

A. Vident Douglas

Lectures and Speeches

1930s (i)^{19.}

Loc 2303.9

Box #1

1. Response to Toast to
The Faculty -

Senior Dinner 1934.

2. & notes for future Speeches.

3. + Introduction of L. N. Freley.

4. Response to Toast to Alumnae Soc.
1936. Dinner

Windsor Hotel.
1934 May 12.

Golden Moments of Silence

It is a pleasure + an honor to respond to this toast - The Faculty - so graciously proposed and so heartily received -

The Senior Dinner is always an important event - important to many of us in different ways. For some of you it is your first such occasion and marks the conclusion of your first college year.

For some of you it is your last and soon you ^{are to} partake of your Alma Mater's encircling walls as graduates of a beloved university.

On this occasion of our College Dinner so important to each one of us as another session draws to a close, I felt that it was incumbent upon me to try to say

For all of us here gathered it is an important occasion for one reason or another. For ^{it is} ~~me~~ particularly ^{so} it is an important occasion because it is exactly ^{one} twenty years since I attended my first Senior Dinner as a very verdant freshman. And so when the representatives of the Junior Year asked me to respond to this toast I realized that in ~~no~~ ^{no} sense at least it ^{would be} ~~was~~ my maiden speech at ~~such~~ ^{these} annual functions

and that I must say something worth while.

So I sat down at my desk and said to myself "What shall I say?" — ~~and~~ ^{but} no ideas were forthcoming. I thought and thought, ^{without any} and ⁱⁿ ~~vain~~ ^{perplexity} I said energetically "What shall I say?" — but still ^{no} ^{available} ^{no inspiring thoughts} ideas, ^{came into} ^{to me.} my head. At last in desperation I said "What shall I say?" — — — — — And then

a strange thing happened — that mysterious, mischievous, little elf that dwells somewhere in the caverns at the back of one's mind began to laugh at me, to make fun of me from just out of sight — He said to me "Don't you know any psychology at all? Don't you know by this time that the way to get a good idea is not to go searching so hard for it, getting all worked up and trying so desperately ~~hard~~ ^{to think of something?} to think of it. Don't you know that the way to get the idea you need is just to sit still & be calm and restful

and let me - the elf - toss the right
 thought lightly into your mind? Like
 seed fluff wafted on the gentlest breeze, it
 will come to you; one moment it is not there, the next
 moment it is - Are you willing to trust
 me?" And being quite desperate I
 said Yes and realized that a bargain
 had been made and I must stand by
 it now for better or worse.

So I leaned back in my chair,
 made no effort at all to think and
 waited. What do you suppose
 was the first thought that came into
 my mind? ~~What a thing~~...! - "Silence
 is golden."

At first I thought it was just
 an absurd mischievous elfin joke; but
 do you know that the more I thought
 about it the more definitely it dawned
 upon me that this was indeed the thing about
 which I would most like to speak ^{to you} ~~about~~. For
 when you pause to consider, is it not true

that ~~the~~ the richest, deepest, most treasured moments of life are nearly always moments of silence?

We live in such a world of noise and tumult, of hurry and rush, that we hardly ever experience real silence. Physical noise is everywhere about us almost continuously beating in upon us.

* p 49
cc.

And apart altogether from outer noise, we are ~~uncompassed~~ ^{uncompassed} on every side, ~~by~~ ^{by} ~~there is so little silence and peace~~ ^{much} ~~our~~ ^{our} ~~tumult and restlessness~~ ^{turbulence} ~~within~~ ^{within} our spirits. We cannot escape

into the calm of silence ~~in the world~~ ^{in the world of literature, of art, of politics and social theory} of thought. ~~Everywhere~~ ^{Everywhere} about us is the spirit of suspicion, of distrust, of strife or of fear of strife. As graduates of a university, it is our task, our duty, to go out into this world and use our influence to bring a spirit ^{of sanity} of understanding, of mutual trust and respect, into the affairs of men. Let us work for peace and good will among men - in

our own circle, in our community, in our country and in international affairs. In as far as it is given to any one of us to influence the world, let that influence be only on the side of righteousness and ultimate peace.

But how can we hope to bring peace into the thoughts and lives of other people if there be no peace within our own spirits — if our thoughts are restless, and noise and turmoil dwell within ~~us~~ ^{us}?

We must withdraw into a silence of our own making, and allow the Spirit of Nature to play in upon our spirits. In these are influences in the world of Nature that can bring harmony and peace to the tired, jarred, ~~restless~~ spirit of man, discord gives place to harmony, the restlessness of fever passes into ^{composure} ~~quietness~~ and strength. — The Greeks knew something of this. They wrote of

4 (a)

It is not easy to escape from it if we are city dwellers — noise of traffic, noise of the wheels of industry and commerce, noise of radio, of telephone, of voices ~~often~~ shouting, talking, endlessly talking about anything ~~musical, dramatic, or nothing~~ ~~we have almost~~ ~~so devoid of~~ ~~thought content~~ that I forgotten the healing balm of silence. Many people today actually dread silence and solitude and will mercilessly spur on a tired body and a weepy mind into an atmosphere of noise and excitement, to escape an hour or two of relative quiet. It is little wonder that hospitals and homes are filled with men and women whose nervous and mental balance ^{are shaken} ~~is lost~~. We need the physical, nervous and mental relaxation which silence makes

(to p. 4 B)

Candidate's number _____

(For Matriculation Candidates only)

Fill in the above carefully.

Put the number of this book in top right hand corner.

Put this book inside first book when handing in.

4(b)

possible; for the effect of noise upon us is not merely psychological. Sound is a series of impulses transmitted by material particles. These impulses ~~are~~ a rapid succession of actual pressures upon the surface of the body including the ear-drum which is particularly sensitive to them, and ^{they} set up corresponding impulses of an electric nature in the nervous system. Thus noise without produces disturbances ~~the~~ throughout the body and agitation within the brain; and the more harsh and jarring is the noise, the ~~more~~ ^{greater} ~~the~~ ~~disturbance~~ are the physical and nervous fatigue which result.

ADDITIONAL BOOK

BOOK No.

McGILL UNIVERSITY

Name

Subject

Bell jar

Interplan
" still

There dwells silence

Light can travel - star to star
God to god
but not sound

The greatest known cataclysm
of nature - the vast explosion
of a star - hurley off

sends no message to the ear
only to the eye - Silence
reigns supreme between the
stars -

Wearied by the noise, tumult
and the shouting which do not cease
~~we read~~ we read with a
smile of symp. understanding
Carlyle's words - "Looking outward

and harmony within ourselves, ^{it is} ~~is~~
^{possible for us to} ~~we~~ play an effective part in
 the crusade against war, misunderstanding
 and turmoil in the world around us.

As the years pass,
 life almost inevitably brings to
 each ~~of~~ quota of sorrow and
 disappointment, but joy may
 remain - If we learn to draw
 upon the great reservoir of Nature's
 mystic music, melody, harmony;
 if from our moments of silence
 we derive strength, peace and
 courage, then joy will remain.

And so it comes about that
 my best wish for each of
 you is simply this: May there
 be in your lives many
 golden moments of silence.

Perplexed - elf mischievous, impudent
little parcel.

Silence is golden.

Richest deepest most treasured moments in
life are nearly always moments of silence.

We live in such a continuous noise &
hurry & commotion.

Harmony, beauty, melody - music of
~~the spheres~~ - play in upon our spirits.

uplift us on the wings of imagination
give us a sense of peace & joy -
impart depth & value to life.

Greeks - music of spheres - the deep
music of the rolling ~~spheres~~ world kindly within
the strings of the waaved air
Aeolian modulations.

Life brings disappointments & sorrows
but joy will remain.

Our wish for you - many golden
moments of silence.

nothal care

Godlike - over the clear billows
of sweet sound.

graciously proposed -

Miss H. portals unseen.

Important occ. 21

Elf.

Silence is golden

Noise physical
 mental
 spirit.

In silence - harmony, beauty
melody, rhythm play in
upon our spirits, uplift us on
the wings of imagination, give
us a sense of peace & joy,
impart depth & value & rhythm
to life.

Greeks - deep music of the
rolling world, kindling
with strings of the winds as
aeolian modulation.

If we would take our part in the
crusade against war & discord
& misunderstanding, we must
have peace & harmony in our own
spirits.

personal - disapp-
sorrows -
struggles -

reservoirs of mystic
music, harmony
& melody -
joy will remain

Golden moments of
silence -

Saint Anne
May 1934

Introducing Lorraine Finley at alumniæ Soc 1935

In a Sonnet by Alfred Austin there occurs this line: - All things that are made music to mine ear.

To many of us it is given as a gift from the gods to hear now & again the divine harmonies of nature, the ^{deep} music of the rolling world, the music of the soul, playing in upon our spirits.

To very very few is it given to be able to capture melody unheard to give it expression, to translate the intangible experiences of the spirit into black notes on white paper, so that the musical heritage of mankind is permanently enriched.

Miss F. is one of these rare ^{composers} ~~speakers~~. She is a poet, a composer and a pianist. We welcome her very warmly and we welcome also very warmly Miss Olive Hubbard who has come to us to sing for us.

to sing for us some of
Miss Finley's own songs.

And now it is with very
real pleasure that I introduce
the McMill Alumnae Society
to Miss F. & Miss L. N. F
to the alumnae of McMill.

Quo Fata Vocant

Ruskin He only is adv. in life...
Living Peace -

Princess Beatrice's Embroidery
Our lady - Canada.

Wm. James
Life is a real fight in wh. something
is eternally gained -

Alfreds - Few men & fewer women can
think in centuries.
The far vision.

