

A. Vibent Douglas

Lectures and Speeches

1950s

22.

Loc 2303.9
Box #1

man to

Dr Albert Einstein

Princeton

1954 Jan 4

1925 + Jan 4 - Albert Einstein

11²⁵ - 12¹⁰

Min Dukas, horse
Min Hauptman sec
Hoffman

Σ: Ep^{stems} + Roley + sprinter + football organizer + science + pol. org.
in 2 Jan 1 list - Σ: quite a zoological garden
lion tigers and giraffes
Σ: not the type of person for a knighthood

Σ: powerful imagination, weak in critical judgment

Σ: was guest of Edd. when Edd received his knighthood -
not at all strange for a Quaker -

Σ: "if I were not a Jew I would be a Quaker"
[P.C. pictures - old monk wood carving - mother 'china shrine' - just works of art]

Pictures of Gandhi - greatest man of our age

a: Schmitzer? - yes also a very great man -

Snapshot of Lorentz - The greatest "towering" intellect I have
known
Leiden 1853-1928

Minkowski was his teacher at Zurich
"son" - radio astronomer

Σ: creation of matter is not a tenable sole
{ re Dingle's address - I said Jordan Bondi & Hoyle
not basing their theory on physical facts

Σ: neither did Clerk Maxwell! I then referred
to Edd's 11th of red shift explanations yet no effort to explain away Clerk
Maxwell's el-mg-theory.

Milnes Kinematic Theory also no critical judgment - + Edd saw this!

a time of 'a beginning' seems necessary.

'Anomalies in the Cepheids' a needed escape to larger time & space.

Beauty of his writings - but misleading in making laymen think
he understands.

A man of science who tries to popularize is
like a fakir. It is the duty of a scientist to
remain obscure

Dark grey dressing gown + a brown silk buffler + dark eyes v. dark
but not brown -
large head-shaven skin. longish white hair
grey white-eyebrows shaggy. eyes stronger than in Epstein's bust

no consensus
but no grounds for laughter of Caml youth
who have not done what Edd did.
Youth both critical & uncritical of themselves
(critical of their elders)

Re Lemaitre - every man has his own cosmology -

I asked why Am scientists so anxious to avoid exp. units
he said - they don't understand gen. relativity -

Re Infeld - he does write to E. but he does not say the
things he would like to say.

E: I am not a Russia-eater, but I would not
like to work under the intellectual restrictions
they have created.

Infeld made a mistake & will not want to admit it

I told him about I. A. V. & Russians - language - but excellent infra red photos

Edd's Math. Theory of Rel. E thinks one of the clearest & best
presentations of the subject - masterly

Edd's definitions: E does not agree. Def. empty space by λ relation
This is not the only test of emptiness -

(I failed to ask him about the defn of matter or action as
curvature.)

Re E. W. T. Whittaker + Edd. F. Thy.

E: Whittaker's must be very narrow minded

He was one of the first
 to recognize
 that the displacement field
 was the most fundamental
 concept of gen rel
 theory for this concept
 allowed us to do away with
 the inertial system, ^{as} ~~to do without~~
~~without~~ the ^{system}
 dictated by Einstein

2nd - an experim v. high
 on a continent limited
 on a person - v. high
 in a cut 1 pt
 month
 weight
 Lennards
 de Sitter
 factor
 problem
 "Schubert" of "Hans" by
 "Hans" v. "Hans"

ARTHUR STANLEY EDDINGTON

By A. VIBERT DOUGLAS

President of the Royal Astronomical Society of Canada

i / Sir Arthur Eddington - Astronomer
and Religious Thinker

Queen's Theological Conference

3pm Convocation Hall

1953 Oct. 20

ii / Eddington - His Life & Work
RASC Toronto

Reprinted from
The Journal of the Royal Astronomical Society of Canada
January, 1945

~~1882~~ 1882 Kendal. Stramonate.
85 Weston-Super-Mare - Brynmelyn Ref ①
98 Manchester.
1902 Cambridge - Trinity - Barnes, Whitehead
1906 Greenwich. Practical telescopic work
Malta - Bodly - Greenmid
1913 Cambridge Stellar movements globular clusters
Plumian Prof. - F.R.S.
Stability of a star - Radiation Pressure
Mass - Luminosity Law

For R.A.A. Toronto
MADE IN U.S.A.

FINAL DRAFT

QUEEN'S UNIVERSITY

SIXTY-FIRST

Annual Conference

OF THE

Theological Alumni Association

Chancellor's Lecturer

THE REVEREND HAROLD A. BOSLEY, PH.D.,
Minister of First Methodist Church, Evanston, Ill.

Subject: "Religion with Revelation: A Study of the Experience and
the Idea of Revelation in our Religious Tradition."

October 19th to October 22nd, 1953

KINGSTON, ONTARIO

PROGRAMME



MONDAY, OCTOBER 19th

8:00 p.m. — First Chancellor's Lecture: "The Claim of Revelation in Hebrew and Early Christian Experience." Dr. Bosley.

TUESDAY, OCTOBER 20th

10:00 - 11:00 a.m. — Communion Service, conducted by the President of the Association. Communion address by Rev. James A. Lyttle, D.D.

11:30 a.m. - 1:00 p.m. "Recent Excavation at Jericho." Professor A. D. Tushingham, Ph.D., Queen's Theological College.

3:00 p.m. — "Sir Arthur Eddington: Astronomer and Religious Thinker." Dean A. V. Douglas, M.B.E., Ph.D., Queen's University.

8:00 p.m. — Second Chancellor's Lecture: "The Claim of Revelation in Classical Christian Thought." Dr. Bosley.

~~1882 Kendal. stramonate.~~
85 Weston-super-Mare - Brynmelyn Ref ①
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Plumian Prof. - F.R.S.
Stability of a star - Radiation Pressure
Mass - Luminosity - Law

For R.A.S. Toronto

MADE IN U.S.A.
111-121

Apr 16.

Farmers of Somerset.

Quaker bkgs - system re Quakers
Kendal -

My first meetings with him, Camb. 1921

Edd vs. T. as lecturer
Capendish Soc. Edd + Rutherford -
Research with him

Toronto for Ass. + Chants lunch

C.P. Snow - Edd "a queer fish"

Summarize Sci work

J.T. + Edd 'group'

Basile
Lemaître
+ Slater -

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lecture
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- 1882 Kendal. stramonate
 85 Weston-super-Mare - Brynmelyn Ref ①
 98 Manchester.
 1902 Cambridge - Trinity - Barnes, Whitehead
 1906 Greenwich. Paschall telescopic work
 Malta - Bridget - Greenwich
 1913 Cambridge Stellar movements globular
 clusters
 Plumian Prof. - F.R.S.

Stability of a star - Radiation Pressure
 Mass - Luminosity Law
 White dwarfs
 Stellar diameters -
 Pulsating Stars
 Relativity - Einstein - de Sitter - Weyl
 Edd. - Lemaitre.

Interstellar matter - Constants g, h
 ρ, μ, ν, κ
 Fundamental Theory

math & physics - the universe in lab, the stars in crucible.
 Huxley: Spin the gossamers as well as forge the anchors
 of the mind.
 Blake: Imagination goes forth in uncurbed glory.
 Read Scarus.

Eddington was more than a very great scientist,
 he was ^{not only} greater by birth, ^{but by} inclination and intellectual
 acceptance

a natural mystic; who does not prize the moments that
 reveal to us the poetry of existence.
 Beauty in nature, in poetry, lies - equally
 in an elegant piece of
 math - fragrance of
 "devastating beauty"

Ref ② S+UW p 26-29

a religious mystic

Ref ③ H Weyl p 2 ✓

④ - NFW p 317? see Ch III ✓ passages

When my friends to the new President of R.A.S.C. that it
and to all those who with him + before him
from credit up the fine traditions of the
scientific theories - some
In accordance to the former 17 long months to observe
the conference a second time.

There have been giants on the earth
during the last 60 years -
1917 - discovering the electron
the theory of
de Broglie's originator of wave mechanics
Planck's proposition of quantum theory
Einstein's breaking the shackles
of tradition with his Rel. Thy
Eddington's synthesis all these
discoveries and theories
and applying them with
actual results and power
and insight to the advancement
of knowledge not of things of
the earth but of the stars.

ARTHUR STANLEY EDDINGTON

By A. VIBERT DOUGLAS

President of the Royal Astronomical Society of Canada
(With Plate I)

TO the memory of a great and good man, Sir Arthur Stanley Eddington, O.M., F.R.S., and in recognition of his contributions to physical science and to philosophy, the Royal Astronomical Society of Canada pays its tribute.

Had Sir Arthur lived until the Annual Meeting of this society in January 1945, he would have been one of the first two Honorary Members of the R.A.S.C. to be elected under its new Constitution. The committee charged with the selection of Honorary Members placed his name before General Council in the following terms:

~~Member of the Royal Astronomical Society of Canada~~
Sir Arthur Stanley Eddington, O.M., M.A., D.Sc., LL.D., F.R.S.
Chairman Professor of Astronomy in the University of Cambridge.

Sir Arthur Eddington has been contributed to the progress of astronomy and cosmology for about forty years in fields as diverse as stellar movements, internal constitution of the stars, (radiation pressure, pulsating stars, stellar diameters and densities, white dwarfs, central temperatures), mathematical theory of relativity, cosmological and physical constants, combination of relativity and quantum theories. His papers before the Royal Society, The Royal Astronomical Society and other national and international scientific bodies placed him in the very forefront of the world's scientists. His expositions in *The Nature of the Physical World*, *New Pathways of Science*, *The Philosophy of Physical Science*, have been stimulating to scientists, philosophers, metaphysicians and thinking laymen in many countries. His insight and powerful thinking placed his work at the foundations and within the superstructures of many investigations still in progress. We are proposing as honour to our R.A.S.C. in suggesting that Sir Arthur Eddington be asked to accept honorary

~~Member of the Royal Astronomical Society of Canada~~
A.V.D.

In 1882 Eddington was born in Kendal, Westmorland. From Owens College, Manchester, he went to Cambridge where he became Senior Wrangler and Smith's Prizeman, Fellow of Trinity, F.R.S., Plumian Professor and Director of Cambridge Observatory, before he was thirty-two. During seven of these years he was Chief Assistant at Greenwich and concentrated on investigation of stellar movements, star streaming, and the structure of the galaxy, devising an effective way of projecting proper motions in different regions of the celestial sphere so that general trends would emerge.

From 1913 until his death on November 21, 1944, he resided in Cambridge, though meetings of the International Astronomical Union and the British Association, or special lectures and visits took him across three continents.

Eddington has been the prime interpreter of relativity theory in the English language. His powerful mathematical ability and insight made it possible for him to grasp the significance of Einstein's work against the background of Minkowski and the pioneers. DeSitter, Weyl, Eddington and later Lemaitre, provided the early criticisms and developments of the theory. Eddington published a *Report on the Relativity Theory of Gravitation and Space Time and Gravitation* in 1920, followed soon after by *The Mathematical Theory of Relativity*, and in 1938 *Relativity Theory of Protons and Electrons*. He has consistently upheld the theory of an expanding universe since 1930 and from this cosmological basis combined with quantum theory he has developed his most daring work—the synthesis of a world structure relating all the fundamental physical constants. From three measured constants—the velocity of light and the Rydberg and Faraday constants for hydrogen—his theory enabled him to calculate with no further dependence upon observation thirteen constants including the charge on an electron and its mass, the mass of a proton and a hydrogen atom; Planck's constant, gravitation constant; mass of the universe, number of particles in the universe and speed of recession of the spirals. The agreement of ten of these quantities with the values determined in laboratory or observatory is so remarkable that his theory deserves the closest scrutiny by those with the mathematical ability to do so critically. ~~Max Born, like Herbert Dingle, dislikes the Aristotelianism of this work, and attributes its success to~~

He died before completing the logical exposition of this work. The mathematical physicists and cosmologists are divided in their opinions of it. Some are cynically critical, some completely mystified and some are reserving judgment hoping that the future may

elucidate the ambiguities and bridge the serious gaps. Few critics ~~will~~ fail to pay tribute to the sincerity of
Arthur Stanley Eddington

Eddington's "personal genius and insight." These and other qualities enabled him to "spin the gossamers as well as forge the anchors of the mind" and who shall say what of his work future assessors will regard as his profoundest contributions?

The name of Eddington will always be associated in the minds of astronomers with some of the great peaks in the advance of this science in the last three decades: the first verification of the Einstein deflection of light from Eddington's eclipse photographs at Principe Island and Crommelin's at Sobral in May 1919; his recognition of the importance of radiation pressure as a prime factor in stellar stability; the theoretical calculation of stellar diameters and of the density of Sirius B; the Mass-Luminosity law; the central temperatures of stars; interstellar gases; the age of the universe. His books in these fields are *The Internal Constitution of the Stars* and the non-mathematical smaller books *Stars and Atoms* and *The Expanding Universe* and his Bakerian and Halley lectures.

Eddington's three books dealing with philosophy and physical science are already mentioned. Add to them his Swarthmore lecture *Science and the Unseen World*, and we have a body of literature, rightly so called, for it has great literary merit as well as being a source of penetrating honest thought and brilliant exposition. With rich metaphor and striking analogy, sometimes with subtle humour and sparkling wit, the symbolism of mathematics is translated into words as he unfolds the significance of relativity and quantum theories, wave mechanics, indeterminacy, theory of groups, probability, and speculations in cosmology.

In compiling his philosophy, Eddington recognizes that the problem of experience has dual aspects—experience resulting in sense data in the realm of physical science which embraces all that is measurable, and a different but complimentary kind of experience which is an awareness of values and of the significance of things immeasurable and unseen save by the eye of the soul. No philosophy is complete which does not include both types of experience. His philosophy of science dealing with the symbolic world of physics is best described as Selective subjectivism and Structuralism, to use his own terms. But the same urge from within man's spirit which drives him to seek truth and evaluate experience in the

Arthur Stanley Eddington

physical world, drives him with equally logical reasonableness to seek truth through spiritual apprehension, and to evaluate experience of beauty in nature, in art, in human personality, and in "the sense of a divine presence irradiating the soul." Faith, he insists, is fundamental to both approaches to the problem of experience. "In an age of reason, faith yet remains supreme, for reason is an article of faith."

