
Constant deviation spectroscope for chemists.
Pocket spectroscopes.
Monochromator.
Color mixing and comparing apparatus.
Two field monochromator.
Comparison photometer.
Martens photometer.
Photometer stand.
New Abbe refractometer.
Dipping refractometers.
Colorimeter.
Hemoglobinometer.
Aspheric condenser.
Dioptrometer.
Field telemeter.

6. DR. HARRY S. GRADLE

Instrument for the determination of areas of retinal correspondence.

7. BUREAU OF STANDARDS (RADIOMETRY SECTION)

Stellar spectral radiometer (Coblentz).

8. A. AMES, JR., AND BLANCHE AMES

Color standard.

9. SOCIÉTÉ GÉNÉVOISÉ D'INSTRUMENTS DE PHYSIQUE

Constant deviation spectrometer.
Length comparator for measurements in air.
Automatic machine for graduating micrometer heads, drums, cylindrical and conical surfaces.

10. LABORATORY OF APPLIED SCIENCE, NELA RESEARCH LABORATORIES

Diffuse reflectometer—A. H. Taylor type.
Photometer and special window for integrating spheres.

11. CORNING GLASS WORKS

Light filters.

12. HANOVIA CHEMICAL AND MANUFACTURING COMPANY

Kalosat soft focus lens for photographic use with specimens of photographs taken with Kalosat.
Fused quartz optical goods, microscopic slides, cover glasses, prisms, etc.
Special lenses of fused crystalline quartz.

13. COOPER-HEWITT ELECTRIC COMPANY

Graded fused-quartz-to-Pyrex and fused-quartz-to-lead-glass joints.
Quartz-glass apparatus for photophysics and photochemistry.
Uviarc lamps.
Labarc.

14. BUREAU OF STANDARDS (AERONAUTIC INSTRUMENTS SECTION)

Synchronizing type ground speed and drift indicator.
Rate of climb recorder.

15. A. H. PFUND

A precision rotating section, aperture variable and measurable while in motion.

16. CENTRAL SCIENTIFIC COMPANY

Ingersoll glarimeter, new model.

17. J. C. HUBBARD

Gold-leaf electrometer.

18. BUREAU OF ORDNANCE, NAVY DEPARTMENT

Binocular collimator mark III (manufactured by Naval Gun Factory, Navy Yard, Washington, D. C.).

19. C. P. GOERZ AMERICAN OPTICAL COMPANY

Polariscopes and accessories.
Polariscopes for the analysis of sugar solutions and other polarizing fluids.
Various lamps and accessories.
Refractometers and accessories.
Refractometers, system Abbe, but of new and improved design, for testing fats, oils and other fluids.

20. WARREN P. VALENTINE

Refractometer—Modified Abbe type, "Precision" model.
Refractometer—Modified Abbe type.
Refractometer—Improved "Precision" model.
Refractometer—Modified Butyro type, "Fat" model.

21. BUREAU OF STANDARDS (F. J. BATES)

Adjustable sensibility saccharimeter (made by J. & J. Fric).

22. BUREAU OF STANDARDS (OPTICAL INSTRUMENTS SECTION)

A variable power magnifying stereoscope.

23. CHRISTINE LADD-FRANKLIN

Charts illustrating the Ladd-Franklin theory of color vision.

5. *Bureau of Standards Laboratory Exhibits*

On account of the limited space in the exhibition room and the inconvenience of disturbing complicated "built-in" apparatus the Bureau of Standards contributed very little to the exhibits in the exhibition room. The bureau apparatus was, however, open to inspection in the rooms where it is regularly used. Instruments and apparatus thought to be of most interest to the Optical Society were listed and described in the advance program, which thus served as a guide to visitors. This list is given below.

Standard horizontal photometers (in charge of B. S. Willis).

Flicker photometers and colored test solutions for photometric observers (in charge of B. S. Willis).

Photometric distribution apparatus (in charge of B. S. Willis).

Integrating photometric sphere and Taylor reflectometer (in charge of B. S. Willis).

Koenig-Martens Spectrophotometer (in charge of M. Katherine Frehafer).

Photoelectric spectroradiometer (in charge of K. S. Gibson).

Hilger sector photometer with quartz spectrograph for ultra-violet spectroradiometry (in charge of H. J. McNicholas).

Spectrophotometer (color analyzer) for measuring spectral reflection (designed by Keuffel & Esser and the Bureau of Standards) (in charge of R. E. Lofton).

Exponential spectrophotometer for liquids (in charge of Irwin G. Priest).

Micrometer-microphotometer for measuring relative wave-lengths and photographic densities in spectra (in charge of W. F. Meggers).

Commercial (life-test) photometric equipment (in charge of Miss R. M. Collins).

Photometer for measurement of brightness of self-luminous materials (in charge of W. H. Wadleigh).

Apparatus for the determination of hue sensibility (wave length differences perceptible by difference in hue) and the visibility of radiant energy (in charge of Irwin G. Priest).

Rotatory dispersion colorimetric photometer (in charge of Irwin G. Priest).

Standard rotatory dispersion apparatus for the determination of the normal stimulus of gray (in charge of Irwin G. Priest).

Special apparatus for the determination of the normal stimulus of gray with full field illumination (in charge of Irwin G. Priest).

Fizeau expansion apparatus (in charge of C. G. Peters).

Dimensional change apparatus (in charge of C. G. Peters).

Scale ruling machine (in charge of C. G. Peters).

Portable gas interferometer, laboratory gas interferometers (in charge of E. R. Weaver).

Disappearing filament optical pyrometer (in charge of C. O. Fairchild).

Universal polarimeter (in charge of A. Q. Tool).

Crystal growing apparatus and various crystals (in charge of F. P. Phelps).

Photographic sensitometric apparatus (in charge of Raymond Davis).

Metallographic microscopes (in charge of H. S. Rawdon and S. Epstein).

Dalby optical load extension recorder (in charge of John R. Freeman, Jr.).

Photomicrographic apparatus (in charge of R. E. Lofton).

Microprojection of stratified soap films (in charge of P. V. Wells).

Ultramicroscope (Zeiss Slit) (in charge of P. V. Wells).

General Electric oscillograph, Bureau of Standards modifications (in charge of R. A. Webster).

Cathode-ray oscillograph (Braun Tube) (in charge of Miss F. Kenyon).

Projectile camera (in charge of A. H. Sellman).

Optical glass plant (in charge of A. N. Finn).

Optical shops: Highest precision hand work (in charge of J. Clacey); Machine grinding and polishing (in charge of F. C. Weaver).

The president announced the election of Professor A. A. Michelson and Dr. S. W. Stratton to honorary membership in the society.

The meeting was concluded by an informal dinner at the Hotel Ebbitt.

The next meeting will be held at Cleveland, in October, 1923.

IRWIN G. PRIEST,
Secretary

WASHINGTON,