Viscount Bockmaster: Women's sphere
no man-made limitations

Notes for a Senior Dinner Speech

1. Hope members of Fac. have taught students -
Know students - have taught something to the Fac.
2. Difficulty of representing other members -
e.g. Knowledge of Hist. no better than that
of the Eng. Admiral - Burnside of Washington
Joan of Arc, but not Washington
3. Knowledge of biology -
The centipede was happy quite, etc -

Fiat Lux = Great First Command.
It is people of trained mind & high ideal that
in any realm - sci, art, politics, home etc
will illuminate what is obscure & dark &
so fulfill the 8th. 1st Command -

Leigh Hunt + - - Blake
Imagination goes forth in his uncurled glory
(see Noxae lecture)

Ramsay MacDonald
Voltaire on Newton (see 8th. 1st Astronomer)

Address (12 min) to
800 Undergraduate women
at Pembroke College
in Brown Union

Providence R.I.

Inside annuus mens et astende fortiter, attende ubi absentis ventus.

Pembroke - bad year also 1347

✓ Shearer ^{16th cent} & Gray ^{15th cent} - poets
Paley - Theologian
G. Stokes - Physicist
Wren's Chapel -

✓ Post. Shearer - the glorious light of her sunshiny face.

✓ outer adramis minus inner adramis
based on Truth, goodness, beauty.

✓ J.F.V.W. stands for these things in the world.

now women should be the leaders in home life
community national & int'l.

✓ 1919. Giddesheim, Springfield, Cullis & McLean
1920. Can & France.

37 - - - Then Mex Italy, Czech Austria
now 33 with Philippines China Siam

✓ Great women - Past Pres. Adams & Co
Past VP Karin Koch
Present VP. Jm Bowie
m. Chatow
Helen White. Wisc.

✓ Italy Levi Civita home maker & Pres
Racheli. " & engineer.
Monti " & prof of chem

Denmark 4 judges teachers civil servants
research worker in Serum Inst.

✓ Holland MP & IRO.

Peace the world's greatest need
Shelly There is one road to peace & that is truth.

✓ Courage my mind & press on mightily - Argyshu
Press on where Truth begins to dawn - 397

Ramon Lull.

Sydenham St Ch
W.M.S. 1939 Dec 1 -

Ramón Lull 1235 Palma .

Son of one of those who had driven out the Moors
in 1229 & who had been given an estate .

Early wild life at Court & sudden conversion .

Vision of the Crucified Christ : Ramón follows me,
5 visions .

Determination to give himself to Conversion of
Moors & Jews .

Not emotion but "a progressive and
unanswerable appeal to reason" .

Sold much of his land & retired to
Mt Randa, study, prayer, fast, vigil
& vision .

→ Read p. 2 .

Exp. study of Arabic .

Book "art General" inspired by H. Spirit

King James II of Majorca endowed a
college at Miramar to train Franciscan
missionaries to the Saracens 1275
in the sciences languages & the art .

To Montpellier, Rome where he persuaded
the Pope to establish a School for Oriental Languages .

To Paris . To Navarre & a college founded

To Palestine, Egypt, Ethiopia & Morocco

1282 back in France at Perpignan.

1291 goes as missionary to Tunis
 public debates with the Moslems - Converts
 + prison. condemned to death.
 reprieved. banished amid insults
 blows + threat of stoning.
 after a year of hiding + secret
 preaching went to Naples.

To Rome. 1296 apathy to his appeal
 for new missionary projects.

To Genoa, Paris. 1297-8 To Majorca
 to Genoa. 1300 to Cyprus, Armenia
Rhodes + Malta

Again to France to Barcelona, Majorca
 + to Montpellier where he saw
 both the King + Pope Clement V.

Planned a Crusade for Holy Land.
 but no support from Pope.

→ Read p. 8. Foolish lover.

1306 (aged 71.) Preaching in Africa again
Some success, school founded - imprisoned
in a dungeon, released + exiled.

To Pisa 2 yrs - wrote of his discourse
with Saracen apologetic.

Again appealed to Pope - no enthusiasm

To Paris preaching + teaching against
the heresy of Averroes (Arab. philosopher
b. Cordova - 1126 - 98 - Universal intellect

at Council of Vienne 1311-12 pled with
→ Pope - p. 10 Read paragraph.

1314 Aged 79. returned to Tunis.
taught, debated, made converts, grew
bolder: proclaimed himself the same
Ramin executed in 1291 + in stoned
to death. 1315 aged 80 1/2 yrs.

Bishop brought back to Palma
to convent ch of St Francis.

Rare combination: scholar, man of affairs.
man of god.

Mystic writings :

8.

15.

18.

28.

38.

230.

240.

270. 271. 272. 273.

288. 289. 290.

338.

362.

O Thou that fillest the Sun
with splendour, fill my heart
with love.

Written in Cambridge July 1939.
for SFV W Stockholm Aug 10 1939.

Atoms Men and Stars

Gathered here in this beautiful city of Stockholm are representatives of the university women of 35 countries.

There may be various questions upon which our opinions might not coincide, but there is this upon which we are all agreed - namely that one way to achieve for women an intelligent outlook upon life and its manifold problems is by means of a university education.

209 An intelligent outlook upon life —
Many years ago, a Swedish writer said that it is no proof of a man's understanding to be able to confirm whatever he pleases — that is mere sophistry — but to be able to discern that what is true is true, and what is false is false, this is the mark

and character of intelligence.

There is so much falsehood in the world today masquerading in the guise of truth; and there is so much truth unrecognized as such, waiting to be perceived.

The aim of education is to teach men and women to love truth, to seek truth to recognize truth, and to apply the truth ^{to the} problems of life.

It is my belief that one of the great defects of education from the very earliest years onward, in all our countries, is that it tends to be too nationalistic. of course love of country is good and natural of course pride in the achievements of the great men of one's race is healthy and justifiable. But these things are not enough, and overemphasised they lead to narrow, bigotted race-pride, to intolerance of other nations and to a warped outlook upon the world.

~~What~~ the world needs ~~today~~ is a generation educated to realize that no nation has a perfectly clean record in the past, that no nation is in any sense self-sufficient, that every nation owes an immense debt an immeasurable debt to other nations.

5 min.
The debt of any nation to many other nations is obvious in every department of human endeavor, in every branch of knowledge. Whether we think of philosophy or the arts or any one of the sciences, the growth of knowledge down through the ages has been like a long continued treasure-hunt with now a clue from this country, now from that; here an idea springing out of this nation, later another idea arising elsewhere. No matter what subject you may choose if you glance back over the story of its development down the centuries you will find it a record of international effort.

This can be beautifully illustrated by the history of astronomy and astrophysics where the search for truth about the stars has led to the study not only of vast stellar galaxies but of atoms and electrons — and in tracing the growth of this ~~progress~~ knowledge we pass from Babylonia & Assyria to Greece, to Alexandria, to Poland, to Denmark, Bavaria & then Italy and on to England in the days of Isaac Newton, thence to France, Russia, Austria; and for the great mathematical cosmologists we go to Germany, Holland, Switzerland, England and Belgium and for modern astrophysics Italy, England, the U.S.A. ^{the Scandinavian countries} Norway, Sweden, India.

So we come down the years viewing an international pageant leading to the present ideas of the unity of the physical universe where stars atoms and radiation are not three subjects of research but one.

The study of atoms throws light upon the fundamental nature and behaviour of stars, and in the starlight are revealed some of the basic attributes of atoms.

This has been the work of the minds of men of many nations exploring the mysteries both of atoms and stars and producing the great synthesis which forms the body of knowledge so appropriately called Natural Philosophy.

8 min

7 min

SLIDES

- ✓ 1. Any sky S.
 - ✓ 2. Flamsteed ditto
 - 3 Ptolemy's Zodiac 140 AD.
 - ✓ 4. Bab. boundary Stone 1200 BC.
Hydra, Scorpio.
Triad of stars 4000 BC
Bab. Tablet Sun god
 - ✓ 5. Geocentric universe
 6. Hildegard of Bingen 1170 A.D.
Job. Hast thou entered into the treasures of
the hail .. & snows. Knowest thou
By what way in the light parted
that scattereth the east wind upon
the earth.
 - ✓ 7. Copernicus 1543.
 - ✓ 8. Tycho Brahe ^{Swedish nobleman} ^{to Denmark} oscillation of
observation & theory.
 - ✓ 9. Kepler. Tübingen & Graz. + to Prague with T. Brahe
 - ✓ 10. Galileo
 11. " Telescope 1610
- CHANGE a ~~few~~ universal LAW.

12. Isaac Newton. *one of the great of the pt, thinkers of all time*

The marble index of a mind forever
Voyaging through strange seas of thought alone

13. Telescope 1672.

brought into being a
cosmological order based
upon celestial mechanics
The laws of Universal Grav,
analyzed light thus making
Astronomy possible

14. Le Verrier

15. Bessel. 1838 //x

Struve. Russia.

Henderson, SCOTLAND.

16. Yerkes. 40 "

17. Mt. W. 100 "

18. Pleiades ^(six fingers) 7. Dec Sky S.

19. Maestlin 1579. 11

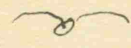
20. Galileo. 1610 36.

21. Hertzsprung 2616.

22. Perseus Double Cluster.

23. Orion Neb.

24. " Horse head.

25. Cygni. 
vast clouds like wreaths of
glowing gas.

26. Solar Spectrum.
Galileo. *dogma of changelessness of matter universe*
Newton.
Fraunhofer.
Kirchhoff
Huggens
Secchi.

27. Secchi Types.
Temp. - Molecules.

28. A.V.D. Grant. Dwarf slide.

Sir J. Herschell
Kesteven
Charley
Shayley
J.P.