* The modern world owes much to the Society of Friends which has produced many men of great and good influence. This debt is immeasurably increased when we remember that Arthur Stanley Eddington was of that company of devout seekers after truth.
Cum illo sint animae nostrae.

Queen's University,
Kingston, Ontario,
~~1911~~ December 6
1953 Oct. 20.

WEDNESDAY, OCTOBER 21st

- 9:30 - 10:00 a.m. — Morning Worship, conducted by the Rev. F. J. Whiteley, B.D., Picton, Ont.
- 10:00 - 11:30 a.m. — "Light as a Component of Theology." Rev. L. M. Outerbridge, Ph.D., Lennoxville, Que.
- 11:30 a.m. - 1:00 p.m. — Third Chancellor's Lecture: "A New Philosophic Basis for the Claim of Revelation." Dr. Bosley.
- 1:15 p.m. — Luncheon, followed by Annual Business Meeting.
- 4:30 - 6:00 p.m. — Reception of Members and Friends by Principal and Mrs. S. M. Gilmour, East House, University Grounds.
- 8:00 p.m. — Induction of Rev. S. M. Gilmour, Ph.D., D.D., as Principal of Queen's Theological College by the Presbytery of Kingston.
Inaugural Address: "On the Training of Ministers."

THURSDAY, OCTOBER 22nd

- 9:30 - 10:00 a.m. — Morning Worship, conducted by the Rev. E. I. Johnston, B.D., Inverness, Que.
- 10:00 - 11:30 a.m. — "Jesus and the Gentiles." Rev. R. K. Shorten, S.T.M., Seven Islands, Que.
- 11:30 a.m. - 12:30 p.m. — Fourth Chancellor's Lecture: "Revelation Through Religious Experience." Dr. Bosley.
- 12:30 p.m. — Closing Service of Worship, conducted by the President of the Association.
- N.B. — The Communion Service, the morning Acts of Worship and the Closing Worship Service will be held in Morgan Memorial Chapel. The lectures and the Induction of the new Principal will be in Convocation Hall.
- Paper other than the Chancellor's Lectures will be about forty-five minutes in length and will be followed by discussion.

Leiden Observatory
Researches Past & Present

Montreal Centre
R.A.S.C.
1956 Dec. 13.

Leiden Observatory - Researches
Past and Present

- I Personal interest in Leiden - Cosmology & de S.
Oort's papers on Rotation of the Galaxy
and S. Plaskett's 1926.
Dr W. de Sitter's visit to McMill 1932-3
Seeing Dr. Oort receive the Gold Medal
of the R.A.S. in Burlington H.
on his first visit to England
after the 1939-45 war
in 1946 May 10, & see Leo Darwin Lecture
8 years after he invaded Holland
Visiting Leiden Obs. in 1948
Seeing van de Huls receive
the 2nd Eddington Medal
of the RAS in 1955

II Early history

1633 - 1861 - on roof of main
Univ. bldg. - an aid to teaching
first obs. in the world to be connected with
Jacob Gool (or Golius) brought a telescope
the great Quadrant owned privately
by Willem Snell (Snellius) in 1632
Read p 10 - Golius life

The only still existing observatory older than Leiden is The Vatican Obsy founded in 16th Cent by the great Pope Gregory XIII (Greg. calendar fame)

Scaliger - Julian Day calendar 1582
The continuous number of days since BC Jan 1 4713
(Dec 13 is J.D. 2435821.
was a professor at Leiden

SLIDE 1 1670

1682 Obsy enlarged by De Volder
-1705 Brass sextant purchased.
2 more quadrants
telescope with 2 objectives
18 ft + 50 ft focal length
2 clocks showing seconds

1861 - New obsy opened by Prof^{Helmer} Kaiser
Kaiser's revision of orbit of Halley's Comet
giving time of perihelion passage 1835
which proved correct to within 1 1/2 hours
1500 piles beneath bldg, 100 under each pier of Meridian C.

Botanical Garden behind SLIDE 2 1933

1872 Succeeded by his son P.J. Kaiser

The 1887 1st intl. conf. in Paris led to plans for Carte du Ciel & this led to first photographic telescope at Leiden & at Groningen. The plans & activity of J.C. Kapteyn (chair of astron at Groningen 1878) who had been a Leiden observer 1875-78.
34 cm aperture 524 cm focal length

1919 Reorganization
Director W. de Sitter
(prof since 1908)

Asst Director E. Hertzsprung

Sr. Staff member J.C. Kapteyn
J.H. Oort

Astrophysics One time known as P. Krüger

Statistical astronomy

Theoretical astronomy

The great period of Leiden research was about to begin -

III Outstanding researches

i. de Sitter - relativity

Jupiter's satellites

& the measurement of Time.

ii

Engjar Hertzsprung (Dane, Rotterdam, Leiden)

1. Grant & dwarf Terms
+ abs. mag — Sp. Class diagram
independently Russell
∴ H-R diagram - 1905
2. Proper Motions & Moving Clusters
esp. Urs. Major cluster with
members in all parts of the sky
(including Sirius 40 members
in a disc shape with plane
⊥ to galaxy + diam 130 l.y.
3. H + Shapley (Lowell) independently
studied diffuse neb. with dark line
Spectra + ∴ reflecting light from
associated stars - often B + O
+ this led to Hubble's researches
on inv. sq. law of neb. luminosity
+ reflection, abs + re-emission.
(ex. Pleiades - reflection spectrum)
4. Distribution of globular clusters
found to be about a centre
in the dense star clouds of Sag.
1912. Later work by Shapley
on Glob. Clusters + star counts.
i.e. centre of galaxy.

5

iii

- 1851-1922
- J.C. Kapteyn - Though Prof. of Astron
at Groningen remained an Asst
Director of Herden Obs.
(a half day drive from G. to L.)
1. 1904 - The Two Star-Stream Theory
leading to the monumental work of
K. Schwarzschild (Göttingen) ^(collaborator) and
as Eddington (Greenwich) ^{Two-Draft Theory} 1906
 2. 1900 Completed the Catalogue of Southern
Sky from plates of Gill at Cape.
 3. 1906 "Selected Areas" 206 distributed
evenly over cel. sphere
Kapteyn was a born Generalissimo
a planner + coordinator
+ inspirer of team work
 4. 1922 - Luminosity Law: rel. freq
of stars of various abs. mag.
K. in 1922 gave estimate of
nos. down to 13^m. (vis)
 5. pub. 1923 Dimensions of our Galaxy
as flattened disc 100,000 ly diam
10,000 ly thick
from extensive statistical study up
to time of his death

Intimate friend of as Eddington - letters
shel. tribuli: This was the rare gift of intuitively grasping the
sunny aspects of every experience of life.

iv J. H. Oort - Director of Leiden Obs. succeeding de S.

- 1. 1926-27 following pioneer theoretical work of Lindblad (Sweden) Oort dev. formula for testing Rotation of the Galaxy & finding Coord. of C.g. distance to Sun, vel. & period of Sun - (J. S. Plaskett)
- 2. Interstellar matter - culminating in researches on hiding during Ger. occupation of Holland 1940-45
Its irreg. distrib., containing both gas and solid ptcls, assoc. of O & B stars with clouds, obscuration, motions up to 20 km/sec & friction & luminous interfaces, evaporation & condensation are sensitive to density - est. 10^{-24} g/cc
Interstellar matter in ext. galaxies may lead to formation of spiral arms
- 3. Inspired his assistants with urgency of ^{finding} method of recognizing the presence of hydrogen thru diffused or in clouds betw stars
Result. van de Hulst 21-cm.
- 4. Halley Lecture 1951 on Comets in Oxford.
Sizes of ptcls around head & coma
1 cm & dust, dens 10^{-13} air.

masses of comets $\frac{1}{3 \cdot 10^8}$ mass of Earth

Oort believes nucleus solid arguing from periodicity of development of shells of gas & stability considerations.

Tails. Elect. mag. forces \gg rad. pres. in expelling matter into tail

High speed electrons from Sunspot can cause high accelerations of coma material esp CO+ into tail.

Sudden variations in tail due to variation in sunspot emission of high vel. ptcls. The strong curvatures may be light pres.

Old age of a comet & source of new Comets.

5. Radio Astronomy -

v.

van de Hulst

at the IAU Symposium on Radio Astr. at Jodrell Bank Aug 1955 in the session on 21-cm H radiation

"the Leiden group deserves the blue ribbon"

Oort, van de Hulst, Westerhout & Schmidt

1. 3 Arms of our galaxy beyond Sun from Cygnus to Sirius $\pm 10^\circ$ of gal. equator - spirals in slightly different planes - (Westerhout)
2. Inner parts of our galaxy (Schmidt spiral continues to within 10,000 of C. of G. with Sun 26,000 ly out adding 1 + 2. spirals extend from 10,000 to 40,000 from C. G.

The close cooperation of Mt Palomar (D. Baade) and the Radio astronomers.

Many outstanding problems remain as a challenge - It would be sad were it not so
 In 397 AD St Augustine wrote
 Courage my mind and press on
 Press on where truth begins to dawn
 mightily

Immensities of Time & Space

1958 Jan

Time & Space - what an enormous amount of philosophical thinking has grown up around these two words.

Time "like an overflowing stream"...

Space - Euclidean or non-Euclidean?

Immensities of Time

Archbp. Usher 6006 B.C. < 8000 yrs.

Lord Kelvin $20 \cdot 10^6$ yrs.

Radioactive rocks & Meteorites $5 \cdot 10^9$

Modern estimates $< 10^{10}$ yrs.

Read J.H. Jeans on mankind on earth.

Immensities of Space

Read A.S.E. at Centenary

p. 119

Read A.V.D.
" Earth-Moon $1\frac{1}{4}$ sec
" Sun $8\frac{1}{2}$ min
" Cent 4.4 years.

- Milky Way 30000 l.y.
- M31 $1\frac{1}{2} \cdot 10^6$ l.y.
- distance galaxies $> 1000 \cdot 10^6$ l.y.

Mt Palomar 200-inch 500 10^6 l.y.

SLIDES

1. Atmosphere
2. Sun - planets scale
3. orbits
4. "
5. Dec sky. S
6. Jan S
7. Dec N.
8. Zodiacs Crivell^m
9. Quadrant - 1576 woodcut.
10. Hevelius, Danzig 1690 ±
11. 16th cent woodcut
12. Galileo d 1642
13. Newton
14. G's tel 1611
15. N's "
16. 40"
17. 100
18. 25" near stars
19. 25"
20. Sirius A, B.
21. Perseus Cluster
22. Milky Way & Pers.
23. " " of Opt.
24. " Cygn.
25. Cluster Her.
26. Orion.
27. "
28. G^oms
29. Herschel Chart
- 30 } C. G
- 31 }
- 32 M51
- 33 M42 & Coma.
- 34 M33
- 35 M81
- 36 Radiated Haw. 60 ft
- 37 Mills X
- 38 "
- 39 Jodrell Bank
- 40 Cas.
- 41 Cyg.
- 42 Chart of galaxy
+ arms
- 43 " " ext. gals.

In the Dynasts, Thomas Hardy presents the Spirit of the Years hovering above the earth contemplating the doings of mankind and exclaiming "- This terrestrial tragedy," whereat the Spirit Ironic adds - "or comedy." It is only as one sees this earth in its astronomical setting and in the perspective of the astronomical time scale that it is possible to begin to evaluate and assess the record of history. Viewing thus the page upon which mankind is writing his hieroglyphics, with the long vista of the physical world stretching far out both before and after, (Herbert Spencer was oppressed (and the apparent unimportance and futility of much human effort weighed very heavily upon his mind.)

we are often

The intolerance, superstition and barbaric savagery of so much of human behaviour (not only) oppressed the keenly sensitive spirit of Voltaire but goaded him into action. In one of his rapiers-like efforts to tear the veil from men's eyes that they might see and act with sanity and justice instead of making this earth a hell through war, greed, and fanaticism, he conjures up a man from Sirius, and another from Saturn, in order to bring into sharp focus in its universal space-time setting "this terrestrial tragedy." One of the greatest thinkers of our own day, General Smuts, likewise feels the necessity for this cosmical perspective. In his (Holism and) (Evolution) he makes it clear that a satisfying philosophy must bring into one field of view the problems of the physical world, of life, of mind, and of spirit. "In ever varying degree," he writes, "the universe is holistic and organic through and through----- The great values and ideals retain their unfading glory and derive new interest and force from a cosmic setting."

and

2004/04/04

→

writing

What then is the challenge to mankind, contemplating the immensity of space, the vastness of time, the majesty of law & order & harmony in the universe of stars & atoms?

Are we going away tonight appalled & appressed
by the vastness of the universe - the immensity of
time & of space brought ~~before~~ ^{applied} to our minds by these
slides - or are there other reactions more logical?

It is a challenge accompanied by
Great HOPE, for the future of mankind
on this planet is so vastly long that given
more & more people trying individually
to play the game of life, an approach
to the order & harmony of the outer
universe ~~will~~ ^{may} eventually ~~be~~ ^{revere} through
slowly be attained ~~in~~ the earth.

The day of nationalism must pass. The
Slogan of the unskateers must become
an international slogan. All for one
and one for all - Thus only can
there be established upon the earth some
semblance of the majesty, beauty and
harmony of the universe of stars.

IMMENSITIES OF TIME AND SPACE

All the records of history, archaeology and ethnology point to the fact that man in every age and in every country seems to exhibit a curiosity about his environment and about himself. The former leads to science, the latter to religion and philosophy.

