

# Journal of the Minnesota Academy of Science

---

Volume 14 | Number 1

Article 10

---

4-1946

## Abstract Papers

Follow this and additional works at: <https://digitalcommons.morris.umn.edu/jmas>



Part of the [Life Sciences Commons](#), [Physical Sciences and Mathematics Commons](#), and the [Social and Behavioral Sciences Commons](#)

---

### Recommended Citation

(1946). Abstract Papers. *Journal of the Minnesota Academy of Science*, Vol. 14 No. 1, 99-105.

Retrieved from <https://digitalcommons.morris.umn.edu/jmas/vol14/iss1/10>

This Article is brought to you for free and open access by the Journals at University of Minnesota Morris Digital Well. It has been accepted for inclusion in Journal of the Minnesota Academy of Science by an authorized editor of University of Minnesota Morris Digital Well. For more information, please contact [skulann@morris.umn.edu](mailto:skulann@morris.umn.edu).

ment need not be sealed during treatment if the biologic effect is primarily due to alpha irradiation. For unless an alpha ray is produced practically in contact with the tissue it can have no effect, since its range in tissue or vaselin is of the order of 0.1 mm., hence loss of radon from the outer layers of vaselin would not affect the alpha irradiation of tissue. If beta irradiation is also of importance, then the escape of radon from layers a few millimeters from the tissue would be of importance, since beta rays have a range of approximately 1 cm. in tissue or vaselin. There is also the probability that radon escapes from the vaselin into the tissue, but this process should not be significantly affected by changes in the concentration of the radon in vaselin more than 1 or 2 mm. from the skin.

At the present time our conclusion from these experiments is that as far as the therapeutic effects are concerned it is not necessary to seal the ointment during treatment, but if it is not sealed there is some danger of contaminating rooms in which the patient stays. Also it is desirable to use a covering which will prevent rubbing off the ointment. However, the use of this ointment is still in the experimental stage. Problems of dosage and what produces the biologic effect must be at least partially solved before the question of the necessity of sealing the ointment can be answered. On the other hand, a comparison of the results of a series of treatments given with the ointment sealed with those of a series given with the ointment not sealed might suggest some answers to some of the other problems.

\* \* \*

## THE DESIGN OF A LARGE APERTURE GRATING MONOCHROMATOR FOR USE IN PHOTOSYNTHESIS INVESTIGATION\*

C. S. FRENCH, G. S. RABIDEAU, AND A. S. HOLT  
*University of Minnesota*

### ABSTRACT

An instrument has been constructed that will give monochromatic light of sufficient intensity for the measurement of photosynthesis in red light with reasonably narrow spectral band width. The apparatus uses a 4 x 6" replica grating and large condenser lenses of 17 $\frac{3}{4}$  inch focal length. It covers the spectral range of 350 to 1000 mu. The dispersion is 3.55 mu/mm in the second order and 7.1 mu/mm in the first order. The entrance and exit slits are fixed on axes at 90° to each other and the wavelength of the emergent beam is controlled by the rotation of a mirror and one lens. The per cent

\* Published in *Rev. Sci. Instruments*, 18:11-17, 1947.

transmission of the instrument reaches a maximum of 34 per cent in the red of the first order and 21 per cent in the blue region of the second order. The entrance slit is 34 mm long and the exit slit 50 mm long. A small cylindrical lens near the entrance slit reduces the vertical height of the beam entering the grating thus increasing the output by about 20 per cent. At 650  $\mu$  with 2 mm slits it will isolate from a tungsten source  $3.7 \times 10^{-2}$  cal/min with about 95 per cent of the energy within a band of 28  $\mu$  wide. The apparatus has been used for several years for the study of the efficiency of oxygen evolution by chloroplasts and for the measurement of leaf absorption and reflection spectra in an Ulbricht sphere. The parts are not expensive.