- ✓ 29. J.S. Plaskett Model of Galaxy.
- ✓ 30. M 31. Andr.
- ✓ 31. Whirlpool M51 Can Ven.
- 32. M 33 in Δ.
- ✓ 33. And. balances.
- ✓ 34. Einstein & Rabindranath Tagore.
2 mystics of our own day.
mystic vision of the mathematical cosmologist.
" " " " poet-philosopher.
Life is a constellation, an unplumbed
dark strewn with starry moments.
- ✓ 35. M 81 Urs. Maj.

✓ Macmillan Alumni Lecture
Oct 1939

x Ottawa U.W. Club
1939 Dec 11

In this beautiful astronomical photograph I see a representation of human life.

With the eyes of the astronomer I see stars, & clusters of stars, motion, pattern, energy & a great and beautiful unity in the synthesis of it all ^{into one galaxy.} ~~Let us~~ work towards the synthesis of the human race in the spirit of internationalism.

And in human life we have the work of individuals, communities, nations

With the eyes of the mystic poet I see starry moments against a background of unplumbed dark-mystery - the unknown. Let us ~~be~~ as individuals and as a federation so live and think and act ^{that} in our own lives and in the lives of others there may be more starry moments.



Stars & Starlight

King's Hall
Compton, 1937 April 30.

Stars & Starlight

✓ Edgar Allan Poe : astronomers are men
whose task is

To seek for treasure in the jewelled skies.

This treasure - not gold or silver
but knowledge :-

✓ partly useful knowledge


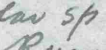
Time

Direction

partly knowledge which satisfies the
curiosity of people regarding
this great universe.

Stars & Starlight

SLIDES

1. Feb sky 5.
2. Orion neb 2 exp. $\frac{1}{2}$ hr = 2 $\frac{1}{2}$ hr.
3. " "
4. Extra focal Pleiades
5. Maestlin 1579. "
6. Gal. 1610 36.
7. Hertzsprung 2616.
8. July 5.
9. } Ross C. 27.
10. } July 11
11. } Persens Clusters
12. } Pers. Cl.
13. } Argam N. Am.
14. } 
15. } 
16. Solar sp.
17. The Runners
18. Stellar sp.
19. Giant & dwarf. sequence.
20. Star motion
21. J.S.P. Galaxy
22. M 31
23. M 51
24. Scales.
25. M 101.

Moving slides 4 + coloured Zodiac & eclipse slides.

The Music of the Spheres

- ✓ 1. The morning stars sang together Job 38. 7.
- ✓ 2. The Song the stars of morning sang
Has never died away - J.G. Whittier.
3. The Southern stars a music pealed Tennessee
4. Silence is the speech of love
The music of the spheres above. R.H. Stoddard.
5. Within the hollow silence of the night
I lay awake and listened - I could hear
Planet with punctual planet chiming clear
And unto star star cadencing afloat.
Alfred Austin.
- ✓ 6. 'Tis the deep music of the rolling wood
Kindling within the strings of the waived air
Aeolian modulations Shelley.
- ✓ 7. There's not the smallest orb that
Thou beholdest
But in his motion like an angel sings
Still quivering to the young-eyed cherubim

Read them
at close after
the dawning

Telescopes & what they
Reveal .

Knigs Hall, Compton
1932 March 11 .

Telescopes and what they reveal.

SLIDES.

1. Astron Prag. 1546
2. Ptolemaic System
3. Galileo's Tel. 1610
4. Sunspots.
5. "
6. Jup's - Sats.
7. Jan 5. 5K4.
8. Gal' Orion + Pleiades.
9. Pleiades Maestlin 1579.
10. " 4.0.
12. Newton's Tel. 1672.
13. Paris obsn. 1667.
14. Greenwich 1675
15. Hevelius
16. "
17. Greenwich today.
18. " Transit.
19. Herschel 4 ft 6 inches 40 ft. long
1795.
20. Yerkes obsy. 1896
21. " 40 inch
22. Milky Way. Scorpio
23. " " 10 n.e.s.
24. Horsehead neb. Orion belt.
25. Gr. neb. Orion. Milton
26. G.O. spectrograph
27. Stellar spectra
28. Solar spectrum
29. Harvard 24 in tel.
30. Arequipa station.

31. Berlin Tel. 26"
32. Vic BC.
33. Mt W. Dome.
34. " 100 inch.
35. Diagram of Star Jiges.
36. " " " "
37. Mt W. Solar tower.
38. Arcetri " "
39. Eclipse Diagram
40. " Map. Can
41. " " Usa.
42. Corona
43. "
44. 16th cent. woodcut.
45. Whirlpool Neb.
46. M 101.

Shelley The eternal orbs that beautify the night
 ... The majestic laws
 that rule yon rolling orbs.
 ...
 The depth of the unbounded universe
 above, and all around
 features unchanging harmony.

and we like the atoms and the ripples of light
 and like the stars & the great galaxies must
 play the part allotted to us in the great scheme,
 for "a star or a soul
 Is a part of the whole
 and left in the wondrous plan"

omitted

The Constellations

Compton P.A.
1931 Jan. 28-

Introduction

Robt Browning once wrote a long poem about a young man named Paracelsus, full of enthusiasm who set off on a long quest - to find out all knowledge about the universe - especially medical & chemical secrets & the highest good - the secret of true happiness - In his wanderings he met a man who was like a man described in the Bible - Having ears he heard not - having eyes he saw not - There are many people like that - they miss the beauties & wonders of Nature - around them - & Paracelsus described him as a man

"whose eyes saw in the stars
were garrulous of heaven"

Shelley also found that there were stupid people like that, blind to the deeper significance of things. He described such a man

"to whose passive ken
Those mighty spheres that gem infinity
were only specks of tinsel, fixed in leaden
To light the midnight of his native town."

I hope none of you are so blind as all that. I hope you don't think of the stars as merely specks of tinsel!

I hope if you don't already love the stars that you will begin to love them tomorrow

Compton 1931 Jan. 28.

SLIDES - Morning 4.

1. Jan sky - N
2. " " S
3. N. Constellation diagram
4. Wm. May. Bayer. 1603 Bavarian attorney
1277 star positions
+ maps -
5. Motion of stars. Plough 20' cent +
50000 yrs hence.
6. Ursa Min. Why is his tail so long?
7. Polar Constellation + Precession movement
8. Zodiac Ptolemy's Chart 140 AD
Almagest
9. Egyptian Zodiac - I Denderah
10. " " II
11. Chinese "
12. Orion etc diagrams
13. Extra focal images Orion -
14. Diagrams - Size Betelgeuse
15. Orion - Bayer.
16. " Photographs 30' + 150'
17. " Nebula

18. Feb Sky. Pleiades Tennyson
 many a night I stand
 the P. (using thro' the hollow shade)
 glitter like a swarm of fireflies
 tangled in a silver band.
- 19 Taurus Constel. extra focal.
- 20 Maestling 1579 11 m. c. stars
- 21 Galileo - 1610 33 stars
- 22 Pleiades $3^{\text{h}} 45^{\text{m}}$ forward.
 Hertzsprung - Cluster 2616
- 23 June sky
- 24 July "
- 25 Scorpio - extra focal
- 26 Galileo's telescope 1610
- 27 Newtons " 1672
- 28 Newton - Trm. woodwork. The marble under
 of a mind for ever, voyaging
 the stars seas of space - alone
- 29 Vic Bt 92"
- 30 Mt W. 100"
- 31 Yerkes obs.
- 32 " 40"
- 33 Muddy way - Cygnus
- 34 " " network neb & meteor
 trail
- 35 Perseus double cluster. 5 m. stars

- 36. Solar spectrum
- 37. Stellar Spectra
- 38. Evolution Diagrams
- 39. Scales. " "
- 40. Andromeda neb.
- 41. M 101

Such photographs reveal something of the
 majesty & mystery of the Universe about us.
 These myriad stars, these vast spaces - the
 immensity of Time behind & before us - but
 we should not overlook the fact that of all
 the mysteries & marvels of nature, none is
 greater than that of the mind & spirit
 of man - Physically, you are star dust
 typical of the stuff of which the Universe
 is made - mentally & spiritually, you
 are something more.

~~Walter~~ ~~Here are they~~

Miss Gillard -
" Huntley -

Stars Near & Far

High School. St. Lamberts.

1937 May 7.

4

Stars Near & Far.

Wooden Slides 2 Constellations
 Seasons.
 Sun & Moon
 Tides
 S. System

SLIDES

1. Feb 5.
2. July 5.
3. " IV
4. Orion extra focal.
5. " 30' 150'
6. " reb.
7. Pleiades . 6
8. " " Maestlin 1579.
9. Gal. Tel. 1610.
10. " Pleiades 36.
11. G.D. tel.
12. Pleiades . Hertzsprung . 2616.
13. Newton Tel. 1672
14. 2.0 inch
15. Solar Spectra
16. Stellar "
17. Stars - Dwarf Sequence
18. J.S.P. model
19. C. of S.
20. "
21. Perseus Cluster
22. IV. Am. Tel.
23. Cygnus .
24. M 31
25. M 51
26. M 101

like atoms & stars
 live in harmony
 with the laws of
 our being.

This is a universe of beauty, of motion & change
 of obedience to law - The vastness - the very small
 the strange thing called life - Man's mind & spirit
 Man is a being to whom TRUTH matters

"Stars"
Nature Love Series

J. W. P. A. 1932 March 8.

These silver Camps that crown on high

The eternal orb that beautify the night.

Above and all around
Nature's unchanging harmony.

"Nature Love" - series - Y.N.C.A. Camp leaders -

"Stars"

Introduction - "a star has not any points"

encourage intelligent observation + curiosity.

Star colours?