The development of astronomical knowledge and speculation can be studied from Babylonian and Assyrian times, through the Greek period and in the writings of arabic scholars down to the immortal work of Copernicus, Kepler, Galileo and Newton who opened the way to modern science based on observation, experimental method and a mathematical foundation.

The combination of spectroscopic and telescopic investigations has made possible the advances in astrophysics whereby the physical properties of stars and gaseous nebulae as well as of distant galaxies are determined. Some of the nebulae appear as vast turbulent masses of glowing gas, luminous partly because they reflect the light of nearby stars and partly because the ultra violet light from very hot stars stimulates the atoms of the nebula to emit their own distinctive radiations. The problem of nebulium was solved after 63 years when nitrogen and oxygen were found responsible for some of these radiations.

Our galaxy may be pictured as a lens-shaped aggregation of many thousand million stars, with the sun, earth and other planets not at the centre, but well out towards the rim.

If one could travel beyond our galaxy, phantom patches of light would beckon in the distance, each of which on closer inspection would be revealed as a galaxy very like our own. There are one hundred million of these "island galaxies" estimated to be within a radius of 500 million light years, the probable distance of the faintest image on Mt. Wilson plates as examined by Dr. Hubble.

The spectroscope shows that the displacement to the red of spectrum lines is greater the more distant the galaxy. If this be interpreted as a recessional velocity, it leads to the Lemaître theory of expanding space. A. E. Milne suggests alternative explanations involving the time scale and leading to interesting meta physical conceptions involving the mutability of the laws of nature.

The success which has attended man's efforts to solve some of the problems of space and time, and the vast picture of an ordered universe that he has unfolded are a challenge to mankind today to view the discord and tragedy of terrestrial things against a cosmic setting and turn his attention to the international task of establishing upon the earth some semblance of the majesty, beauty and harmony of the universe of stars.

Synopsis of Lecture at Roy. Can. Inst.

Sent to Sec. by request

1941.

... ..
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Stellar Universe

SCM Banquet
1956 Mar 16.

1. Over the centuries man has learned a great deal about the earth on which he finds himself. He looks both ways to the microscopically small and deep into atomic structure, and he looks out farther & farther into space with telescopes and probes far out into the universe by means of radio telescopes.

atoms & stars
aggregation of atoms in molecules and
" " stars in clusters & galaxies.

2. In both directions, the very minute & the exceedingly vast we find law & order, even if it be statistical order and we find MYSTERY

Man a spark of the divine, views mystery as a challenge to seek & search & strive for further knowledge & mystery awakens in man a wonder, an awe, a reverence for the great Master Mind.

man is a being whom beauty & mystery challenge & to whom TRUTH matters.

1. Scales
2. S. Sky
3. N. Sky
4. Copernicus d 1543
5. Galileo d 1642
6. " Tel.
7. Newton 1642 - 1727
8. " Tel
9. Yerkes 40-mch
10. Mt W. 100-mch
11. Pleiades South Sky 7. 2 diagrams
12. Macstlin 1579 " slides.
13. Galileo's tel 36
14. Photo 2616
15. Orion's belt + sword 30' + 150'
16. " nebula
17. " region in blue + red
18. Arm Galaxy
19. Milky Way in Aph.
20. " " " Sag + Scap.
21. " " " Cygnus
22. Star cluster in Perseus 5 or 6 stars
23. M3. Herc. Cl.
24. Horse Head neb
25. Cygnus neb.
26. M31
27. M31
28. M31
29. Leo cluster H + dust + young stars
30. 310 stars
31. M. 81
32. Rab + sim.

Some
Scales
Bolt
Safe

36 slides
to p3

92 elements H To Uv.

H in the Universe overwhelmingly the most abundant.

1p + 1e.

H in stars

H gas throughout interstellar space
1 atom/cc.

→ New Br. supersonic Fairchild Delta II jet plane
(outgives) 1132 mph - 8.8 days to moon
9.35 yr. to Sun.

∴ spring onto a reflected beam of sunlight

1/4 sec to the moon.

8 1/2 min to Sun

4 1/2 years to nearest star. Define l.y. -

30,000 years at C. of Galaxy

40,000 years farther
+ out thro integral space

for 10⁶ or more years.

500 10⁶ l.y.

Tajore + Einstein

2 Truth sections - poet mystic
math scientist mystic

Read Ein in Frank's book. p 284

Read Tajore on the music of the spheres
p. 42
p. 36

Life is a constellation, an
unplumbed dark stream with
starry moments.

and for Tajore as for us the starry
moments are those when our spirits
feel the Touch of the divine, the
presence of our King & our God.

Address to Postgraduate Students
Society of Queens U.

1951 Feb. 27.

The Union.

The Spirit of Seeking

The Spirit of Seeking -

Intro: Post-grad. students - just entering into the experience of that intense inner compulsion to seek truth, to shed at least a ray of light on some of the problems in some sphere of human activity.

2. Faith that there is something to be found - faith in order in the existence of relationships between phenomena in nature & in man's reactions mental, emotional & physical of various kinds.

1. Curiosity: What? where? when? how? why? Dostoevsky: "No one is only, riddles" ^{the mystery of life}

3. Imagination i. Sean O'Casey: The dramatic fancy that creates myths is the raw material of both poets & sci.

ii. Sir David Brewster: The first gift required for the researcher is the gift also of poet & artist - a vivid imagination.

4. Critical judgment - example Louis Pasteur's valley Rabot
"In experimental science it is always a mistake not to doubt when facts do not compel you to affirm."
Be your own severest critic

Truth seeking - What is truth? Bacon's Essay
Martin Johnson: science & the meanings of truth -
"Coherent communicability of logical forms of pattern -
The truth of science not contradictory to poetic vision but complementary."

Without trying to define Truth, let us look at the story which the Hebrew historian Esdras tells us about the young men at the court of Darius King of Persia
"As for Truth it endureth & is always strong, it liveth and conquereth for evermore - Great is truth and might above all things" "Then the King said unto him, Thou art found wisest."

Truth Seekers - research students can feel themselves of a great company through the centuries.
We are the best

Record of growth of Knowledge in every field is a great international record.

Physics

Archimedes
 Lucretius
 Galileo
 Newton
 Boyle
 Pascal
 Clerk Maxwell
 Zeeman
 Planck
 Doppler
 Rutherford
 Rydberg
 Bohr
 Kapitza
 Saha
 Compton
 Sternmetz (16)
 Hm

Geol.

Theophrastus
 Steno Dane. Crystal
 1669
 J Hutton Scot.
 Werner Ger
 LeMarck Fr
 Wm Smith Eng
 Dana USA
 Logan Can
 Federov. Rus
 de Lier Swed
 Voigt Nor.
 Molengraff Dutch
 Suess Austri

(13)

Hist

Thucydides
 Herodotus
 Tacitus
 Caesar
 Maccabees
 Brantome
 Gibbon
 Carlyle
 Bryce
 Trevelyan

Creative Literature

Homer
 Author of Job
 Dante
 Shakes.
 + Milton
 Goethe
 Moliere
 + Voltaire
 Cervantes
 Tolstoy
 + Austen
 + Scott
 + Swift
 Ibsen
 Tagore

(12)

(7)

Elect Galvani ampere oerstedt Kelvin
 Volta Ohm Faraday B Franklin (7)

centuries described by T.H. Huxley as "filled with the divine afflatus of the Truth Seeker!"

USA industrialist - employ the technically well trained man who knows most about a wide range of other things.

Einstein on award of Gold medal of R.A.S. Feb 12, 1926
"He who disc. a line of thought wh. permits us to penetrate a little deeper into the eternal mystery of Nature is greatly privileged - He who in addition is encouraged by recogn., sympathy & help. from the best minds of his time experiences more happiness than anyone can realize."

Scholars
~~Truth Seekers~~ by the very nature of their quest must have the highest ethical standards.

Scholarship implies the ultimate in honesty
it presupposes high faith in honesty

In so far as you are scholars engaged upon scholarly research, you belong to the great company of men & women down through the centuries described by T.H. Huxley as "filled with the divine afflatus of the Truth Seeker!"

A Half Century of Astronomy

*R. A. S. C.
Montreal Centre
1951 Jan. 25.*

RETURN
ENGAGEMENT

It is always an event when Dr. A. Vibert Douglas, former Secretary of the Montreal Centre, comes back to visit us. There was a record attendance for her lecture on "A Half Century of Astronomy" on January 25th and officers of the Centre had the added pleasure of her company at an informal dinner prior to the meeting.

1951

1. Knowledge of Physical Universe about 1900

The great synthesis of Energy had
taken place Heat, Light, Sound, Elect,
Mag. — potential, Kinetic.

Slide 1 Review of Energy

Hertzian waves 1888 — Rutherford 1895

Röntgen Rays 1895

had watched in infancy.

J J T — electron 1897

Planck's Q Thry 1900

Punch over.

Rutherford's nuclear atom 1911

Bohr — electron states 1913

Punch Jan 3, 1951.

Thoughts in the New Year.

The first half of the century
for fifty years it ran
But nobody can quite agree
In which year it began
Whether too early or too late
The difficulty is not
Entirely when to celebrate
Nor even how, but what?

1.

Lorentz, FitzGerald Michelson. Merley
18 1887.

Poincaré in Paris 1900

questioned whether aether had any
real existence

1904 Special Relativity

1905 Einstein $E = mc^2$

1915. Einstein's General Relativity

Mach-Einstein metric of spacetime
may be determined wholly by the
masses & energy present in universe.

Spacetime cannot exist at all
except in so far as it is due to the
existence of matter

hence Einstein's modification of Gen Rel
in 1915
De Sitter -

grav was now absorbed into geom
but other natural forces were still forces
in Newtonian sense. Try to formulate

a geom to absorb all.

i.e. Complete geometrization of physics

Rebuild Geom.

Levi-Civita (Rome) 1917.

Euclid, Bolyai, Lobachevski

Levi-Civita affine geom.

Weyl 1928. Eddington

Einstein's latest?

Lemaître - expanding space -

1927 - - 1930.

Instrument since 1900

100-inch Mt. W., 1917

72-inch Vix B.C. 1919.

more recent, i.e. since 1935

200-inch Palomar.

120-inch Lick

82-inch Mt. Lick, Texas.

74-inch Preston S. af.

74-inch David Dunlap Ont.

69-inch Perkins Delaware.

100-inch Isaac Newton tel. Roy. Obs. Herstmonceux

Tower Tel - Solartwork.

150 ft. Mt. W.

120 ft arcetri - Italy.

Spectroheliocope - Hale 1924.

Schmidt tel - sph. mirror + thin covering
glass plate. 1930.

Coronagraph - Lyst. 1931 Meudon, 8500' alt.
Pic du midi.

Photographic plates + filters for uv + infrared

Stellar Interferometer Michelson 1920

Radio + radar in astronomy

Spectroscopy + atomic structure

Developments in this century

1. Solar gases - chiefly H -
 increasing He -
 some 70% of known 98 elements
 definitely identified.

Compounds - esp. in cooler parts of
 solar atmosphere. Sunspots -

CN, CH in gen. spectrum

NH₃, MgH₂, CaH₂, TiO₂, HO in sunspots.

Problem of Coronium Fe Ni Ca A

Edlén 1941 (9 to 15 electrons gone)

Fe⁹⁺ Ti¹³⁺ Ni¹¹⁺ Ca¹²⁺

2. Planetary Atmospheres + Comets

CO₂ Venus - 10⁴ x earth's CO₂; not enough O + H₂O
 to affect spec.

Mars v. little O₂ < 1% Earth
 H₂O < 50%

NH₃, CH₄ Jupiter, Saturn + nature of ring
 possibly ice particles.

Satellite Titan of Saturn

CH₄ + perhaps NH₃

CH₄ Uranus + Neptune.

Comets Head CN, C₂, near nucleus CH, CH₂, NH₂, OH

further out NH, H₂, H₂O, H₂CO

3. Interstellar lines

Hartmann 1903 K line in Sorionic

Ca Na K Ti⁺ Fe H O⁺ O⁺⁺ N⁺

Ca⁺

CH

CaH⁺ CN

Interstellar matter in mass = Σ stars.

10⁻²⁴ gms/cc or 1 to 10 atoms or molecules/cc

Stromberg
 H I
 H II
 H III
 H IV
 H V
 H VI
 H VII
 H VIII
 H IX
 H X
 H XI
 H XII
 H XIII
 H XIV
 H XV
 H XVI
 H XVII
 H XVIII
 H XIX
 H XX
 H XXI
 H XXII
 H XXIII
 H XXIV
 H XXV
 H XXVI
 H XXVII
 H XXVIII
 H XXIX
 H XXX

4. Temps - vague before this century

Sir Rbt Baell 1893, reprinted 1906.

Solar temp 7500 or more

Solar Radⁿ abbot C.G. 1905 Const 1.94 cal/min per sq cm.

Infra red star ϵ . Aurigae A - 1200
(2797)

N - 2500

G - 6000

B - 18000.

Core star of planetary neb. 100,000
as evidenced by O^{+++} lines in neb.
Bomen, Calif. 1940.

Central Temps -

Eddington - Internal Constⁿ of Stars

his recogn of importance of Radⁿ Pres.

5. Stellar Energy. "Thermo nuclear reactions"

1. at central temp 500,000 To 10^6

" simple proton-proton reactions
hence deuterium and ejected positron
+ a free el. \rightarrow radⁿ.

2. deuterium + proton \rightarrow He³ + radⁿ.

3. at central temp 2×10^6 to 9×10^6

protons - Li or Be or B

3. at central temp 20×10^6 . (solar) Carbon cycle
Bethe 1939.

Gamow. 8% only. 92% are \perp

6. Densities - Theoretical av. for universe

- Interstellar matter
- Infra red star
- Range of visible stars ρ

→ The White dwarfs. Sirius B. ρ 30,000 \pm
 ASE. March 1924 MNRAS. 110m/cc
 WS Adams. 1925
 Verifying Einstens Rel. Thy. also.