## INTRAPULMONARY MIXING CURVES AND THE DETECTION OF ABNORMAL VENTILATION

JOHN B. BATEMAN

*Mayo Foundation, Rochester*

### ABSTRACT

The time course of lung nitrogen elimination during unforced breathing of pure oxygen is determined by several variables, notably: (1) mid-capacity ("functional residual air"), (2) respiratory dead space, (3) tidal volume, (4) rate of nitrogen transfer from blood to alveolar gas, (5) uniformity of distribution of tidal air. When simplifying assumptions are made the course of removal of nitrogen from a single perfect mixing chamber can be calculated as a function of (1), (2), (3) and (4).

An open circuit method has been devised for measuring the course of expiration of nitrogen during inhalation of pure oxygen. Values of (1), (2) and (4) can nearly always be assigned to give a theoretical curve that will fit the experimental data; known changes in tidal air or respiratory dead space displace the experimental points to the calculated extent.

The curve which fits the experimental data provides, we believe, a reliable value for the mid-capacity. The value of the apparent dead space embodies both the respiratory dead space and the effect of unequal distribution of tidal air, or of imperfect mixing brought about by other means. It may therefore be regarded as an index to the effectiveness of the lung as a mixing chamber, and data have been collected on normal persons and patients with pulmonary lesions (emphysema, bronchiectasis, bronchial obstruction) which provide support for this point of view.

## FURTHER INVESTIGATION OF THE ABSORPTION AND REFLECTION SPECTRA OF LEAVES AND CHLOROPLAST SUSPENSIONS\*

G. S. RABIDEAU, C. S. FRENCH, AND A. S. HOLT  
*University of Minnesota*

\* Covered in the publication: The Absorption and Reflection Spectra of Leaves, Chloroplast Suspensions, and Chloroplast Fragments as Measured in an Ulbricht Sphere, *Am. Jour. Bot.*, **33**: 769-777, 1946.

• • •

## PHOSPHOLIPID SYNTHESIS IN DAMAGED AND REGENERATING LIVER STUDIED WITH RADIOACTIVE PHOSPHORUS

EUNICE V. FLOCK AND JESSE L. BOLLMAN  
*The Mayo Foundation, Rochester*

• • •

## THE INVERTED PENDULUM

C. N. WALL  
*University of Minnesota*

### ABSTRACT

A physical pendulum with a rigid supporting rod has two positions of equilibrium: (A) the normal position with the center of gravity of the pendulum directly below the point of support; (B) the inverted position with the center of gravity directly above the point of support. The equilibrium is stable for position (A) and unstable for position (B) under normal conditions.

If, however, the point of support of the pendulum is made to perform vertical oscillations of appropriate amplitude and frequency, then the roles of A and B may be reversed as to stability, i.e., position A becomes a position of unstable equilibrium and position B becomes one of stable equilibrium. This strange effect may be explained in terms of the stability of the solution of Mathieu's differential equation.

## Science Education

### IMPLICATIONS OF THE HARVARD REPORT

SISTER MARIE JAMES  
*College of Saint Catherine*

1 1 1

### A NEW COURSE OF STUDY FOR SCIENCE EDUCATION

MARY EMERSON  
*Mound High School*

#### ABSTRACT

How can a new course of study for science education achieve the goal of the Minnesota Education Association Policies Commission, that of "Development of ethical character, healthy bodies, and balanced personalities, as well as academic training of students"?

One way of achieving this goal, though by no means the only way, would be to make tenth grade biology a required subject. Then teach biology from the standpoint of conservation of human resources as well as natural resources. The goal of such a course would be competent understanding of the student on the importance of obtaining and maintaining good health.

At the beginning of the course, gather the following data: (through the school nurse's files, the physical education records, or directly)

1. Name
2. Weight, height, age
3. Vision test
4. Hearing test
5. Color blind test
6. Intelligence quotient
7. Achievement record (or Accumulative records)
8. Dental cards
9. List of communicable diseases student had
10. List of non-communicable diseases
11. Vaccination
12. Chest x-ray
13. Other immunization
14. Speech defects
15. Posture rating

After the records are complete, interview each student individually on his physical profile. Help him to see what his particular objective should be. Many abnormal personality traits can be traced directly to poor health or disease. Often these traits may be rectified if the cause is eliminated.