Seasonal changes in constellations visible?

Is our sun a star?

SLIDES

- | | | | | |
|-----|----------------|----------------------------|----|---|
| 1. | <u>N. Sky.</u> | Jan | 5. | Urs. Bear |
| 2. | | Mar. | 6. | Proper motion of Dipper
± 200,000 yrs. |
| 3. | | June | 7. | Cygnus N. am. neb. |
| 4. | | Sept. | 8. | " seagull neb. |
| 9. | <u>S. Sky.</u> | Jan | | |
| 10. | | Mar. | | |
| 11. | | June | | |
| 12. | | Sept. | | |
| 13. | | Orion 30' + 150' | | |
| 14. | | " neb. | | |
| 15. | | M. 31. | | |
| 16. | | Ang. Chart | | |
| 17. | | Evolution Diagram | | |
| 18. | | Eclipse " | | |
| 19. | | St. L. valley Eclipse map. | | |
| 20. | | U.S.A. " " | | |
| 21. | | Corona. | | |

Conclusion: Browning - "mere geometry of heaven"
Shelley - These mighty spheres that gem us
were only specks of tinseal fixed in heaven

realize something of the grandeur + solemnity, the depth, the vastness + the underlying unity + harmony of the universe of which we form a part.

Omitted.

The Winter Constellations
& The
1932 Solar Eclipse.

Montreal Girls High School.

1932 Feb. 18.

Westmount High School

1932 Mar. 1.

SLIDES -

1. Jan sky N
2. Feb " N
3. March " N
4. Bear Ma
5. M.
6. Jan sky S.
7. Feb. " S
8. Mar. " S
9. ~~Newton~~ Orion extra focal.
10. Orion diagrams
11. " Exp. 30' + 150'
12. " nebula
13. Taurus 7
14. Pleiades Maestlin "
15. Galileo's Tel.
16. " Pleiades
17. Yerkes tel.
18. " Pleiades - Tenneyson, many a night
19. N. Am. Nebula
20. Milky Way 30. 4^h 4 m.e.s.
21. Solar Corona. Wranne Top Centre .)

and 3 wooden slides - eclipse & Sun.

SLIDES

1. Jan sky N
 2. Feb. " N
 3. March " N
 4. Mrs. May
 5. Dipper 200,000 yrs \pm
 6. Little Bear + tell tradition + de Morgan's yarn.
 7. Jan sky S.
 8. Feb. " S.
 9. March " S.
 10. Orion
 11. " extra focal
 12. " 30' + 150' exposure.
 13. " Nebula
 14. Taurus
 15. Maestling 1579 11 stars
 16. Galileo's telescope. 1610
 17. " Drawing of Pleiades. 33
 18. Yerkes 40"
 19. Pleiades. Hertzsprung 2616.
 20. ~~Diagram~~ Double Cluster in Perseus. 5 n. eye. 5
 21. Diagram stellar evolution.
 22. A.S.T. Solar Corona
-

Astronomy Ancient
& Modern

Christ Ch. Cathedral Guild
1937 Mar. 1.

Astronomy Ancient & Modern

Astronomy is often referred to as the oldest of the sciences. The reasons are not hard to find.

Time direction curiosity - the mere spectacle of the mighty pageant of the skies challenges

SLIDES.

1. Anaximander 600 B.C. The Infinite: Eternal Motion.
Babylonian astron. much ahead of grk.
2. July sky S.
3. Harvested.
4. Oct. S.
5. Harvested
6. Jan S.
7. Harvested.
8. " N. Polar region.
9. " S. " " ∴ Date of mapping 2700 B.C.
- 10
- 11, 12 Denderah Temple Planisphere
13. Egyptian Symbolic Universe.
14. " Hermopolis Section R. vis.
15. Homer 1100 - 900 B.C.?
16. Hildegard of Bingen 1170 AD.
Job. 38.22 Hast thou entered into the treasures of the snow? or hast thou seen the treasures of the hail? By what way is the light parted which scattereth the east wind upon the earth?
17. Ptolemaic Universe

Jacobi - Once upon a time there were 1000 yrs
of night.

This was the period from the burning of the Lib
Library of Alexandria about 300 A.D.
until the death of Copernicus 1543.

Helio centric system.

Rev. of Thought -

Earth not centre, but Sun not centre
of Univ. of stars

& our galaxy not centre of
the universe of galaxies.

18. Diagram of Herschel + Kapteyn.

19. Proper motions. Herschel 1783.

20. Sirius simonsy; of path. Bessel. 1844.

21. " orbit

22. " Diagram - Eddington + Simonsi + W.J. Adams

23. stellar spectra

24. " Giant - Dv. diagram

25. atoms - man - Sun.

26. 16th Century woodcut.

27. Cygnus  7 hr. exp. Mt W. 100".

28. meyingo round nebulae

29. Whirlpool neb.

30. Coma Berenices neb.

31. M 101.

not a static universe - physical energy running
down - is spiritual energy going up or down on earth
movement from 10¹⁰ to 10¹⁰ of stars in galaxy 10¹⁰

omit:

The Universe of Stars
and Starlight.

O.B.M. C.C.
1938 Feb. 6.

Towards the Light.

SLIDES

Galaxies

- 4 1 M57
- 2 M33
- 3 Yng 2
- 4 M31
- 5 M31 Blue

Our Galaxy

- J.S.P. diagram
- Jeans Diagram
- Milky way pictures

- 6 MW 41
- 7 " 15
- 8 " 13
- 9 " 1
- 10 J.S.P. diagram

Clusters

sky charts -

- 11 Jan N
- 12 " S
- 13 Havelius 1.

Telescopes

- 14 Galileo
- 15 Newton
- 21 Y.O.
- 22 K.C. B.C.
- 24 Mt. W.
- 26 200"

25 Lippner

Orion n. eye.

- 21 Tel. - 30' 150'
- 23 Tel. long exposure

- 27 Solar Sp
- 28 Stellar Sp
- 29 M101

16, 17 Pleiades n. eye

- 18 Maestlin
- 19 Galileo
- 20 Modern

of the stars story

Influence of natural knowledge upon men's philosophy & beliefs

- Greeks ✓ Ptolemy
- Bruno ✓ J.H.J. - Whitehead.
- Newton ✓
- Kant ✓ 2 things -
- Eddington.

The Winter Stars

Y.W.C.A.

1938 Feb. 7.

1938 Feb. 7.

- | | | |
|-----|--|-------------------------|
| 1. | Jan N. | 1 Jan N. |
| 2. | Feb. N. | 2. M.N. 1. |
| 3. | Apr. N. | 3 Can Ven. M.S. 1 |
| 4 | Flattened diagrams
Mrs May. | 5-6. Pleiades. |
| 5 | M 31. | 7. Mule's Tail |
| 6. | Jan 5. | 8. " Pleiades. |
| 7 | Feb 5. | 9. Pleiades. |
| 8 | Orion & Taurus
diagrams | 10. 1546 Robinson. |
| 9. | & v Tauri & Orion's
diagram. | 11, 12. Headlines & Co. |
| 10. | Sirius A & B
Orion Net. | 13. Mule's Tail |
| 11 | Telescope | 14. " " |
| 12. | Gal. 1. | 15. M.N. 1' |
| 13. | Med. 1. | 16. 2000 " |
| 14 | 40. | 17. Orion 30' x 150' |
| 15- | 100" | 18. " Net. |
| 16 | Pleiades | 19. Opus 449. |
| 17 | Group. | 11 20. Virgo region |
| 18 | Aperting | 36 21. Clonten (c). |
| 19 | Galileo. | 26 16, 22. Merc. Cl |
| 20 | Magnom. | 23. Feb Sk. S. |
| 21 | Pappus' elements | 24. Old. Bot re design |
| 22. | M. 81. | 25. Sirius system |
| 23 | | 26. M. 31. |

Search for Trout down the Centaures

Leonardo da V. the Greeks on Knowledge the

Greeks are here.

Greeks: Love moved the stars

Plutarch - Love one another

12th Cent maybe Philo Sphel of Mygona. P. Thon. He filled the Sem. with
and splendour till my hand with love

The Message of Astronomy

*Old Brewery Mission
1937 May 2.*

R.V.C. Science Club.

The Degeneration of Science

R.V.C. 1938 Mar 24.

11/11/1910

Spacem as the strong tremor
has reported in kind of normal gaze
that part only as if without mental sight.

Rad. Layer. Tip in a cerebral
an unblinded dark stream with strong moment.

R.V.C. Science Society. Thurs. 1938 March 24.

1926-27 Session - Alice Turner.

Value of a Sci. Society -

Influence of Science down the ages -

The Quest for Truth

an unending search.

Qualities

- (1) Curiosity
- (2) Observation (Kepler? Kneel down before facts & let them speak to you.) 1929.
- (3) Honesty
- (4) Imagination (Blake goes forth in his increased glory.)
- (5) Skepticism (Pasteur Try to prove your own theory wrong.)
- (6) Perseverance
- (7) Faith.

Page

The dramatic fancy wh. creates myths is the raw material of both poetry & science.

DOPPLER principle Sound - Light

1. Rad. vel. of stars
2. moving clusters
3. rotation of Sun 27 days.
4. binary stars
5. Cepheid variables
6. Saturnus rings.
7. novae.
8. rotation of galaxy -
9. spiral galaxies

Inf. of sci. on Literature
Philosophy
Religion.

Surveying the Universe

Mechanics Institute
1937 Dec. 2.

To Survey' in Oxford dict. has 2 meanings
 (1) to let the eye travel over, to scan
 to inspect.
 (2) to determine the boundaries, size
 position, shape.