5% of stars white dwarfs Luyten
 quoted by Gamov.

slide

7. Stellar Diamos. 19th Cent. theory

- Michelson & Pease 1920
- Super giants. Mira Ceti
- Betelgeuse

slide

8. Solar $\parallel x$ - Gross { 1930 Oct - 1931 June 2848 plates
 24 observations. 14 countries
 93,005,000 \pm 9,000 mi
Stellar $\parallel x$ + Scale of galaxies

1838, 39, 40 Bessel, Henderson & Struve.

1915 200 $\parallel x$ determined.

1925 2000

1949 10,000.

1912 Leavitt - Shapley Per-Lum-Law.

1914 Adams & Kohlschütter Spec. $\parallel x$

Our Galaxy 100,000 ly \times 10,000 P.y.

⊙ 30,000 from C.G.
 Rotation - Dordt, J. S. Plaskett.

M 31

1922-24 Hubble - Cepheids 900,000 l.y.
 Shapley - Hubble. also light \therefore 700,000 l.y.

9. Red Shift relation - 1925
Slide
Masses of galaxies 10^9 to 10^{11} suns
av. dist.
Nos. of galaxies.

10. Cosmogony Planetsimal CMM 1900
Origin of solar system - J.H.P. H. Jef.
Hoyle & Lyttleton, Edgeworth
Weizsäcker.

11. Cosmology
Einstein, de Sitter, Lemaitre,
Eddington -
Unifying principles
Fundamental Theory
Edd. Take no.

dispersal of galaxies obs. 560 km/sec/megaparsec
Theor. 572.

12. I.A.U. 1919.
1948 Zurich - 300 astronomers
32 countries.
New Commissions - Radio - Radar
Huge telescopes
Photo of stars
1951. Petrograd & Moscow

Astrophysical Results & Problems

Math & Physics Club.

Queen's -

1950 Dec. 6.

Some Astrophysical Results + Problems.

- SHDTS.
1. Solar Sp.
 2. Lines Coincidences.
 3. Reflected Sunlight. Venus CO_2 mass. $< 10\%$ earth's O
 4. AND DO Sun from blue sky. $< 5\%$ " H₂O much CO₂ Jup. CH₄ NH₃ -150°C. Crystals Sat. ditto.
 5. Mitchell flash sp. 1868 He yellow helios 1895 Ramsay in atmos. 1905 ± Rutherford 2 ptcl. 1914-19 He in nat gas. 1938 ± Gamov + Bethe. C. cycle giving 4H \rightarrow 1He + 3 γ + 2 positrons.
 6. Ca Chromosphere lines
 7. Secci Types
 8. H Draper Classes.
 9. DO Betelgeuse
 10. DO Rigel
 11. H — Paschen + Balmer Series Merrill
 12. Diff. intens + widths of Paschen
 13. " " " " Balmer " $\left\{ \begin{array}{l} 27 \text{ in } 5 \text{ lines} \\ 35 \text{ in U-V Sun} \\ \text{flash sp.} \end{array} \right.$
(widening, slit-turbulence, rotation, stark fields)
 14. Fields in Kopem. Helios
 15. Y. Peg. B2. strong Helios lines
 16. $\lambda 4471$ profile. + JST stark data
 17. $\lambda 4358$
 18. $\lambda 4026$
 19. Grottrian
 20. Doppler displacements in extragalactic Systems.

20. jobs for math + physics grads -

H₂ 6563
 B 4861
 Y 4340
 D 4101
 E 3970

H 3968
 K 3933

Silvanus P. Thompson
1951
Notes on Silvanus P. Thompson.

1951 June 8
Ottawa

1951 June 8
Library of Parliament
Ottawa

Sirvanus P Thompson, Bsc. L.H.S., F.R.S.

His life & letters

by Jane Smeal Thompson
& Helen G. Thompson, Bsc.

London: T. Fisher Unwin Ltd.
1920

b. Westminster June 19, 1851. Soc. of Friends.
d. 1916. buried at Jordans, Bucks.

published. 1898 Life of Faraday.
1910 " " Kelvin
1910 Calc. made easy.
1915 The Quest for Truth.
1918 a not impossible Religion (posthumous)

and 12 technical books & translations

11 privately printed Lives & books.

Scores of papers in Phil Mag. Proc Roy Soc &c
and addresses.

Painting of mts, glaciers, sketch of Tyndall at R 1876
1894 at Ruffel dep. Matterhorn in storm & rain. juvenile audience.
1911 ^{Cherryburn} ~~Cherryburn~~
Finsbury College - Roy. Inst. home in Banbury also
Sir Wm Crookes, Ayrton, Bidwell, Perry &c.
Later W. Hampstead

Verse writing & music - loved Wagner.

steeped in Browning, Tennyson & Matthew Arnold

"These... inspired him in the prodⁿ of verses... read at
meetings of Westminster Portfolio Soc. in 1892
privately printed for the members... in little booklets
called Monodies"

p. 315 S.P. Thompson's 'little blue note-books'

One ref. to Warren's Death of Virgil.

" To know, to do, and on the tide of time
 Not to drift idly like the cockle-sailor
 Whose pearly challop dances on the blue,
 Fanned by soft airs and basking in brief sun
 Then at a cloudlet sinks, with scarce a ripple;
 But to steer onward to some purposed haven
 And make new waves with motion of our own,
 That is To live "

SPT sent this quotation to a friend, an Oxford man
 with the reproach, "What, you don't know the
 finest bit of English poetry that Oxford has
 produced since Matthew Arnold's time? Fix upon
 you . . ."

With Warren's lines SPT closed his
 Life of Kelvin.

from Dict. of Nat. Biography.

Warren J. B. L. 3rd & last Baron de Tabley
 Lord Warren 1835-95
 Eton and Christ Ch. Oxford

Wrote much poetry - 1st vol under pseudonym Geo. F. Preston
 'Tennysonian blank verse' sincere, some of it
 forceful & vivid, & some
 of it undistinguished.

E. Gore: "brocaded stately lines of his diction"

None of his verse is in Ox. Bk. of Eng. Verse. but in other anthologies.

Quotation from SPT's Quest for Truth

Truth is not to be found by refusing to seek it; nor in the quest must we count the cost. There are many ways of arriving at truth; many views of truth. There are other windows opening on to heaven than those of the nursery in which we were brought up; some are wider and some face toward the dawn."

From a letter to Sir Lodge 1912.

When mankind has really got into the scientific frame of mind in which the instinct will be to resolve problems by applying principles, and abhorring prejudice, there will be no chance of squabbles being settled in any other way than by law and arbitration, national and international.

Since Huxley's days there is no scientific man who has the ear of the public as you have, except the late Grant Allen, whose biology appealed ... and he had a poor philosophy behind him. You have the ear of the public. Have you realized that the public needs to be told, not once, nor twice, that our rulers, politicians, administrators, legislators, are — (That is 95% of them) trained

up in a non-scientific school of thought or no-thought; that their current measure of truth is — even when they are honest — of truth unsifted of truth that has never been tested by first principles?

Ref. to TH Huxley's grave in Fenchley Cemetery
 "Beneath afraid, ye waiting hearts that weep,
 For still "He giveth this beloved sleep",
 And if an endless sleep He wills — so best."

SPT defended the amateur "the cobblers who have become immortal by not sticking to their lasts". Herbert Spencer who left engineering to create a synthetic philosophy; Keats left surgery to write 'imperishable odes'; the curate of Selborne; Thos Hodgkin the banker one of the great historians of his age; etc.

Added joy of travel if knowing a little botany, geology, entomology etc.
 Linnaeus' fell on his knees in ecstasy before the golden gorse-bushes on Wandsworth Common — Thrill of wild narcissi above Lomsanne + Vevey, of michaelmas daisies in Canada, of Soldanelle in higher Alps. etc.

S.P.T. After Reading "Paracelsus"

"I shall arrive," he said, "in His good time
I see my way as birds their trackless way.
God guides me and the bird "O faith sublime
of him who dares aspire nor feel dismay
To learn the workings of the Master Mind,
To climb transcendent heights, nor look behind,
To win the secret of the Universe -

'Tis God who calls us to aspire - to KNOW;
For ignorance is the great human curse.
Knowledge is God-like: Though the way I go
I know not. By what crooked paths or plain
The circuit leads, the toil will not be vain
That brings me onward to the unseen goal.
Error decays, but knowledge shall survive.
Clear is the call. "I go to prove my soul.
In some time - His good time - I shall arrive."

'Optics and Artists'

In his note book, after seeing Rossetti's Beata
Beatrix "see the shadows on the dial; evidently
it was about 1 am in arctic circle with sun at
least 30° above northern horizon!"

School in Yorkshire - Friends' Flourens College

The U. of London. B.A. at 19. 1869.

Introduced to John Bright on that occasion
who said severely "Nature provides a very
convenient safety-valve for knowledge
too rapidly acquired -"

1876 in London heard public lectures by Tyndall
& Huxley - of Huxley: perfect flow of language,
graphic, perspicuous, simple - "as a speaker
he beats Tyndall hollow".

Publications on Elect & Mag., Dynamos,
Electromagnetic mechanisms, Polyphase
E.C. currents, Light visible & invisible,
Photographic optics, Crystals Tourmaline of fluor. & iron
acoustics, telegraphy, turbines, nitrates by
elect. prodn from atmosphere, harmonic analysis
etc etc.

Astronomy: Solar System
& beyond.

Queens Alumnae
& Univ W. Club

in B.R.H.

1951 Oct 2.

Man's Curiosity led to spec. about universe
Knowledge replaced older ideas - even more
wonderful than more logical:

Old ideas . geocentric univ.
Solar syst. + tides + zodiac etc.
+ planets, eclipses etc.
New ideas - Sept sky S + Dec S + Sept N
+ star fields + nebulae
+ Galaxies - M81

Beauty + harmony aesthetic appreciation

a similar aesthetic satisfaction from
the math relationships laws
+ revelation of physical nature
of universe -

Kepler - fragrance of ambrosia

3 quotations from K. letters
to Galileo, Graz +
Intro to 'Harmonice Mundi'
praise of ^{God the} Creator - poetry

The Origin of Earth
(Solar System)

1952 Jan 29.

To Miller Geol. Club
Queen's Univ.

1952 Jan 29
8 pm

1. Galaxies. SLIDES

Stars single binary + multiple, nebulosity

2. Our Sun. Solar system planets, satellites, asteroids + meteors, comets + meteors

mass of sun > 99%
" " all planets < 1%

Ang momentum of planets 98%
Regularities by pure chance $2 \times 10^{14} : 1$

Complexity of problem

* Weizsäcker - turbulence in a solar nebula of mass $\frac{1}{10}$ sun

primary vortices

ball bearing eddies site of concentration of matter

of Kuiper.

concentration is within the primary vortices

Kolmogoroff energy spectrum eddies in

Chandrasekhar normal turbulence meter
+ Ter Haar

$3 \cdot 10^9$ yrs since formation of proto planets

Roches limit + density determine distances

of planets + their proto planet densities
greatest dens. for inner planets

if self grav > suns tidal disruption

3. Kant 1755

Laplace 1796

C + M. 1910 Planetsimal

J + J. Tidal

Russell Binary

by Alclon capture

Banerji fission

Gunn supernova

Hoyle sh-mat

* Weizsäcker turbulence + ball bearing eddies 1941

of Kuiper primary vortices as proto planets

2 Gem. Castor 6 stars.

$A_1 + A_2$ P. 2.9 days.

$B_1 B_2$ P. 9 days.

A about B P. 380 yrs

$C_1 + C_2$ period unknown about $A+B$ very long period.
lines of Ca^+ , H 73" from $A+B$

Novae normal -5^m mag. 10 to 15 increase $\therefore > 200,000 \times$ luminosity
or energy output.

Supernovae. I -14^m .

$100,000,000 (10^8)$ luminosity of sun.

II -11^m

$10^7 \times$ luminosity of sun.

SLIDES.

1. Spirals in Leo
2. Group of spirals
3. 2 spirals
4. 2 spirals
5. Corona Borealis
6. Can. Ven. Whirlpool
7. M. 33 Δ
8. M. 31. Andr. 800,000 l.y.
9. nucleus M. 31
10. (H) galaxy diagram
11. Feb. Sky S. Ori. + Gem. etc.
12. Gem. 5 n.e. stars.
13. Orion nebs.
14. Lt " "
15. Lyrae veiled neb.
16. Ophiuchi neb.
17. " neb.

Telescopes and the Universe
they reveal

YMCA - YW. Club.
Kingston YMCA.

1953 Nov 26

1. Dec sky N.
2. " " S.
3. Jan " S.
4. Copernicus
5. Galileo
6. " tel 1610
7. Newton
8. " tel 1672
9. Herschel 4' 40" 1795
10. Flamsteed 1675
" transit
11. " transit - 0
12. Y.O.
13. " 40"
14. Great Pyramid 42"
15. Mt W.
16. " 100"
17. Solar Syst 5 - Mer.
18. " " 5 - Uran.
19. Pleiades
20. Maestlin 1579 "
21. Galileo . 1610 36
22. Herkypis 2616.
23. Orion $\frac{1}{2}$ hr $2\frac{1}{2}$ hr.
24. " neb.
25. " Horsehead
26. Cygnus. Swan
27. C of S.
28. Perseus Cl.
29. Colours of the Nebulae
30. Christian
31. Galaxy JSP.
32. M 31
33. " "
34. 2 spirals
35. Whirlpool 51
36. M 33
37. region of spirals
38. Solar Spectra
39. Veltar "
40. Dragon Sirius
41. " Belt & Min
42. Edd & de S

43. Eddem & Taylor
44. M 81

Astronomy

Kingston Nature Club.
arts Bldg. - 1955 Nov. 24

SLIDES

1. Sept. N
2. Dec N.
3. S. S
4. A S
5. Pleiades - maester 11
6. Galileo Pleiades 36
7. Hertzsprung 2616
8. Copernicus
9. Hevelius
10. Galileo 1610
11. Tel.
12. Newton
13. Tel
14. Y. O. 40"
15. Y. O.
16. Mt. W. 100
17. Mt W
18. Spectra
19. Runners
20. stars
21. Orion
22. " 30' 150'
23. " no fillis
Red fillis
24. " neb
25. " Kometta
26. Perseus cl
27. Harc cl. 100 globulars
28. clusters
29. Planetary neb.
30. big neb
31. " 6960 size.
32. N.A. neb
33. Milky way scorp
34. Hydra
- 35.