Each biological unit then should be studied from the standpoint of personal or community health and economic importance.

Through a guidance or counseling program, students who plan to go to college should be given a college preparatory course in chemistry or physics if they need either subject as a prerequisite for their college work. A practical course in chemistry and physics should be offered to those who are not planning to go to college. These courses should emphasize the chemistry of the individual, the chemistry of the home, and the chemistry of the community.

For the course in practical physics, emphasis should be placed on the safety measures needed to prevent accidents in home and workshop, repair of simple household equipment, and how to make use of physics principles in everyday problems.

↑ ↑ ↑

## TEACHING PHYSICS AS WE USE IT\*

O. A. NELSON

*Central High School, St. Paul*

\* Published in *School Science and Mathematics*, 829-835 (December), 1947.

↑ ↑ ↑

## THE USE OF A SKELETON-TYPE CELESTIAL GLOBE IN SCIENCE COURSES

ZABOJ V. HARVALIK

*State Teachers College, Duluth*

### ABSTRACT

A skeleton-type celestial globe was designed and built by the author a few years ago to facilitate the instruction of elementary astronomical phenomena in courses of science, mathematics, geography, general science, elementary astronomy, navigation, etc. on secondary school and college level. Due to the unusual structure of the celestial globe, many phenomena, as projection of stars and constellations, the motion of the sun, moon, the planets, can be demonstrated, as well as the origin of the seasons. The outlines of the constellations, although mostly in their traditional features, will help the students to identify them by using the globe.

POSSIBLE CHANGES IN GENERAL PHYSICS  
LABORATORY EXPERIMENTATIONPETER E. FOSSUM  
*St. Olaf College*

\* \* \*

## A FUTURE UNIVERSITY

E. M. FREEMAN  
*University of Minnesota*

## ABSTRACT

The University of Minnesota is the largest single factor in science education in the State. Its future is, therefore, of vital concern to all scientists and no less to all citizens of the state.

For some years it has been obvious to thinking educators that the University would before long reach a critical size. The recent initial postwar flood of students has substantiated that belief.

The University is fast reaching maturity.

The University itself must plan a future of greatest efficiency, adjusted to the state's ability to support and coordinate with other educational agencies, instead of leaving that future to warring political factions, opportunistic lobbies, or even friendly legislatures.

The University of Minnesota has been particularly fortunate, not only in generous state support but in the consolidation of practically all professional colleges (excepting Education) of the state in one closely knit institution. These colleges require staff and facilities for which only the University is adequately equipped. It is therefore suggested that the future University capitalize these unique functions to maximum strength, at the same time adjusting its program to the best use of probable future state support and cooperating with the other state colleges in common enterprises by the two primary and fundamental procedures.

1. The University should adopt a well-defined policy of gradual but sure evolution toward becoming primarily a Senior College, Graduate School, and Research Institution, retaining only a greatly restricted Junior Division (Freshman and Sophomore) for educational research purposes especially for Junior Division preprofessional and vocational curricula.

2. The University, the Junior, Teachers, and Private Colleges should cooperate in a state-wide Junior Division program to increase the efficiency and opportunities in Junior Division preparatory and vocational education. The initial step might well be an All-State Advisory Council appointed and organized by the cooperating institutions to plan and promote such a program.

Summarized briefly, the University would limit drastically its Junior Division work to experiments and demonstrations in pre-professional, academic and vocational curricula releasing funds and facilities for improvement and expansion in Senior College professional curricula, Graduate School, and fundamental and applied research. The increasing thousands of Junior Division students throughout the state could be more appropriately and efficiently served by a cooperative state-wide program.

## Social Science

### LATIN AMERICAN RELATIONS

ASHER N. CHRISTENSEN  
*University of Minnesota*

• • •

### BASIC FACTORS IN INTERNATIONAL COOPERATION

REGINALD D. LANG  
*Carleton College*

• • •

### IMPLICATIONS OF THE HARVARD REPORT ON THE SOCIAL SCIENCE PROGRAM

AUGUST C. KREY  
*University of Minnesota*