Read. From Atoms to Stars p 2 - Man has looked out ---
 (We look out from our stance upon surface of
 one small planet - - - - - Solar System
 Stellar System)

Read - From atoms to stars.

Trig Survey - (1) Land survey.

(2) Moon survey.

Gross "

Hence Sun - Earth dist
 by Keplers 3rd Law.

3. Stellar //x

Bessel 1838 61 Cygni 0".31 11 l.y.

Henderson 1839. 2 Centauri 0".75 4.3 l.y.

Struve 1837-40 2 Urae 0".12 26 l.y.

Read Sir J. Herschel address 1841. p. 154
 Smart SS + U

Slow progress - by 1924 1870 //x Yale.

1928 2500
 R. Obs. Greenwich 50 per year

Secondary methods

- (1) Cluster or group //x
 - Hyades - 130 l.y.
 - 130 l.y. Δ Tauri not in cluster
 - 60 l.y.
 - 580 l.y. Praesepes
 - 100 l.y. \pm Pleiades
 - Urs-Maj., Orion etc.
- (2) Dynamical //x
 - Binary star systems
 - Period of revolution
 - Angular separation
 - + assume hypothetical mass 2 \odot .
- (3) Average //x
 - from component of proper motion
 - freed from Solar motion
 - + radial velocity
- (4) Cepheid variable relation.
 - Pulsating stars - giant suns $\pm 10\%$ (rad)
 - SLIDE
- (5) Spectroscopic mag. + //x.
 - 20,000 estimated by 1932.

for clusters

- (a) Dist a function of brightness
 (b) any diam

for Spirals

- (a) ditto brightness
 (b) any diam
 (c) redshift of sp. lines.

SLIDES -

Conclusion

Let us in conclusion survey the universe
 in the sense of letting the eye + mind
 travel over it -

Milky way -

Spirals -

A survey of Universe includes a survey of mankind his history past + present.

In outer world we see Law + Order, Ceasless activity, ceasless change but ordered + directed change.

Contrast the world of men - wars and rumours of wars, greed + injustice.

Herbert Spencer.
Voltaire
Thos. Hardy.
Gen. Smuts.

Perhaps there is a lesson for men in the contemplation of the universe of atoms + stars + radiant energy.

Lord Cecil
" Tweedsmuir
ad as
tell us we
must think.

Do not be appalled by what are so often referred to with a gasp as astronomically large numbers.

More honest thinking.
2 ideas into juxtaposition
in our minds.

No. of stars in average galaxy 10×10^9
Does that number seem so large as to be meaningless.

Then compare it with this: the figure given in this city last winter by Lord Riverdale as the 1937 world expenditure on armaments - 11×10^9 .

With this tragic but significant comparison we bring our Survey of the Universe to a close.

SLIDES

1. Surveyors Δ triangulation method
2. Greenwich - Cape - Moon Δ
3. ^{6000 mi approx.}
Gross 240,000
4. Diagram of orbit base - Stellar //x
5. Bessel. 1784 - 1846. 1838.
6. 25 nearest stars. space distrib
7. " " rel. sizes
8. Human hair. or 1" arc. Greenwich //x/plates
9. Pleiades & Hyades.
10. Convergent of Hyades. Taurus cluster
11. Nov Sky IV. 5 Ceph marked
12. Light curve. " " "
13. Leavitt - Shapley " relation.
14. Small Magellanic Cloud. Dist. 100,000 l.y.
Diam 6,000 "
Clusters 20,000 l.y.
& 50,000 l.y.
15. Glob. clusters
16. Glob. "
17. Herc. " 35,000 l.y. 4000 stars
18. 34 glob. cl. in S. M.W.
19. J.S. Plaskett's model of Galaxy.
20. Subsidiary methods -
Spec //x giant dwarf spectra.
21. K line Width.
22. M.W. S.
23. C.V.8. FarRos.
24. "

SLIDES .

25. M31.
26. " 40 cent. Hubble.
27. M33. 42 " 850 000 l.y.
28. Field of spirals.
29. Spectra of Spirals. Lens. F.o.b.
aper. 2"
focal length $1\frac{5}{16}$ "
length of Spectra $\frac{1}{8}$ "
30. Spiral. Dist. Vel. relation.
31. M51.
32. 3 Spirals.
33. M101.

The Astronomer's View
of the
Universe

Y.M.C.A. 1935 Oct. 21.

Good
introduction

Seeking a Satisfying Philosophy of Life.

The general title of this series of lectures is Seeking a Satisfying Philosophy of Life. Let us place the emphasis upon the first word SEEKING. It is the spirit of the search that matters most - and it is a search that must continue while life shall last - for the satisfying philosophy of life is not something which having found is our changeless & unchangeable possession forever - it must continually be amended, expanded, enriched, deepened if it is to ^{continue to} meet the needs of a growing spirit growing continually as life brings wider visions, deeper experiences whether of joy or sorrow. The spirit of seeking is the important thing. Seek and ye shall find. Knock and it shall be opened - this is the basic faith of the man of science, as also of the searcher after spiritual truth. "You will understand the true ^{meaning} ~~spirit~~"

neither of science nor of religion
unless SEEKING is placed in the
forefront" - these are the words of
Sir Arthur Eddington. The claim
of science is not that we have
attained unto the fulness of TRUTH
but a sureness that we are on the road.

In his essay El Dorado, Robt. Louis
Stevenson writes "To travel hopefully
is better than to arrive".

The spirit of the chase must be ours
To strive, to seek - perchance to find.

During the long centuries of Search for
Truth in the realm of science, a certain
method or procedure has been evolved,
viz the Scientific Method.

My specific task this evening is to give
you a glimpse of the Universe as
Astronomers see it or have seen it
in the past.

SLIDES

The Babylonian Astronomer looks at the Universe.

- 1. Nov. sky N. Imagine parapets, gardens & minarets of Babylon instead of roofs, domes and turrets & spires of London - the Euphrates instead of the Thames 3000 B.C.
- 2. Flamsteed's constellation diagrams ^{1st Acta Regal.}
- 3. Plough now ± 200 000 yrs. Fixed Stars!
- 4. Dec. sky S.
- 5. Flamsteed diagram
- 6. July S.
- 7. Flamsteed " ^{sexcentric 7 wanderers}

The Greek astronomer views the Universe.

- 8. Anaximander 600 B.C. ^{2 postulates}
 - 1. The Supreme an undefined primordial substance
 - 2. Eternal motion
- 9. Ptolemy - spheres -
- 10. epicycles system

Aristotle + The Elements - 4 + 1
 Changelers new

One thousand years of NIGHT

mind shackled by traditional belief - dark ages of orthodox ignorance.

Copernicus views the universe.

Pythagoras
 Eudoxus
 Anaxagoras
 Hipparchus

- 11. Copernicus 1473 - 1543
- 12. Galileo 1642
- 13. " telescope 1610.
- 14. 40" q.d. "Tons 60ft focal length
- 15. sunspots - death blow to Aristotelian Changelers

Telescopes see the Universe.

16. Pleiades . extra focal 6 or 7.
17. Maestlin 1579. "
18. Galileo. 1610 36.
19. Pleiades. 1929 Hertzsprung 2616.
20. Kepler views the universe 1571-1630.
1st Law. Death blow to Aristotelian idea
of perfect curve in \odot
 \therefore planets move in circles -
21. Newton - 1642-1727 Wordsworth.
The marble index.
22. Tel. 1672
23. 200 in ch. Mt Palomar.
24. Rel. sizes Solar System. Universal Law
of Gravitation.
25. The Spectroscope views the Universe.
Solar sp.
26. stellar sp.
chemistry,
velocities,
temps, pressures. abs. mag.
Why does LIGHT reveal so much?
Bec. light has its source within atom.
ult. elec. nature of matter.
H to Uv. 92.
27. Light runner - abs.
Dual nature of light.
" " " matter
Thomson. sp. in detern in air.
Addington. "We are scarcely likely to avoid a storm which would
make the human spirit
more much more
than the
blow and
blow"

- 28. Universe as seen by Herschells & Kapteyn.
- 29. Perseus Clusters.
- 30. M. Way 23. Ophiuchus.
- 31. Orion Neb.
- 32. " Horse head neb.
- 33. Cygnus glowing wisps of gas 7hr. exp.

The Universe of other Galaxies.

- 34. M 31.
- 35. M 51
- 36. NGC 4736.
- 37. Two Mystics View the Universe.

Einsteim: a deep mystic insight into the nature of the physical universe. a courageous pioneer thinker bringing a new point of view. the master stroke of genius - to find a geometry of space & time in which as identities will appear what we call the Laws of nature. i.e. these laws are not restrictions imposed arbitrarily by a Creator from without but are of the very essence & nature of the universe itself.

Tagore: a mystic insight into the spiritual world, the realm of Ideas, ideals, values - the realm of the spirit of man.

38. Sir James Jeans. physicist & astronomer.

whose popular books have given to many people a picture of the vastness of space & of the stately march of stars & galaxies along the corridors of time measured in tens of thousands of millions of years.

Jeans set himself this task: Given a universe of energy in complete chaos calculate the probability of its coming to the present state of organization that we now observe as a result of pure chance. Result overwhelmingly small \therefore a creator.

Contemplating the sheer beauty & wonder of the mathematical relations exhibited in atomic structure & behaviors, he was led to write 'The architect of the universe now begins to appear as a pure mathematician.'

39. Sir A.S. Eddington. mathematician, astronomer, astro physicist, cosmologist.

Who ranks in the very fore front with the great men of science of this century.

Eddington warns against confusing the mathematical symbolism for the reality - he warns against the confusion of mere awe at the immensity & glory of the heavens with the reverence of real worship; he does not look for God among the stars and nebulae, but in the spirit, in the silence of the inner consciousness.