35. Exterior systems
Lesseo May. cl.
36. Andromeda of 31
37. M 31
38. M 31 with 10th Ven (40)
39. Plaskett merid.
40. C. of G. E
41. C of G. W
42. Spectra
43. Wheel pool M³¹ Cam Ven.
44. M 33 Δ
45. Red shift spectra
46. M 81 W. May
47. Newton
48. Eddington
49. Einstein + de S
50. " + Tagore.

like is a constellation - an
unplumbed deep shown
with starry moments

SCIENCE '44 CO-OPERATIVE

Annual Christmas
Dinner

SATURDAY, DECEMBER 7th, 1957
5:00 p.m.



DECEMBER 7th 1957

Menu

★

Celery Hearts

Olives

Sauterne

Fruit Cup

Hot Buttered Rolls

★

Roast Young Turkey

Cranberry Sauce

Savory Dressing

Giblet Gravy

★

Mashed Potatoes

Fresh Green Peas

★

Christmas Pudding
(Sauce)

★

Coffee

★

Port

★

Candies and Fruits

Programme

★

GRACE

Padre A. M. Lavery

★

TOAST TO THE QUEEN

John Foote

★

TOAST TO THE UNIVERSITY

Vir Handa

★

REPLY

Dean Douglas

★

INTRODUCTION OF GUEST SPEAKER

DON MacEACHERN

★

SPEAKER

Padre A. M. Lavery

★

THANKING SPEAKER

Joan MacPherson

Toast (Reply)
to University

Camp Dinner
1955 Dec. 3

Inside . 1956 Dec. 8.
1957 Dec 7 ?

The University
I thank you for giving me the honor of applying
1. Q. U. not one of the oldest like Bologna
where Dante + Copernicus studied
yet not one of the youngest - not one
of the largest yet by no means one
of the smallest - ^{was} equally important
to us because we are all a part of it.

Like all U. it is a community of
scholar teachers, and students.
Where old + young pool their
experience, their knowledge +
wisdom and creative ideas.
So that each may grow in
learning and stature toward the
fulfillment ^{as} thinking, responsible
individual.

2. We who are members of any one
U. will find ourselves at least to
some extent at home in a
university group anywhere in the
world.

It is a fraternity of world wide
scope.
I have talked with Univ. people
at Sci. or Educ. conferences
from 40 or more countries
+ every continent

I have visited Universities in
almost every country of Western Europe
across this continent also for 3 or 4 years
Almost exactly a year ago I was
talking on Astron. research in the
Southern Hemisphere with professors
+ students in Astoria Phys. Chem.
in the U. of Montevideo. They
spoke Spanish, some spoke a
little Eng. or more French.
I spoke E. + a little Fr. +
we had a tremendously interesting
time.

Wherever you go you will find

What we expect of U.
Knowledge
wisdom - ^{Barth}
proportion
comprehensive vision
sense of human values.
Rebelain - Sci - ^{Conscience}
all knowledge.

Toast to Univ
When? ^{Coop. D.}
Community of ^{Dec 8/56}
+85

Just
met as friends

Reality of This
Marburg
Tubingen
G. B.

" They say that books impire the mind
But only words do I find
a ~~thought~~ that has the depth and weight
of thoughts I think cogitate "

really
of
about
own
and

The University

I thank you for giving me the honors diploma
1. Q. U. not one of the oldest like Bologna
where Dante + Copernicus studied - not one
yet not one of the youngest - not one
of the largest yet by no means one
of the smallest - unusually important
to us because we are all a part of it

Like all U. it is a community of
Scholar teachers, and students.

Where old + young pool their
experience, their knowledge +
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so that each may grow in
learning and stature towards the
fullest ^{as} thinking, responsible
individual.

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It is a fraternity of world wide
scope
I have talked with Univ. people
at sci. or edu. conferences
from 40 or more countries
+ every continent

I have visited Universities in
almost every country, Western +
across this continent also Jan 3 - 5 am sat
Almost exactly a year ago I was
talking on Astron. research in the
Southern Hemisphere with professors
+ students in Astor, Phys + Chem
in the U. of Montevideo. They
spoke Spanish, some spoke a
little Eng. or more French.
I spoke E. + a little Fr. +
We had a tremendously interesting
time.

Wherever you go you will find

" They say that books improve the mind
But only rarely do I find
a ~~thought~~ that has the depth and weight
of thought I think cogitate."
So said the poetic Penguin of a cartoon series
of yesteryear. But a University is built around
a nucleus of books and university men and women
have the special privilege of having time set apart
to learn to know and to love books. To be able to
read books appreciatively, imaginatively and critically
to be ~~equipped~~ is of immense value -

Q 116

Yale & Harvard Key.
~~Col. Pam OTC~~

Tradition

Christmas . good w. helpfulness
in selfishness

news in hist. some - ditto
Whereas who god Columbus
was
initiated & carried out by Unit-men & as
with fraternity of scholars. shield
On behalf of this V. ^{& seeker after truth}

Dec. 1957

Reply to Toast to University

Queens Ch. Fellowship
Annual Banquet
1956 Mar 2 -

Cordoba - 800-1000
centre of arab learning.

Mr Furber (Bermuda) Pres. & CF
introductory remarks
In the beginning, God...

Now a spark of the divine
in a universe in which
from the beginning, God...

End 12th Century Paris Theol.
Bologna Law.
Salerno Med

Many more in following centuries
throughout Europe.

Eng. Oxford 13th Century
Camb 1281 Peterhouse
London 1836.

Scotland St A. 1411
Glasgow 1450
Aberdeen 1494
Edin 1552

Ireland TCD 1591

Love of Truth & Truth seeking
Courage to face truth & all
its implications.
High faith in honesty is the
hall mark of the Scholar.

The Universe - Facts and Fancies

Charlmes Church

Sunday evening Feb 13

1955

A. Any study of the Universe must begin with You - the Observer.

Your senses of touch, smell, hearing do not carry you far beyond your immediate environment but sight with its increased range due to telescope photography carries us out in space and back in time to unimaginable but not fantastic distances.

SLIDES

- B. The Universe - man's power of observation, curiosity, imagination
1. Homeric cosmology 1000 B.C.
 2. Anaximander 600 B.C.
 3. Egyptian Universe
 4. " Symbolic Universe
 5. Indian cosmology
 6. Ptolemy's geocentric system 1170 A.D.
 7. Quadrant of observer wood cut 1546
 8. 16th century wood cut - Wanderer
 9. Galileo's telescope 1610
 10. Reflecting telescope 1672
 11. Dec. sky Pleiades 7
 12. Max Planck of Tübingen 1879 11
 13. Galileo's drawing 36
 14. Huygens prism - Pleiades 2666
 15. Newton 1642 - 1727
 16. Reflecting Tel. 1672
 17. 40 "
 18. 100 "
 19. Jan sky 5.
 20. Orion neb
 21. Horse head
 22. Cygnus
 23. " N. Am. 3 hr. 75 Rm
 24. P. Oph. 10 in eye glass
 25. Herschel 1800+
 26. Plaskett 1930 E
 27. Hubble 1910
 28. From C. of galaxy. Sag + Oph.
 29. Perseus D cluster
 30. external systems
 31. " "
 32. Triangulum
 33. Whirlpool
 34. M 31
 35. M 81 was mag
 36. M 81 was mag
 37. U.S. Ed. Another Sci. M. J. etc.
 38. Einstein + Tolosa.

Eq.
 Simon 86
 Ptolemy 300
 Rigol 540
 Orion Neb 1600
 M 31 1510

Stars, galaxies
& telescopes

Out. Mast.
1956 Nov. 11

- | | | | |
|----|---------------------------------|-----|--|
| 1 | Sunset (dawn) | | |
| 2 | Dec 5: | | |
| 3 | Pleades maestlin " | | |
| 4 | Gal. tel | | |
| 5 | Pleades 36 | | |
| 6 | " 2606 | 32. | Ext. systems |
| | | 33. | M 31 |
| 7 | Tch 5 | 34. | Coma effem sp. ^{5 h} _{5 exp} |
| 8 | Orion tel, | 35. | 2 shells |
| 9 | " horse hair | 36. | 2 " |
| 10 | nov. N. | 37. | M 33 |
| 11 | Cygnus | 38. | M 51 |
| 12 | Hevelius | 39. | M 81 U. Maj |
| 13 | Newton Tel 1672 | | |
| 14 | Paris obs, 1667 | | |
| 15 | Greenwich. 1675- | | |
| 16 | " " | | |
| 17 | " Transit | | |
| 18 | Yerkes | | |
| 19 | " 40-in | | |
| 20 | " Intl group 9 nationalities | | |
| 21 | Mt W. | | |
| 22 | Mt W. 100" | | |
| 23 | " Solar T. | | |
| 24 | DAO | | |
| 25 | 72" | | |
| 26 | Berlin 26" | | |
| 27 | Crimea 42" lenses at Newcastle. | | |
| 28 | Milky way in Gem. 5 mes | | |
| 29 | Pers. d. cl. | | |
| 30 | Plaskett's medal | | |
| 31 | C. of Gal. | | |

Eddington
His Life & Work

R. a. s. c.

Toronto 1957 Apr 16.

1

Eddington

Intro ^{another ancestry}
1882 Dec. Kendal - Stramorganate School
1885 " Weston Super Mare - Brynmelyn RA Brock
98 Manchester - Dalton Hall, H Lamb.
1902 Trinity Col - Cambridge -
 Herman; Barnes, Whitehead + Whittaker

1906 Greenwich
1913 Cambridge - Plumian Professor.

Conclusion The stars were his crucibles.
The universe his laboratory.

His mind could spin the gossamers
of thought or forge the anchors
of knowledge.

His soaring imagination could go
forth in uncurbed glory -

His spirit could wait in quietness
and solitude for the still, small
voice of the god in whom he believed

" You will understand the true spirit
neither of science nor of religion
unless seeking is placed
in the forefront "

12
(2)
Practical Astronomy

Greenwich - routine obs^s
instrumental errors, transit & μ , zenith
angle instrument,
Cookson floating Zenith tube
Malta long to O-DI.
Brazil eclipses

Cambridge

Completed obs^s for Zedical Catalogue
in 1915-18

Principles eclipse 1919-

Sci. work 1906-13.

Two Star-Drift Theory. W Herschel 1783
Stability of Glob. cl. J. C. Kapteyn
Comets. Schwarzschild
Errors. "aggregations" p. 22
Lat. Variation
Proper motions
Moving clusters.

1914 Stellar Movements & the Structure of the Universe
Dunlap & Trubitt p. 20

Stellar Physics

- 1916 Internal constitution of a star -
 Equilibrium forces $\frac{1}{2}$ Rad. pres.
 Rad. & mass approx.
- 1917. Av. mol. wt about 2.
 1. Masses of stars $\frac{1}{10} \odot$ to $20 \odot$
 2. Sub-atomic source of energy 20p. Lata Bethe
 JAG vs ass
- 1917 Cepheid Variables : Thermodynamic problem
- 1918 Pt I p 101, 65
- 1919 Pt II
- 1920 - Stellar diameters Bet. ".051 arc".020
 G.E. Hale, Pense 0.45 Pense 0.24
- 1922 Ed. - viced consid. of hypothesis H \rightarrow heavier element
- 1923. Interstellar lines (JSP.) \rightarrow Ed + Rosseland
 R. 3° + 5000 Å
- 1924 M-L Law.
 White dwarfs - p. 75-77
 RHF. Degenerate matter
- 1926. Radiative viscosity - JAG
 28. (Liquid or Crystalline stars). JAG & Ed
- 1926. Stars & atoms Internal Const. of the Stars
- 1932. H as chief constituent of Universe

Relativity -

- 1918 Report on Rel for Phys Soc Lon. p. 42
- 1920 Space Time & Gravitation

Helping the reader to explore the relative world and to employ the terms applicable to relative knowledge but with a fuller appreciation of its relativity.

Stress on Action density, 4 dimensional world of Space & Time.

" is the curvature of the world
atomicity as the most fundamental problem

- 1921 Generalization of Maxwell's theory of elec mag & grav fields

- 1923 The Mathematical Theory of Relativity

Lectures 1922-23 p. 51

E's fundamental hypothesis p. 52 12 yrs later
p. 53 in Rel. Thz of P & G

- 1930 The Expanding

Fundamental Theory

(5)

p. 146) 137 one of 4 pure nos derivable from
7 primitive constants of Nature

Continuum helix

p. 163 Symphony

169-8 N. cosmic no. 10^{79}

Equation for m $\frac{m_e}{m_p} = 1838$

174 Constant of recession of the galaxies 572.36
15 mic. constants + 12 solar. obs 560

Slater's correction $N \times \frac{9}{4}$ Gal. distances $\times \frac{9}{4}$
 $572 \times \frac{9}{4} = 254 \text{ km/sec / megapsec}$

Kilmister p 150

Whittaker 181

Conclusion p 1.

Scientist's Look at Religion

SUM

1958 Feb 6

Chalmers Hall

- Read (1) Dingle
 (2) Einstein
 (3) Edd

Words

no static body of knowledge —

the spirit of seeking; Edd. 141

courage, honesty,
 imagination + critical judgment.
 proof. skepticism
 intuition

- (4) C.A. Coulson: Science is an essentially religious activity characterized by much the same temper + spirit as religion.
 (5) John Oman p. 51

Scientists vary as do any other groups —
 lawyers, teachers, accountants,
 economists.

- (6) Survey of 1932. Follows Roy. Soc. London
 ambiguity of words e.g. Personal.