40.

M.101.

We seek a satisfying philosophy of life - We are not perturbed by man's apparent insignificance as a physical entity in the vast universe - a new comet to this little old planet moving about a very average ^{average} star, one star of $100\,000\,000\,000\,000\,000$ stars in a galaxy & millions of other galaxies.

When we think of the spiritual potentialities of man, we can walk beneath the stars with head held high; and we build our philosophy of life - with Sir Arthur Eddington around this immensely significant fact - man is a being to whom TRUTH matters.

The Physics of the Stars

Westmont High School
Science Club. 1936 Feb. 13.

1. Review of Physics
2. Newton of Gal
3. 1610 Tel
4. 40 "
5. Newton
6. Tel
7. 5 ad
8. out w.
9. Palomar 200"
10. Sky
11. ~~11~~
- 12-15 Pleiades
16. Solar Sp.
17. Fraunhofer etc
18. Line Coinc
19. Stellar types
20. Runners
21. Hrs. Mag. $\pm 200,000$
22. Doppler
23. "
24. Stellar Sequence
25. Red
26. Mich
27. Interferon
28. Betelge
29. Sirius
30. Milky Way
31. Perseus Cl
32. Scales
33. M 31.

SLIDES.

- ✓ 1. Development of Physics through the ages.
2. Greeks - unchanging & unchangeable -
- ✓ 3. Galileo - CHANGE.
4. Newton - spectrum
5. Fraunhofer - abs. lines
6. Kirchhoff.
7. Huggins -
8. Stellar Physics - Motion ρ_m
radial

Mass -
Size - diams.
Density
Temp.
Pressure -

Chem. of stars -

SPIRIT OF SEEKING

FALLACY OF FINALITY

THEORY IS A TOOL

QUEST FOR TRUTH

IN REALM OF PHYSICAL

& SPIRITUAL -

Stars & Starlight

1. Argyle Junior High School
Westmount
1936 April 8.

2. Hudson Heights - Cancelled
1936 April 9.

Overpowering Curiosity

The 8th Search

• SPIRIT OF SEEKING •

Variety of interests

microbes
insects
birds
animals
plants
human body
nerves
muscles
the eye
" brain

chemistry
atoms & molecules

Electricity
radio
dynamoes

rocks & minerals

STARS

ORDER IN NATURE

8th unity, 8th harmony & obedience to universal Law

Discipline

Courage

Persistence

Curiosity & Imagination

Faith

Seek & ye shall find

SLIDES —

1. Apr. sky N.
2. Bayer - Mrs. Minn.
3. " Mrs. May
4. Cygnus N. am hel.
5. " wings
6. Perseus Cluster
7. Zet. S.
8. Flamsteed
9. Orion 9th the focal
10. " 30' 150'
11. " Net. 24 inch 4.0
12. " " 60 " net. W.
13. " Horse Head
14. Pleiades 4.0
15. Maestlin 1579. 11.
16. Galileo 1610 36.
17. Photo. Hertzsprung 26.16
18. Apr. S.
19. May S.
20. June S.
21. Flamsteed
22. Saf. clouds
23. " "
24. Galileo's Tel. 1610
25. Newtons " 1672
26. Mt. W.
27. Palomar
28. Solar Sp.
29. Stellar Sp.
30. Star diagram
31. Sun
- 32 & 33 Prominences
- 34 & 35 Orbits of Planets
36. Rel. sizes
- 37, 38 M31
39. The Runners
40. The Balancers
41. M. 101.

Stars and Starlight

The Value of Astronomy

Côte des Neiges Women's Club.

1937 March 24.

Keats Those silver lamps that burn on high
 Shelley eternal orb that beautify the night
 Those mighty spheres that gem
 Shakes -
 Dante -

Chance or direction?

J.H.J.

Bruno Things have not come about
 by mere accident but through
 the determining mind.

Ans. The order of the world is not accident
 religious insight is the grasp of the truth.

Asq. The spirit of Seeking.
 The endless search for truth.
 You will understand the true spirit
 neither of science nor of religion
 unless SEEKING is placed
 in the fore front

The Value of Astronomy

Practical Time - Direction

Its value in stimulating imagination
 curiosity
 The search for truth.

Influence on other sciences.

" literature language.
 " philosophy.

SLIDES.

1. Jan 5.
2. Orion
3. Hamsted Orion
4. March 5.
5. June 5
6. Anaximander 600 B.C.
7. Egyptian section
8. " Symbiote
9. Hildegard of Bingen 1170
10. Ptolemaic. Jacobi 1000 years of night.
11. J.P. Plaskett univers. Copernicus 1543.
12. C of gal. E.
13. " W.
14. Perseus clusters (fishes)
15. Veil neb. Cygnus
16. Bar & Dark neb. Cygnus.
17. Orion neb.
18. Spectrum Scotch types.
19. Giant dwarf diagram
20. M. 31.
21. " variables.
22. 16th Cent. woodcut.
23. M 51. Can Ven.
24. M 33
25. M 101.

a dynamic universe of directed change
 not mere chance.

St Andrews Knotted Ch. (East)

1931 Jan 23.

1. Hurdoo Earth
2. Egyptian Hieroglyphs
3. " Symbolic
4. Homerica
5. Ptolemaic
6. Hildegard of Bingen 1170 AD.
7. Jan. Sky N
8. Constell'd Mrs. May
9. Jan Sky S.
10. Orion
- 11-15. Astrologues
- 16-17. Herclius 1650. Danzig
18. Galileo's Telescope
19. Newton
20. Newton. The marble index - wordsworth
21. W. Herschel's 4 ft mirror 1790
40 ft long.
- 22-23. Solar System
24. Yerkes Observatory
25. 40-inch
26. 42-inch dishes Gubb & Parsons
27. 100-inch
28. 72-inch
- 29-32. Pleiades - Tommy May a night
33. Perseus Cluster. 5 n.e. stars
34. Diagram of Galaxy
35. Distances
36. Sun & Planets diagram
- 37-38. Star sizes
- 39-40. Spectra
41. Evolution
42. Scales
43. M 31
44. M 101

7
11
35
1616

The Sun & Stars

League for Hard of Hearing .
New York March 26 1936 .

The study of astronomy has been the result of three urgent factors in human thought.

- (1) The need of measuring time - units of time, a system of chronology.
- (2) The need of determining direction - navigation, land survey, boundaries.
- (3) The natural curiosity of mankind regarding the earth on which he stands and the vast outside universe.

The earliest astronomers believed the earth to be the Centre of the Universe. They mapped the heavens - constellations - 7 exceptions.

SLIDES

1. Earth - Sun - Seasons.
2. Sun spot
3. "
- 4-6 Provinces, Ca, H.
- 7, 8 Corona
- 9-10 moon
- 11-12 Planetary nebulae
13. " " eyes
14. Mars Sat. + Jup.
15. Jup
- 16, 17 Comets 1843, 1744
- 18 Solar Spectrum
- 19-22 Telescopes. 4-1610 N. 1675, 100 not zoomed
23. Apr. sky N.
24. Feb. sky S.
25. Apr. S.
- 26-29 Pleiades many a night down the Pleiades rising thro
the mellow shade glitter like a
swarm of fire flies tangled in a
silver braid.
- 30-32 Orion
- 33 Cygnus
34. Perseus
35. faint Dwarf
- 36 Scales - atoms star
- 37 Milky Way - Sag.
- 38 m 31
- 39 40 41 spirals - M51, M101.

Behold the Throne of Chaos
and his dark familiars
spread wide on the
wasteful deep.

majestic beauty, law, order, harmony
aligned Austin - All things that are
made music to mine ear.

Man in the physical universe ✓
Man as Mind ✓
Man as spirit - a being to whom TRUTH matters.

Stars in the Spring Sky

Knox Present Ch.
Womens Guild .
1939 Apr 14 .

Stars of the Spring Sky

Intro

Spring officially Mar 22.

optimism - leaves out by 24th May

Yes Queen Victoria was a wonderful old lady
& her influence is ~~not yet gone~~ still potent
in our land!

Early Astronomy

4000 B.C. Bablylonia, Chaldea, Assyria.

Mapping heavens. Time, Direction,
Constellations - 7 wanderers.

Zodiac

Winter & Spring Southern Stars

Orion

Taurus, Pleiades

Sirius

Twins

Capella, & Aurigae

Leo

Apr. 19. Eclipse

Astronomy as the great liberating
influence of the Renaissance

Ptolemy

Copernicus

Galileo & Bruno

Newton

Man shall not live by bread
alone - but by every word that
proceedeth out of the mouth of God.

Milton Christ the Logos of God was
divine essence created the
physical world. Everything
that is \therefore in the material
world is the word of God
& on this revelation of God in
Nature - the wonderful world of
atoms & stars moving in harmony
and exhibiting so much of beauty
we can feed our spirits.

L. da V. Great love is the daughter
of great knowledge - Perfect love of
God & perfect knowledge of the Universe
are one & the same thing.

Let us \therefore enjoy the beauty of sunset
or sunrise, of starlit sky, of budding
leaves, of children's laughter, of the wings
of birds realizing that these things are
all revelations of the Divine.

Reman No passing vision exhausts
divinity.

Astronomy

Northern Electric
Engineering Society
Eng. Inst. of Can. 1935 Jan 28.

SLIDES cont'd.