Creeds: p. 143

H Weyl + Edd.

D p. 130 - 133 Edd 144

Scientists reverence for truth.

- (7) John Kepler - Bow down before facts etc.
 a hymn of praise to Creator

- (8) C.F. von Weizsäcker

God is a spirit + thy that w. him
 Some men find God in Nature J.H. Jeans

omit [Aquinas 5 ways. D p 140, 141.
 Whittaker -

Conclusion

Spontaneous truth spiritually discerned.

Now the w. of God is an adventum of the spirit.

Scientists Look at Religion

The experimental method - is it applicable to religion

Honesty & integrity of approach

Intuition & faith

Wm James & Oliver Wendell Holmes

Spiritual things must be spiritually discerned

Direct apprehension

a religion based on scientific theories would not be worth much. The glory of science is its growth & development. The multiplication table does not go out of fashion, but the so-called Universal Law of Grav. was modified by E. & Newton Law shown to be - not universally true but a special case.

Jeans: Pure mathematician
Edd:

- 3. The religious attitude - Dean Inge, Schweitzer or Rab. Tagore
- 4. Determinism (not Newton but his followers -
and determinism in physics today -
psychologists now the threat) But
at H Compton - open road
- 5. Seek only God you will understand - - -
O W Holmes Build thee more stately mansions
Oh my soul.
- 5. all knowledge can be dedicated to the service and
glory of God - John Kepler.
- Whatehead: The worship of God is an
adventure of the spirit.

This Vast Universe

Eng. Inst. of Can.
Orillia

(also Univ. W. Coll.
of Orillia)

April 10 1958

This Vast Universe

Before 1650 AD - naked eye observations

Earth centred universe . Bab. Chald. Assyrians
star patterns - constant -
Constell. groups by 2700 B.C.
7 wanderers.

Alexander the Great -
Naburionnu & Kidinnu

Greek astronomers Hipparchus
Ptolemy

Copernicus 1473 - 1543 .

Galileo's Tel. 1610

Newton

Paris

Herschell

40 - inch

42 - " lens - Crimea

100 inch

200 inch

Pleiades series .

12th cent. woodcut .

SLIDES

- 1 sky N
- 2 " S.
- 3 " S
- 4-6 Constellations N. Ma. Or. Am.
- 7 Woodcut 1546
- 8 Copernicus d. 1543
- 9. Solar System orbits
- 10 " " scale of sizes
- 11 Kepler 1571-1630
- 12- Satellite Time - Period graph
- 13. WAA Jan 31 I
- 14 Hevelius 1650
- 15 Galileo 1564-1642
- 16 " Tel 1600
- 17. Newton 1642-1727
- 18 " Tel.
- 17. Yerkes 40"
- 18. 41" lenses for Crimea - Sir Howard Grubb - Parramatta - Newcastle on Tyne
- 19. Mt W
- 20 " " dome
- 21 Chart of 200"
- 22 Model " "
- new era what telescopes reveal.
- 23 Sunspot cycle
- 24 Sky - Pleiades
- 25 Maestlin 1579
- 26 Galileo 1610
- 27 Hertzsprung 2616
- 28 Orion Neb. region
- 29 " "
- 30 16th Cent Woodcut
- 31 Horse Head
- 32 Cygnus
- 33 Schmidt cone 34 300" cone
- 33 W Herschel Dragon
- 34 Plaskett " ³⁰⁰⁰⁰ 100000
- 35 Centre of Galaxy
- 36 "
- 30 16th Cent. woodcut
- 37 Planetary Neb.
- 38 Perseus clusters
- 39 Globular clusters
- 40 M 31 region
- 41 M 31
- 42. Spiral Coma B
- 43. M 51 Coma Ven
- 44 M 33 in Tri
- 45. Theory of light.
- 46 Howard 60 ft
- 47 miles X
- 48 " "
- 49. Jodrell bank
- 50 250 ft Jod.
- 51 " "
- 52 Strong source Cas.
- 53 Cyg.
- 54. neb
- 55 "
- 56. M 81
- 57. Doppler Shift
- 58 Gal.
- 59. neighbours.

continued

During the thousands of years that man has lived on this earth he has lived in an expanding universe both actually and metaphorically -

2 Theories of cosmology compete for general acceptance now. 1) Expanding universe - 2) steady state universe.

1) an outgrowth of the Einstein - de Sitter theories of 1916-18 where the representation of the observed facts of astronomy & physics is made in terms of non-Euclidean geometry - and the Lemaitre - Eddington extensions to a finite universe whose radius of curvature is increasing with time - The Expanding Universe of the 1930's.

2) The steady state cosmology which presupposes that in the physical world "as it was, is now and ever shall be, world without end" quite literally interpreted. An observer anywhere & at any time past or future would see what we are seeing now - stars, gaseous nebulae, and galaxies - atoms, molecules & radiation.

Graduation Dinner 1959.

This is a nostalgic occasion

For many of us here this evening
it marks an ending on the eve of
a new beginning.

~~Time rolls in ceaseless course!~~

20 years ago when I first came to Q
and proposed this trust for the first time
the Leovana Soc. had 330 members, all
in the Faculty of Arts + Sch. of Commerce.

Today over 685 members are in Arts, Med,
Engineering, Law and the Sch. of Nursing
non-care students.

20 years is a long time & it is fully
time that a new voice was heard in
your midst.

~~Time rolls in ceaseless course~~

The old order changeth --- new.

It is meet that changes should
control our being lest - lest we
get into a rut to descent to
less poetic phrasology than that
of Alfred Lord Tennyson.

My concern for you all is that

The Leovana Society



you should value all the
experience of living -
do not let life pass by un-lived -
Savour it deeply, thoughtfully,
lovingly.

Whether it be the sunny moments
or the dark days, the happy hours
or the times of sadness, the times
when you walk & run on the level
or when you climb hand over hand
up the steep places of life -
all these experiences can add
their quota to the richness of your
life, your mind, your spirit.

The beloved task of living is a
phrase of AC Benson's - think of
life in those terms -

To all of you Women of Omeos
to you capable wise free & free
& to those elected to follow them
let us rise & drink the toast to
The Havana Society

Satellites —
Natural & Artificial

Rotary Club
with Lions as guests —

Gananoque
1957 Dec 5 .

Notes added Feb. 1958

III 2 1958 Jan 31 1958 USA 1st satellite
Explorer I.
orbit 212 mi out to 1800 mi.
a tube 6 1/2 ft long 6" diam
2 transmitters on 103 Mc.
for temp (in vac) cosmic rays
and meteor intensity.

Geocentric Universe

Copernicus 1543.

Kepler 1571 - 1630 (1609)

Newton 1642 - 1727 (1687)

Natural Satellites

Mer. 0

V. 0

E. Moon

Mars 2

Jap. 12 - 4 Galileo 1610

Sat. 9 - Titan, CH₄

Uranus 5

Neptune 2.

Jan 10 1946

106 Mc
3.1 ft

31

Artificial Satellites

Oct 4, 1957 an epoch date.

Theory of Trajectories - Newton

I Russian Satellite I 96' - 115/day
nearly 500 mi Later 2.6/day.

II " " II more elliptical
100 to 150 mi at perigee
to 900 at apogee.
vel. of escape 7 mps
25000 mph - 18000 for orbit
Value of these plus =

Some Observations
within the USSR.

Sudborough St. Church
Men's Club.

1958 Nov. 11.

Contracts
within

1. Privilege + no priv ✓
2. Well dressed + shabby ✓
3. Wealth + poverty ✓
4. Paint + remodeling ✓
+ dreamy delapidation ✓
5. Housing shortage ✓
parks; show places
sky scrapers +
Metro stations ✓
clubs ✓
6. Types - western + mongrel ✓
Black + Armenian ✓
+ Turban ✓
7. names - (same) ✓

Contracts
without

- few cars ✓
- few posters ✓
- no private ads ✓
- no gaudy flashy exploitation ✓
of sex, romance as in
USA + in Paris
'decadence'
for magazines + movies
+ night clubs etc
- clean streets, beaches parks
- USA love of radios blaring
- many televisions
- hotel key disks radios +
good music ✓
- Paul Robeson ✓
- Engineering methods ✓

IAU

Moscow Conf.

Flying S. fields of Ukraine ✓
Khar'kov ✓
Crimen ✓
Simferople ✓
Yalta ✓
2 days ✓

Ship

4 towns Golden fleece

Sukhumi ✓

Tbilisi Abastumani

Yerevan ^{Gori}
Buzakan

Ararat ✓

Elbrus ✓

Rostov ✓

Moscow X

Miro Mir X

Some Observations on Religion
within the Soviet Union

Sydenham St Church
Youth Rally
Sat Nov. 8. 1958.

Syd. St. Ch. Nov 8/59

Observations on Religion in USSR.

1. a) Leningrad - Museums, cl. for repairs and 16 "that work".

St Isaac's Cathedral	red granite
icons	Malachite
USSR frock & posten	93 m. dome
Sanctum railed off	18 sec. T.

b) Guide - young people, music, ritual
St Peter & Paul -

c) Turkish Mosque

2 Moscow - Ch. on Lenin Hill

ornate, rich icons, Cossacks
 priest - sunrise - crossing & blowing
 old women, chow
 woman with kettle
 Candles 1 R.
 old man with bible

Interpreter - no young people

3 Zagorsk St Sergius Monastery
Tomb, Spring 1326

3 churches
 250 priests
 blue & gold onion domes
 5 tier iconostases - an 400 candle
 stands

4. Novorossiisk - east end Black Sea -
white ch - entrance pillar smashed, plaster off
windows boarded up - storehouse.

5. Georgia SSR. Chirchik 4th Century
Sukhumi Novyi Afon manny
1810
old ch. site (10 on
C4 foundation
mosaic + frescoes - closed
cross covered by slab

6. Tbilisi 15 centuries capital here at
at Mtskheta up the Kura valley

- i. Church (14 crowded - baptism at left
+ service with much holy water
- ii. Little Church + old nuns - "only relics"
(4 foundations -
Lovely Georgian writing -
frescoes erased by Turks
- iii. Crypt service near Hotel
Priest red velvet + gold - harsh
voice - men + women
+ a few children - one small
Procession with incense to ^{boy} the icons
+ to consecration.

Inadequacy of observations

∴ no generalizations

Quakers' visit 5 yrs ago - deep spirituality
of some Protestant groups.

MIRO = peace



One hundred and fifty-seventh

Annual
COMMENCEMENT

C.W.W. *an Ineradicable Portrait.*
Kingston Collegiate
and
Vocational Institute

Friday, November the seventeenth

1950

In the Auditorium

Scholarships and Awards

1949 - 1950

1. BOARD OF EDUCATION SCHOLARSHIPS

- Junior Matriculation*, highest aggregate Anna Wyllie
Junior Matriculation, highest aggregate of those students whose
parent served overseas in either Great War Donald Campbell
Honour Matriculation, highest aggregate in six papers Jennifer Boulton
Honour Matriculation, highest aggregate of those students whose
parent served overseas in either Great War George Gray

2. COLUMBIA UNIVERSITY NATIONAL SCHOLARSHIP

Stanley Davies

3. P.W.O.R. CHAPTER I.O.D.E. BURSARY SCHOLARSHIP

James H. Campbell

4. P.W.O.R. CHAPTER I.O.D.E. REGIMENTAL SCHOLARSHIP

Douglas Stewart

5. QUEEN'S UNIVERSITY SCHOLARSHIPS

- Kingston Scholarship* George Gray
Watson Scholarship in German Fred Siemonsen
Watkins Scholarship Lorne Keyes
McLeod and McLean Scholarships John Mellow
Howard Lappan

6. DOMINION PROVINCIAL UNIVERSITY SCHOLARSHIPS

Jennifer Boulton
Maureen Hope

7. DOMINION PROVINCIAL GRADE XII - VOCATIONAL

Rueben Hoadley
Joyce Morgan

8. KINGSTON KIWANIS SCHOLARSHIP Howard Lappan

9. AIR CADET SCHOLARSHIP William Stewart

10. K.C.V.I. STUDENTS' ASSOCIATION MIDDLE SCHOOL

FRENCH PRIZE Anna Wyllie

11. THE H. L. CHOWN GIRLS' TENNIS TROPHY Helen Roughton

GIRLS' ATHLETIC SHIELDS Peggy Senior
Frances Shanly

BADMINTON TROPHY Marion MacLachlan
Patsy Putnam

Scholarships and Awards

continued

THE H. M. WILDER BOYS' ALL ROUND TROPHY .. Bob Morrison

THE HEDLEY TROPHY—CROSS COUNTRY Darrell Walton

BOYS' ATHLETIC SHIELDS Gordon McGaughey
Bob Morrison

CUNNINGHAM CUP Joseph Goodell

"CLASS OF 1950" TROPHY Bob Morrison

ATHLETIC CRESTS:

Girls — Shirley Ayling, Diane Blake, Ann Chambers, Frances Clark, Janette Davidson, Dolores Esford, June Eves, Lois Fitzgerald, Joyce Green, Shirley Hazlett, Connie Henry, Violet Howland, Irene Kelso, Grace Kerr, Janet Leask, Donna Leslie, Edith Lilly, Barbara Loye, Barbara Matthews, Frances Peters, Joyce Raven, Suzanne Robertson, Helen Roughton, Jeri Shortt, Beryl Sweetman, Laura Turcotte, Julie Tanovich.

Boys — Paul Argue, Douglas Beatty, John Best, James Berry, William Campbell, Douglas Carnegie, Irving Dardick, Donald Foster, Robert Heather, Bruce Hay, Alan Hitchcock, Carl Kirkwood, Neil Lakins, John Myres, Gerald Montgomery, Eugene McDonald, Clyde McCrae, Earl McCullough, Peter Owen, Milton Platt, Fenton Saunders, Douglas Stewart, George Speal, Valorie Swain, Edward Taite, James Twigg, Guy Weese, Alec Wakeling.