16. Motions - ans. May diagram
17. Solar spectrum
18. H He Ne Ca etc.
19. Line coincidence
20. Elements absent.
21. Rel. abundance.
22. stellar types - Secchi.
23. " "
24. Doppler doubling.
25. Giant Dwarf sequence.
26. Pleiades extrafocal, 6 or 7.
27. " Maestlin " 1599
28. " Galileo " 1610
29. " Hertzsprung 26/6 1924.
30. Orion neb.
31. Cygnus. feather wisps of glowing gas - 7 hr.
32. C. of Galaxy, 7 E Rows
33. " " "
34. N. am. neb.
35. M 31
36. M 31 40 variables
37. M 33 Tri.
38. Whirlpool. M 51 Can Ven.
39. Twin neb.
40. Distribution
41. Spectra
42. Dist.
43. M 101 - Motion - subatomic universe

+ the mind of man - the most marvellous thing of all - cannot remain static either.

Astronomy

Introduction

When we set out to consider any problem - whether it be in the realm of ~~government~~, of national & international affairs, of government, of social reforms, of ethical principles, or whether it be in the realm of science, in the laboratory, or in the observatory, it is always a wise precaution to look ^{first} very critically ~~first~~ at our own particular point of view - for what we see in the ~~world~~ ^{in the relationship} of ideas, of mankind, of nations or of atoms or of stars may be very largely influenced by, limited or biased by our individual position as observers. Each observer sees the world through his own eyes and necessarily obtains an egocentric view - one aspect and not the only one.

The astronomer's first task is therefore to consider the very special platform from which he views the stars - this EARTH rotating, revolving, drifting through space is our stance.

SLIDES


1. Rel. sizes Sun + planets
2. Diagrams orbits minor planets.
3. " " major planets
4. Gross orbit. Kepler's 3 Laws.
1571-1630
Distance by Ersmay.
5. Jan sky S. Jup in Libra ave
Sat low in S.W. at sunset.
Mars near Spica rises midnight
Venus. -3.4 sets 1 hr after sun.
6. Feb sky S.
7. " " N. What can we find out about
these stars?
 1. Distrib + numbers.
 2. Motions
 3. Chem.
 4. Temp + Pres.
 5. Distance + size.
8. Herschel Kapteyn stellar diagrams
9. Census of sky.
10. Y.O. 40 inch
11. Y.O. obsy.
12. Y.O. spectrographs
13. Mt W. dome
14. " " 100 inch
15. Vic B.C. 72 inch

Comets

1. Argyle Junior High School.
Westwood 1937 May 6.
2. A.A.C. Montreal Centre
1937 Nov. 5.
3. O.B.M. 1938 March 6.

Comets

T. A. Schmitt
sup 3

1. Solar System diagram of orbits.
2. " " " "
3. Kepler " Rel sizes.
4. Ellipse + Keplers 2nd Law.
5. 1843 Comet
6. 1744 " "
7. 1000 A.D. diagram of dragon etc.
8. Isaac Newton
9. Halley.
10. H. Comet. 684
11. " " 1866.
12. " Bayeux Tapestry.
13. " " Josephus sword hangs over Jerusalem
14. " Orbit.
15. " May 15-1910.
16. " " 28
17. Other comets. Gemma
18. " " From Herschel.
19. " " Hevelius.
20. Mosehore, 1908 (Greenwich Sept 29.
21. " " HCO. Nov 20.
22. Cometary orbits
23. V.D. 4 star fields - H. Comet 1910.
24. Solar Sp.
25. Line Coincidence
26. Sp. H. Comet. May 6/1910.
27. " " "
28. " " "
29. Comet at Cheseam. 

2

Historic References to Comets probably Halley's Comet

- B.C. 467 Aristotle.
 87 Pliny
 12 Death of Roman general Agrippa.
 A.D. 66 Josephus (Wars Bk VI. Ch. V.)
 684 Nuremberg ^{Sword} chronicle hangs over Jerusalem.
 912 Japanese MSS refs.
 1066. Istinerant stella.
 1531
 1607
 1682 Halley Computed orbit
 & found Period 75-76 yrs.
 & predicted return in
~~167~~ ←
 1758 16 yrs after Halley's death.
 1834
 1910.

Other of Visible Comets.

- 1472 Muller at Nuremberg.
 1577 Tycho Brahe.
 1743
 1764 - year of birth of Napoleon.
 1811 3000 yr period
 1858 Donati. 2000 yr.
 1861
 Biela's 1805 $6\frac{1}{2}$ yr = P
 1826
 1832 not seen
 1839 not seen
 1845 ap. in 2 parts
 1852 very disturbed -
 never since. But meteors
 not. Andromedas.

Zwislens & Olshits

projected from
 "Sky" + Telescope
 + Paper.

Studies

1. Japs Comet family
2. Paris 1744
3. Rome. 1843
4. Cheseau
5. Morehouse 1908 Nov. 20. HCO
6. " " Sept. 29. Greennd
7. Halley's. 440. finding photos
8. " May 28 1910.
9. " " 15 1910
10. " orbit.
11. " 1066 in Gemini
12. " Bayeaux Tapestry.
13. " Nuremberg 684.
 Chronogid.
14. Hevelius drawings. 1700
15. Herschel W. "
16. Gemma (Cornelius) 1577, 1680, 1769.
17. AD 1000. Lubienietzki
18. Line spectra
19. Halley's Comet head sp.
20. " " Tail obj. sp.
21. Halley
22. Newton.

Comet tail repulsion with sh. fan analogy -

Comets.

O.B.M.
1938 March 5.

Astronomy from Chaldeans
to the present -

(with special reference to Jesus & Edington
by request.)

Church of the Advent, Westminster
1936 March 3.

Astron from Chaldeans
to time of Jews & Edington.

1. Astron the oldest of the sciences.

Time & direction

4000 B.C. Babylon. Chaldean priests.
→ astrologers.

Influence spread to Egypt - Greece
→ east to Persia, India, China.

SLIDES

1. Hindus
2. Anaximander, 600 B.C.
3. Homeric world, circa 1000 B.C.
4. Egyptian
5. "
6. Ptolemaic
7. Polar Constellations - Aratus + St Paul
8. Orion
9. Zodiac
- 10-11. Denderah Hemisphere
Hildebrandt of Bremen d. 1170 Job.
12. Copernicus d. 1543.
13. Galileo d. 1642
14. " telescope 1610.
15. Tycho Brahe d. 1601
Kepler + 3 laws.
16. Newton 1642-1727.
17. " statue.
18. Paris Observatory. 1667.
19. Newton's telescope.
20. Vic Soc.
21. Yerkes
22. Zoo with Mt Palomar

SLIDES.

- Proposition - Halley first noted - Unmaj. Slide.
- 23. Sir Wm Herschel 1738-1822. P. 84/9/13
- 24. " " Telescope - Neptunus . 1781
- 25. " John Herschel . Southern stars
C. of Good Hope.
- 26. J.C. Adams } Neptune 1845, 6.
- 27. Le Verrier } P. 165/1/14
- 28. Carl Rosse d. 1867
- 29. Whirlpool neb.
- 30. Ball bearing "
- 31. Feb Sky N. Cygnus & Androm.
Perseus
- 32. M 31
- 33. Cyg. neb. 7 hr.
- 34. Feb Sky S. Orion Pleiades
- 35. Orion neb.
- 36. Pleiades
C. of Gal.
- 37. Sir Wm Huggins
- 38. Solar Sp.
- 39. Stellar Spectra
- 40. Sir Rab. Taylor & Weinstein . 2 Types of Mystic
- 41. J.H. Jeans . The vision of the Seer
- 42. " "
- 43. W. Riddington . (1) in the realm of the Spirit - the ideals, thoughts, actions of mankind
- 44. M. 101 . (2) in the realm of nature
The world of stars + galaxies
of electrons atoms + radiations

Both a vision of a unity, a harmony underlying all things that the ord. eye does not see before.

J.H.J.

Chance

architect of Univ: a pure
mathematician.

Ans. The order of the world is no accident. Religion ^{might be in} ^{the grasp of} ^{this} ^{Fract}
Eddington. The mathematical

representation is only symbolic. The intrinsic nature of things is not disclosed by the measurements of the physicists or the metrical symbols of the mathematician. He stresses the spirit of seeking, the significance of the fact that man is a being to whom truth matters.
"I assert that the nature of all reality is spiritual"

I am reminded of Caliban's soliloquy upon Setebos: Thinketh he dwelleth i' the cold i' the moon and do you remember Browning's ^{that} ^{comment} ^{thereon} ^{gives the key to that poem} in the words of the Psalmist: Then thoughtest that I was altogether such an one as thyself.

There are ^{sublime} heights to which the Spirit of Man may reach a grandeur & ^{sublimity} ^{of thought} ^{activity} ^{idealism} and our conception of God must embrace all these. There is vastness in the physical universe, grandeur, magnitude, beauty, majesty, ^{sublimity} ^{complexity} and our conception of the Creator must be great enough to embrace all this. Surely as Dr. an ^{wholehead} ^{has expressed it} "The worship of God is an adventure of the Spirit."

Astronomy Ancient
& Modern

St Anne's Women's Club
& School for Teachers
Macdonald College
1939 March 7

1. Naburrauno
2. Hip
3. Cap.
4. Gal.
5. Tycho B.
6. Newton
7. Le V.
8. Struve
9. de Sitter
10. Einstein
11. Lemaitre
12. Saha

Astron a very old science. This is because the heavens alone can yield two of the essential requirements of mankind living in even the most primitive communities. Time + Direction. Aspect of sky as seen by dwellers in the plains + regions drained by the Euphrates + Tigris.