TRACK CHAMPIONSHIP

Boys — Senior - James Haxton; Intermediate - Bob Morrison; Junior - Darrell Walton.

TENNIS CHAMPIONSHIP Norman Reynolds

MUSIC CRESTS:

Natalie Bieler, Mary Capell, Don Chalmers, Mary Clarke, Ron Davidson, Don Derrick, Roy Eastman, Joan Lindsay, Gordon Mouldey, Peter Riches, Barbara Smith, Dorothy Sommerville, Bill Swaffield, Angel Tugwood, Alec Wakeling, Marilyn Walker.

ACADEMIC CRESTS:

Commercial — Mary Smith, Margaret Smith, Joan MacIntosh, Muriel Arthur.

Technical — Robert Barnes, Ron Holland, Bill Richards.

Fifth Form — Jennifer Boulton, George Gray, Lorne Keyes, Fred Siemonsen.

Fourth Form — James Atack, Donald Campbell, Ann Chambers, Anna Wyllie.

THE GRADUATING CLASS, 1950

The Valedictory Barbara Matthews

The Class Poet Enid Johnson

The Class Prophet Eugene McDonald

Programme

—
MR. F. B. PENSE, Chairman
—

GOD SAVE THE KING.

1. CHAIRMAN'S REMARKS.

2. CONGRATULATIONS TO SCHOLARSHIP WINNERS:

Mr. F. B. Pense, Chairman of Municipal Board of Education.

3. PRESENTATION OF PRIZES:

By Heads of Departments: Mr. F. M. Kelly, Assistant Principal; Mr. W. L. Jeffries, Head of Commercial Department; Mr. F. M. Mitchell, Shop Director; Mr. I. Ferguson, Moderns; Mr. E. L. Earl, Science; Mr. A. F. Meiklejohn, English; Mr. H. E. Pearen, Classics; Mr. V. S. Ready, History; Mr. G. N. Maybee, Music.

4. PRESENTATIONS BY STUDENTS' ASSOCIATION:

1949-50 Head Boy — Fred Siemonsen; 1949-50 Head Girl — Barbara Matthews; French Prize — James Haxton.

5. PRESENTATION OF ACADEMIC CRESTS:

By Mr. J. L. Murray, Principal, K.C.V.I.

6. PRESENTATION OF CRESTS FOR MUSIC:

By Mr. George Maybee, Director of Music.

7. PRESENTATION OF GIRLS' ATHLETIC TROPHIES AND CRESTS:

By Miss G. Simmons, Girls' Athletic Director.

Whig - S

EMBER 18, 1950

Their D

Large Audience Witnesses KCVI

KCVI AUDITORIUM was filled almost to capacity last night with students, parents, teachers and friends of the young graduates who received their diplomas and of the many who were awarded scholarships, prizes, trophies and crests for academic and extra-curricular achievements last year. (See page six for list of graduates and prize winners.)

Guest speaker at the annual commencement was Dr. A. Vibert Douglas, dean of women at Queen's University. She told the graduates three of the qualities most needed in people of today are goodness, joyousness, and that of being internationally minded.

Basing her address on a quotation from Andre Gide, "We spend our lives sketching an ineradicable portrait of ourselves," the speaker discussed the making of this portrait. World-famous as an astronomer herself, she explained briefly how scientists had succeeded, only about 90 years ago, in analysing the light from stars and discovering from this analysis of what the

Programme

MI

KINGSTON WHIG-STANDARD



GOD SAVE THE KING

1. CHAIRMAN'S REMARKS

2. CONGRATULATIONS

Mr. F. J. Mitchell

3. PRESENTATION

By Head Mr. W. Mitchell, Science; Mr. V. S. ...

4. PRESENTATION

1949-50 H. Matthews

5. PRESENTATION

By Mr. J. I. ...

6. PRESENTATION

By Mr. Geo. ...

7. PRESENTATION OF GIRLS' CRESTS:

By Miss G. Simmons, Girls' Ath.

Andre Gide: at 22
 - Our whole life is spent in sketching an ineradicable portrait of ourselves.
 - What kind of a portrait?
 - Who or what is this you who is sketching?
 - and then you who is being sketched?
 1. Physically of the stuff the stars are made of.
 2. ~~mind & spirit~~ ^{we are not always the best judges of our own} ~~own~~ portraits.
 Rbt Burns - gift to see oneself as others.
 your ideal - i. Kindness ^{tolerance}
 ii. forgiveness ^{joy in health}
 iii. internationalism ^{in the struggle of spirit & thing world}
 iv. for art & life ^{in the best of work}
 v. a Schiller ^{in friendship}
 vi. in reading
 vii. in thinking
 iii. internationally minded
 worlds need for peace
 Contin: for trust based on understanding
 + Knowledge + respect for other
 peoples
 The world needs the best we can give.



Rabindranath Tagore 1922

The Religion of spiritual harmony
 is not a theological doctrine to be
 taught... It is the spiritual truth
 and beauty of our attitude towards
 our surroundings, our conscious
 relationship with the Infinite
 and the lasting power of
 the Eternal in the passing
 moments of our life.

→ The disciplined, the dedicated,
the pure in heart and the gentle
of spirit
who will achieve universal peace!

James -

Life is a real
fight in which
something is eternally
gained -

→ The d
the pure
of spirit
who n

Ganansque High School
Commencement
1950 Nov. 24.

Some Historic Schools.

1. Congratulations to graduates
& those promoted.

Ladder of Ed^m endless
hence interest of life.

2. These years of greatest ease of learning
Read widely - store your memories.
3. When you go out learn your living
give a little more service than you
are ever paid for.
4. Courage to grasp opportunities & widen
experiences.
5. Some interesting schools visited in 1948-50.
 - i. Grammar School of Bradford.
Dyson, Rotherstein & Delius.
 - ii. Schloss Plön - Danes, Hermanns, B. Smeck
Kain, Hitler, now -
 - iii. Abbey Pontigny - Cistercians -
Thos. a Beckett, Stephen Langton,
St. Edmund.

155. ideals - all students to widen
horizons of knowledge & understanding
& think as world citizens.

Introduced by Dr. Mabee, thanks Mr. Murray & Prince Macnamara.

Programme

8. PRESENTATION OF BOYS' ATHLETIC TROPHIES AND CRESTS:

By Mr. B. J. Terry, Boys' Athletic Director.

9. THE K.C.V.I. SENIOR GLEE CLUB ENSEMBLE:

- (a) "The Cherubic Hymn" *Gretchaninoff*
(b) "O What a Beautiful Morning" *Rogers & Hammerstein*

10. ADDRESS — Dr. A. Vibert Douglas, M.B.E., M.Sc., Ph.D., F.R.A.S.,
Dean of Women, Queen's University.

11. PRESENTATION OF SECONDARY SCHOOL HONOUR GRADUATION DIPLOMAS:

By Mr. M. E. MacMillan, Chairman Management Committee.

12. PRESENTATION OF INTERMEDIATE CERTIFICATES:

By Prof. H. G. Conn, Chairman Advisory-Vocational Committee.

13. SELECTIONS BY THE K.C.V.I. BAND:

- (a) Overture—Magic Isle *Buchtel*
(b) Novelty—Syncopated Clock *Anderson*

14. PRESENTATION OF "CLASS OF 1950" GIFT:

CLASS GIFT TO THE SCHOOL *George Payne*

15. PRESENTATION OF SECONDARY SCHOOL GRADUATION DIPLOMAS AND SPECIAL COMMERCIAL CERTIFICATES:

By Mr. F. B. Pense, Chairman Board of Education.

16. PRESENTATION OF "CLASS OF 1950" TROPHY to Bob Morrison

Graduation Diplomas and Intermediate Certificates

HONOUR GRADUATION DIPLOMAS

Anglin, Betty Arthur, Muriel Bedell, Willet Boulton, Jennifer Boyce, Marion E. Bruce, Helen Butler, Francis Butlin, Nancy Campbell, James Campbell, William Chown, Edward	Cohen, Joshua Connell, John Curtis, Carolyn Davies, Stanley Eves, June Fraser, John Gilbert, John Goodrich, Margaret Gray, George Greggs, Robert Gulka, Walter	Holland, Robert Hope, Maureen Hull, Ronald Keyes, Lorne Kirkwood, Ronald Lyon, Donald McBride, Harry McDougall, Helen McFedridge, Evelyn MacLachlan, Marian MacPherson, Diane	Mellow, Rodger Murray, Robert Oaks, Elinor Platt, John Sampson, Constance Shanly, Frances Siemonsen, Frederic Speal, George Stewart, William Thompson, Douglas Walker, Kenneth
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SECONDARY SCHOOL GRADUATION DIPLOMAS

General

Atack, James Bennett, Douglas Biss, Basil Blackwood Beverley Blair, David Browning, Donald Cable, Brenda Carl, Adele Carter, Marjorie Campbell, Donald Cassell, Barbara Cassell, Wilfred Chambers, Ann Clancy, Lysle Clark, Frances Clark, Mary Cragg, William Dardick, Irving Davidson, Janette Dietrich, Gertrude Duffe, Florence	Edgett, Gordon Fantham, Laura Gordon, Barbara Hanna, Ruth Hawley, Donald Haxton, James Hay, Gwendolen Hazlett, Shirley Herrington, James Herron, Helen Hercus, Sherrill Hill, Jocelyn Hill, Marilyn Hull, Ronald Hunter, Orlean Johnson, Enid Kerr, Grace Lakins, Neil Latimer, Douglas Laturney, Joan Lindsay, Carol	McClellan, Dorothy McEwen, Robert McCorquodale, Susan McDonald, Eugene McKendry, Harold MacCrae, Clyde MacLean, Catherine MacLean, Helen Matthews, Barbara Matthews, Maxine Morrison, Robert Mouldey, Gordon Mowry, Gwendolyn Murray, Robert North, Ronald Orr, Duane Packer, Sylvia Patterson, Barbara Payne, George Plaw, Dania Platt, John	Prince, Helena Putnam, Patricia Redston, Sheila Richmond, Jane Riley, Harold Saint, Donald Scott, Helen Shepherd, Robert Shortt, Jerroldine Sinclair, Duncan Smith, Sally Stewart, Douglas Swain, Valorie Talbot, Bruce Tivy, Joan Tanavich, Ann Thompson, Douglas Turnham, Joyce Warren, Carole Williams, Anne Wyllie, Anna
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Commercial

Babcock, Irma Goodman, Patricia	Connor, Audrey Hingey, Betty	Matthews, Marie Smith, Mary	Smith, Margaret Young, Joyce
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Industrial

Aubin, Paul Barnes, Robert Clark, Donald Harding, Malcolm Henry, Donald	Holland, Ronald Jamieson, Raymond Kay, Robert Kingston, Donald Lutz, Gerald	Marshall, Philip Polk, Karl Mosier, Robert Rodgers, Garnet Shurtleff, William	Simpson, Robert Weese, Guy
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SPECIAL COMMERCIAL GRADUATION CERTIFICATES

Arthur, Muriel Carscallen, Jean Ducette, Shirley Dunlop, Doreen Firth, Joan	Graham, Joan Hunter, Orlean Laturney, Joan Lazarski, Helen McIntosh, Ardele	MacIntosh, Joan Sagle, Patricia Senior, Margaret Sleeth, Margella Sloan, Nadine	Sudds, Doreen Turnham, Joyce Vayrynen, Anja
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INTERMEDIATE CERTIFICATES

General

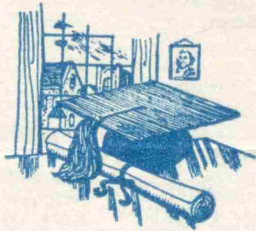
Abramsky, Marilyn Allen, Robert Bartlett, Shirley Best, Ted Bingham, Alaric Bleaney, Margaret Boucher, Betty Bower, Cameron Bowman, Eric Bradfield, Joan Briscoe, Maureen Brookfield, John Brunke, Conrad Bryom, Beverley Campbell, Mary Ann Campbell, Myrtle Canuel, Augustine Carleton, Bruce Carscallen, George Chesebrough, John Childs, Shirley Clarke, Audrey Cohen, Norda Ann Connell, Patricia Compton, Georgina	Cornelius, Donna Crowe, Neil Dardick, Jerry Delph, Ronald Faulkner, Henry Feeney, David Field, Thomas Fitzgerald, Lois Fraser, Helen Frederick, Shirley Freeburn, Bernice Fowler, Peter Gifford, Ronald Goodell, Joseph Greer, James Gregg, Myles Hall, Nancy Harrison, Elizabeth Harten, Elgay Hobden, Peter Hodge, Joan Hope, Arthur Karis, Anthoula Leadbeater, Gordon Leask, Janet	Lewis, Donald Lomax, William Loye, Barbara MacHale, Joan MacLean, Elizabeth MacPhee, Alexander McKee, Eileen Maunder, Donald Morton, Mary Neadow, Sylvia Oaks, Catherine Ogryzek, Melville Parker, Rosemary Peacock, Jane Peters, Frances Pickering, Carol Plaw, Dania Rawson, Eleanor Ready, Sally Redston, John Robertson, Phyllis Robertson, Suzanne Roop, Diana Rose, Marina Ryce, Shirley	Saunders, Fenton Sebire, Gloria See, Marilyn Selby, Jacqueline Shaw, Arthur Shillington, Donald Shurtleff, Joan Smithies, Donald Smith, Helen Swain, Morna Swain, Valoria Taylor, Margaret Tenhouse, Shirley Timmins, Mary Tivy, Betty Wade, Michael Welter, Verna Wiginton, John Wilde, Joan Williams, Maxine Wilmot, Marilyn Wood, Anna Wood, Vivian Wright, Charles Wyatt, Sonya Zakos, James
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Commercial

Azulay, Alice Connolly, Nancy Cowan, Shirley Danby, Zelma Eady, Beulah Flint, Mary Garrick, Shirley Gerow, June Gollan, Mary Hawkes, Joan Johnston, Elaine	Jones, William Joyce, Beth Joyce, John Kenehan, Frances Lalonde, Calvin Lazarski, Mary Lech, Anne Lutz, Edith Lyons, Beverley MacLean, Rose McGowan, Muriel	McGregor, Dorothy McKane, Beulah Mollis, Sophie Morgan, Leah Moulton, Marlene Norman, Gloria Ratcliffe, Grace Reynolds, Barbara Richardson, Shirley Sakell, Marina Salsbury, Marina	Savage, Audrey Shaw, William Simmons, Patricia Swain, Donald Sweetman, Beryl Tanovich, Mary Tozer, June Wilkinson, Ann Young, Fern Young, Joyce
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Industrial

Arthur, Glen Ausken, Ernest Bedwell, Robert Bissett, Charles Blakslee, Warren Bolter, Donald Buffett, Donald Conn, James Crawford, Clare Chalmers, Donald	Fletcher, Friend Fraser, William Galway, Morris Godkin, William Goodman, Walter Grimwood, Roger Hampton, Donald Hearn, Edward Henderson, William Jeffry, Donald	Joyce, Frank Kennedy, James Kennedy, Raymond Lindholm, Ronald McCheyne, Paul McConnell, James Martin, Robert Mills, James Morris, Robert Neadow, Arthur	O'Reilly, James Pappa, Kenneth Parker, Kenneth Potter, Norman Raine, James Richardson, Charles Shepherd, Alan Sitoski, John Stone, Alan Yott, Donald
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To Windsor Alumni 1955 April 22

1. 3 Times player Old Act Bltz a half week
Widess, B. Reid, D. Bellis
2. Univ. as 2-fold task
i. Conserve + increase Learning
ii. To teach students, train thinkers
Happy is that University whose teachers
are themselves productive scholars
and whose students are, some of
them potential scholars and all
of them capable of valuing and
recognizing genuine scholarship.
3. Enrollment 2300 of whom 465 are W.
~~1723~~ are non Canadian from 28 countries.
USA 45 BWI 18 Bermuda 9 Eng. 9
Neth. 5 Hong Kong 7. Pak. 3.
10 or 2 from Brazil Columbia Cuba Costa Rica
Czechoslovakia, Estonia, France, Germany
Greece, Hungary, Japan, Yugoslavia, Latvia
Lebanon, Mexico, Neth. W.I. Nigeria, Peru
Scotland, Sierra Leone, S. Af. Iraq.
Venezuela.
WUS - 1954 summer Scholar to Yugoslavia
1955 " " to Japan
2 Sunday 9 pm Coffee parties.
S.C.M. \$72 from students for baby-sitting
that is real giving.
4. New mens res. 36 upper yr. 140 freshmen.
5. Fellowships & scholarships - men & women.
6. Research work at Q. Arts. Med. Sci. Engineering.
7. 1954 a Year Extraordinary for and.
3 wks Mar-Apr.
3 1/2 " Aug.
5 weeks autumn

Windsor students


Judy Albrant
Dicky Borota
Patricia Chapman
Barbara Clair
Pat Crompton
Joan Darling
Liz Jennings
Ruth Lombard
Dera-lee Patterson
Joyce Safrance
Kathy Totten
Judy Weber
Shirley Howell

The Spectroscope
& its uses in
Astronomy.

The Astronomy of Dante
& Milton,

Francis Bacon.

Surely it is heaven
upon earth to have
a mans mind
move in charity—
rest in providence
and turn upon the
fields of truth.



Quicumque lux ducit

Virginia Woolf: ride your mind at
the gallop across country in
pursuit of ideas.

Scholarship is high faith in honesty.

Get it & get Research.

- Dr. Laurie Pearce ¹⁹⁰⁴ - Leopold award + Lectures
- Prof. Annie Pichon - Prix Marguerite? * "
- Dr. Palgen Luxemburg - Linguistics
- Dr. Kathleen Lonsdale ^{FRS} London - Crystallography

Younger scholars

- India - 1. Blake's Indian symbolism - in drawings + writing
- 2. Brahmagupta's math - 800 AD
- 3. Latinian reference to Switzerland - Gothic cathedrals + sculpture
- 4. French historian to Fern
- 5. Rose Renshaw - 2 letters

There is enthusiasm in May I received you
of the words of Dr. ^{W. Appleton?} ~~W. Appleton?~~ Pres. Roy. Soc. GK Chesterton
The world will never lack in wonders
but the spirit of man may shrivel & die
for want of wonder.

The wonder of the beauty that is manifested on
the world! May you all have eyes to see,
ears to hear & spirit sensitive to appreciate
all that is good, true & beautiful in the world around us.

To McGill Women's Grad Dinner
Scholars of Many Lands 1955.

I congratulate you who are about to receive your degrees at tomorrow's Convocation.

From kindergarten to High Sch. through High Sch. to University, from Freshman class to the final examinations, for the degrees which you have won! — a long and arduous road — and now you will go out into a world that needs your trained minds and hands, your disciplined wills, your balanced judgments — you will go out as University women.

Not many of you will become ^{active} productive scholars, very few either men or women do.

But I hope every single one of you has learned to value & appreciate true scholarship and to recognize what is first class when you see or hear it. And I hope that you will encourage young scholars who have the inclination, ability & determination to be continuing scholars.

It is not easy to be a continuing scholar while running a home, or teaching school or "University" or earning one's living in any other way — it means — in Virginia Wolff's words — "riding one's mind at a gallop across countries in pursuit of ideas", it also means "high faith in honesty".

In the 33 years of my University teaching career — 17 on the Faculty of McGill, 16 at Queen's — I have met many remarkable women scholars.

Prof Caroline Spurgeon - London Univ.

" Winifred Ellis "

Mrs Smedley McBean "

who with Dean Virginia Gildersleeve, Barnard Col
Columbia Univ NY

Founded IFUW in 1919.

Gleitich + ...

from "In Praise of Humour"
Muller Ltd 1951.

Mrs Edmund Craster (d. 1874)

The Centipede was happy quite
Until the Toad ~~to~~ in fun
Said "Pray which leg goes after which?"
and worked her mind to such a pitch,
She lay distracted in the ditch
Considering how to run.

While lying in this sorry plight
A ray of sunshine caught her sight.
She dwelt upon its beauties long
Till breaking into happy song,
Unthinking she began to run,
and quite forgot the croaker's fun.

Copied
1957 April

Civil

Hydraulics (under Kennedy)

The forces involved in Palpwood Holding Grounds

began summer ¹⁹⁵² ~~1954~~ \$ 25,000 Palp + Paper

Research Inst. Can.

of lab equipment for
undergrad teaching + research

Mining

Dunn Fellowship for Mining research (under Lord)

- i. Design of underground openings, such as those for power houses.
- ii. Behaviour of mine rock under stresses resulting from mining operations.
- iii. Statistical analysis of mine sampling: - usefulness of such data.

Mech. Eng

Asst Prof Colborne 1. Warm Air Research on Heating problems

2. Flow of compressible fluids

3. Machinability of al. alloy stb.

Metallurgy

Prof Lord at. Energy project.

Civil

Lee Effect + detergents upon current practice of treaty sewage

Truth Seekers
Ancient & Modern.

Womens Canadian Club
Montreal

1951 Oct. 22.

Truth Seekers

Memor 1920's & '30's

~~A very interesting story is given by the~~
The historian Esdras ^{relates an incident} about the young men of
the court of Darius ^{king of Persia}
wise sayings - one wrote in praise ^{of}
the king, wise women truth

Great is truth & mighty above all things, it
endureth and is undefiled, it is sweet and
conquereth permanently.

Darius said: Thou art found wisest.

Persia - Iran

ii. The power of truth - there is nothing like it. Modern
psychiatry recommends it ^{for the latter years} if we are ^{to be} self-respecting
individuals & have happy stable homes and bring
up trustful self-reliant children.
Dedication to truth does not mean that we become
prosaic and dull, far from it. Truth is
something so wonderful, so mysterious, so
limitless that often it is only by metaphors
& simile & symbolism of thought that we can
express even a part of a blinding vision
of truth about nature, beauty, the divine
in man or divinity itself. Hence poetry
& art are often the only, or at least the
best means of conveying some approach
to the truth about something.

iii. The measurable & the immeasurable.

Johannes Kepler to Galileo 1597

Be of good cheer Galileo and appear
in public. If I am not mistaken there are
only a few among the distinguished mathematicians of
Europe who would dissociate themselves from us.
So great is the power of truth.

I have been made priest of God - the creator of this
of nature; I have composed this hymn for God the
It represents a new type of poetry, but it tames with
the age old -

For all knowledge is intrinsically good + even if you
would you cannot stop truth seekers from seeking new
knowledge - It is the Conscience of mankind that
lags so far behind that the fruits of knowledge are
too often misused - applied to destructive ends
instead of to wholly constructive purposes

Rabalais said Science without conscience is
damnation.
One might truly say all knowledge without conscience
can be misused

Task of Today is to harmonize the Science of acquiring
Knowledge with the art of using it

We must all be active truth seekers working
for tolerance born of understanding + kindness
+ for integrity in our own lives +
community + national affairs as also in
international matters - for
with Shelley - There is one road to peace that
is truth

+ with Swinburne

Truth only is living
Truth only is whole
and the love of his giving
man's pole star and pole



WOMEN'S CANADIAN CLUB
1568 SUMMERHILL AVENUE
MONTREAL 25, QUE.

Oct. 12th, 1951.

Dear Dr. Douglas:

Thank you for your prompt reply - that was a good lesson to me! We made up the card and hope that it is correct! The title is excellent.

If Miss Finley's invitation does not come forth, please let us know.

We are to have a members' tea now that we know that you are agreeable to staying.

If you speak from a text, would it be possible for us to have 3 copies for the papers. Probably you do not and they will then take their own notes, and generally do. The text is quite unnecessary.

At times we have questions after the lecture for about ten minutes. We are not at all sure that your subject lends itself to them and wish to leave this entirely to your discretion and choice. What would you like? If lecture only about 1 hour is usual but if questions fifty minutes is about right.

It will be nice to see you again and best wishes until then.

Elizabeth Jenks

THE BACONIAN SOCIETY

A meeting of the Baconian Society will be held:-

Tuesday, March 13, 1956.

McLaughlin Room, Students' Memorial Union

4.30 p.m. Tea

5.00 p.m. Presentation of paper and discussion

Speaker: Dean A. V. Douglas

Topic: "Distances in Light-Years"

Dr. Douglas is Acting Professor of Astronomy at Queen's.
She will discuss recent researches in regard to the distances
within our galaxy and of the external stellar systems.

H. M. Love,
Secretary-Treasurer

Measuring Distances in Light-Years.

We know the vel. of light to about $1 \text{ in } 10^5$
 1 light year = approx 6×10^{12} miles (3.28×10^{13} km)
(5.88×10^{12} mi)

1946 Jan 10 λ 283 cm ν 106 megacycles
 Signal lab. MOON reflection $2\frac{1}{2}''$ Moon's radius $1080 \pm ?$ mi
 Belmar N.J. To C.G. uncertainty of 2.4 mi or more.

Keplers 3rd Law $\frac{P_1^2}{D_1^3} = \frac{P_2^2}{D_2^3}$
 from terrestrial base line

Direct Survey \parallel^x Sun $8''.790 \pm 0''.001$ $93,005,000 \pm 9000$ mi
 $1:10,000$

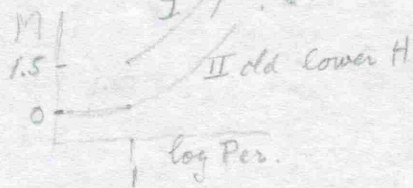
EROS SUN-EARTH dist = 1 a.u. 93×10^6 mi
 $P. 1.7640 \times 10^6$ mi min. from earth 1980 Oct - 1981 June 2848 Nates of 24 obsys
in 14 countries

TRIG. \parallel^x α Cent. $0''.75$ $4\frac{1}{2}$ l.y.
 α C. Maj. 8.8 l.y.
 α Orionis 250 l.y.
 1838-40

over 300 l.y. \parallel^x s too large a f.e.

OTHER METHODS.

i. Cepheid Variables



Baade
 IAU Rome 1968
 IAU Dublin

$$M = m + 5 + 5 \log p$$

Dist. scale for Exterior Galaxies mul. by 2.2 or more

$$\frac{q}{4} = 2.25$$

ii. Red shift of spectrum lines. Ext. Gal. $\frac{\delta\lambda}{\lambda}$ dist
 (Optical range) H & K lines of Ca^+

iii. Radio astron. (i) Red shift of 21-cm H line from diffuse interstellar gas in dist. gal.
 Since 1946 (ii) Continuous emission ν m to 10 m from Radio
 Radio stars μ m. 2. and Doppler shift due to Rot. of galaxy

ii. Radio astron: Radio Stars and interstellar H gas

(a) In our galaxy in Cass. turbulent nebulae. slide
H 21-cm shows.

Rotation of galaxy Doppler shifts give
9780 l.y. dist. (Martin Ryle, Camb)

2 slides

SLIDES of spiral arms.

2 slides

In spiral arms of our galaxy vast interstellar H
Doppler shifts make dist. measures poss.

Van de Hulst, Leiden,

(b) External galaxies - Ryle on Cygnus slide

Bands interpenetrating nebulae

Ryle. 21 cm H found at 22.19 cm

\therefore an expanding universe shift
of $\lambda 1.19$ cm to red

Reces. constant 257.5 Km/sec per Mpc

\therefore dist is $200 \cdot 10^6$ l.y.

3rd + 4th most intense radio sources are

1. Crab nebula
2. External ellip. galaxy M87

(c) Radio stars - 1936 found at Cambridge

areas not points - R.A. 0.2 to 2.0 arc.
Dec. 0.5 to 12' "

30 had ang. diams 20' to 180'

Distrib of small areas is isotropic.

Ryle concludes
Majority are far
beyond optical limit
of 200-inch perhaps
collisions
26