SLIDES

1. Feb. 5. mapping stars + esp. star background of Sun Moon + 5.
2. Flamsteed's diagram Barb → Greece + SK + Roman mythology → western Europe.
3. Babylonian Tablet (Louvre) 4000 B.C.
or Sun worship slide → lunar crescent + d. β Gem
1st new moon of year - i.e. Spring.
4. Flamsteed S polar region B.C. 2700
5. Zodiac Precession Hipparchus. 150 B.C.
6. Ptolemaic System ^{Bab. Ram Fishes} - ^{Orion Yagfish}
7. ~~Spiculus (Eudoxus, etc. etc.)~~
8. Copernicus Danzig. 1543. *De Rev. Orbis* Bruno
9. Galileo (& Milton) (Titto Livio 1890)
10. Tel. 1610 - proved Universality of Law of Change.
11. Moon's Neb.
12. Jupiter's Satellites: (The sky was cloudy. Jan 9 1610.)
Jan 7, 8.
13. Newton - 1642 - 1727 Wordsworth The marble index of a mind foregone voyaging thro' the seas of Thought alone.
14. Tel. 1672.
15. Wm Herschells 4 ft. 40 ft focal length. 1795.
16. DAO Uranus. Star Counts + distrib.
17. Jan Sky 5.
18. Orion Neb.
19. Horse head neb.

Rayson . p 162 .

The starry fable of the M. W.

--- a constellation of a sweet-ray

--- in the alyps when sparkle distant worlds -

18. J.S. Plaskett's model of galaxy. 10" stars.
19. ~~Distance of galaxies.~~
20. Types of stars.
21. Auriga (Capella overhead in winter
low on horizon in early evening in summer)
22. ϵ Aur. diagram - P 27 yr. 1 yr eclipse.
3000 x diam \odot
60000 x total rad. of \odot
1300°C smaller is 8000°C
 $\rho = 10^{-9}$ F2.
Heaviside ionized layer cuts down
opacity to 50%
23. Stellar spectra. Chem. of stars temp. pressures
23. Balmeries 10^{27} 10^{26} mag. + elec. effects in star atmospheres.
24. 16th Century woodcut. shepherd.
25. M33.
26. M51
27. M81
28. Einstein & Rabindranath Tagore.
2 mystics.
1. mathematical harmony of the physical universe
vision of a geometry of time + space embodying
within itself the relations of Grav. el. + mag.
+ Radiation + matter itself.
2. Mystic outlook on human life - honest recognition
of the unknown. metaphor. Life is a
constellation an unplumbed deep stream
with starry moments.

In United Ch. Hall
 Mrs Roe pres.
 Crumpton
 Menzies
 South
 Miss Ramsay
 Miss Dresser.

Astronomy

Verdun Y.M.C.A.
1938 Oct. 9.

Astronomy

Thanksgiving Sunday: "thanks for music, harmony, Pythagoras & m. of 8/8"

1. Astronomy v. old Sci. ^{growth of knowledge from superstition & fear}
Observations & speculations of Bab. & Chald. to
& Greek.
Impetus with Renaissance of Sci. &
critical experimental method -
Cop. to Newton to age of telescopes.
The thrill of the search - an age long quest
Fallacy & heresy of finality.

SLIDES.

1. J. P. Sky N.
2. Flamsteed's polar diagrams.
3. Oct. S.
4. Nov. S.
5. Orion
6. Anaximander. 550 B.C.
7. Ptolemy
8. Copernicus.
9. 10 Solar System orbits.
- 11 Sun & planets - size.
- 12 Galileo
13. Tel. 1610. Pleiades 7 - 36.
- 14 Isaac N.
- 15 Tel. 1672.
16. 40. tel. " 10m 64 ft.
16. D.A.O. 72"
17. Cygnus. Clouds.
18. M. Way. of. Approaches.
- 19 Coma Spirals.
20. M. 31
21. M. 33.

Dynamic universe of change.

Change a law of life

atom & star obey the laws of the physical world

Man laws of physical nature & laws of spirit.

R.V.C. Science Club

Chemistry of the Stars

1938 Nov. 24

Discussion with
Jean Lacey
Dorcas
Dorcas Dunn
Helen Wright

? Biochem.

about 24 present.

Chem. of terrestrial soils.

Problem of outer space matter
Greek apes.

Gal. Newton - Kirchhoff - Huggins
quotation.

92 elements

Spectrum analysis
all but 10 identified.

Molecules - 18 -
Dissociation temps

Spectrum analysis applied
to lab problems

B in plants

Saliva spreads Tongue.

[Impurities in al (in the Se)]
at arvida plant.

Contagious effect of research

W K Clifford - like musician.

[Fold of Miss Drak & Miss Bhagvat
+ Mrs Ludwigs Mann]

Astronomy
in
Education

and.

Education
in
Astronomy.

McGill Alumnae Society.
1932 Nov. 15. 71

Astronomy in Education

The title of this lecture is a very empty one, for there is unfortunately very very little astronomy in the education which most people receive.

So many people, children and adults, are no better off than the man whom Paracelsus met "whose eyes

saw in the stars mere garnishery of heaven".

How many schools make any effort to teach their scholars the first thing about stars?

[How many points has a star?]

Astronomy at McGill.

Toronto -

Harvard, Princeton, Yale, Chicago
women's colleges - Vassar, Wellesley, Bryn Mawr
Smiths & Mt Holyoke.

Having said which, I have exhausted my subject - but I cannot in all decency sit down yet and so I shall turn the title back to front and begin again.

Education in Astronomy -

In the pursuit of astronomical knowledge one inevitably learns a little about a great many other things - one may obtain what Huxley would have called a liberal education.

and conversely students who earnestly

pursue any one of many non-or semi-scientific subjects: must of necessity learn a little astronomy.

All Knowledge forms one whole, all Knowledge is related and interrelated with all other knowledge, — there ~~is~~ ^{are} ~~is~~ no water-tight compartments.

Let us examine the points of contact between astronomy and the following: —

- History,
- Philosophy,
- Literature
- Philology
- Psychology
- archeology.
- art.

History proclaims that there has been no more drastic influence on human thought than the influence of astronomical speculation and discovery.

geocentric to heliocentric
influenced philosophy + religion -
modern astronomy takes us yet further -

This impact of astronomy on human thought is embedded in our language, where traces of the astronomical beliefs of the ancients is to be found in the word quintessence.

The astrological beliefs of the Chaldeans & Babylonians & later of the Greeks is seen in disastrous
saturnine
jovial
mercurial.

The word lunacy from the superstition that the influence of the moon had something to do with mental disorders -

The philologist must take cognizance of early astronomical knowledge.

SLIDES Early cosmologies -
to Hildegard of Bingen
+ Augustus de Morgan -
Francis Bacon + Dean Swift -



Astronomy in Literature

Definition of poetry.

Matthew Arnold - Crit. of life

Carlyle - - musical thought

Kepler. see Alfred Rouse's translation -

Leopold Hubs - Poetry is the utterance of a passion for truth beauty and power, embodying and illustrating its conceptions by imagination and fancy.

Dante's Divine Comedy

Vision of Paradise

9 heavens.

1. Moon - p. 241. 245. 246-247.
 Picardia - holy vows - Jews to break -
 Astrological dogmas
2. Mercury - p. 255 -
 256
 258
 imperial Justinian
3. Venus. p. 266
 King Char Martel
 of Hungary.
4. Sun p. 273
 Thomas Aquinas. p. 275
 Solomon
 Venerable Bede d. 735
5. Mars (in Leo) p. 287
 description of meters - p. 290.
 Joshua & Charlemagne
 warriors & Crusaders
 + the great massacre
 Judas Maccabeus p. 301.
6. Jupiter p. 301 6th orb.
 p. 303 Sweet's
 Sunsets 308
 David
 Trojan
 Constantine
 Hezekiah.
7. Saturn p. 311
 3/3
 the women of those
 who had passed their lives in
 holy retirement + contemplation
 St Peter Damian
 St Benedict

8. Fixed Stars p. 317.
 p. 318. See *Earth* & *hell* *pooles* *Virgin Mary* *p 320*
 & *St Peter* *also Adam*
 Cf. Gabriel Dante Rossetti
 "..... this earth
 Spin like a pretful nidge"

9. God the centre p. 335
 & the *10* *confermed*.
 The divine essence
 nine choirs of angels in
 3 hierarchies.
 His physical endurance is
 overtaxed but the will is impelled
 by the universal love.
 p. 357
 343 sunrise
 Cf. Chaucer p. 543
 This literal spot of earth
 this world, a pitlike
 Beatrice on a throne
 St Bernard
 V. Mary

Dante born 1265
 Melton " 1608 - 1674
 lived in Italy 1638 - 40
 Galileo died 1642 born 1564
 Copernicus died 1543

Milton

Paradise Lost . 273

Raphael - { 274 .
275 -

Galileo's Telescope + St. neb. of Orion

Milton :- Behold the throne of Chaos
and his dark pavellins spread
wide on the wasteful deep.

Archaeology omitted. Temple Lake;
Stonehenge &c.

Meteors .

Eclipses .

Conclusion.

Art M101

Beauty, harmony, the enduring laws
of change

The wheel of Indian philosophy -
the summons to contemplation -
to withdraw into the silence
of one's own spirit -

Alfred Austin

Carlyle .

Stellar + Interstellar Gases.

Chem. Soc. 1934 Nov. 30.

1942 Food Summary

See Ap. 9 - March 1942

Analysis of Starlight

Stellar and Interstellar Gases

Introductⁿ. We are all aware of the ideas of extension in space and passage of time, and because of the close mathematical association of these, the word Spacetime has been coined.

In this spacetime continuum is contained the whole physical universe and it consists fundamentally of just one entity — ENERGY.

Energy may be now thought of in two distinct divisions — BOUND and UNBOUND.

The unbound energy of the universe manifests itself in many diverse and intertransformable ways, K.E., P.E., Electricity + magnetism + all the electro magnetic radiations — long radiations, heat, light, u.v., X, γ + highly penetrating.

The bound energy is matter. and the equation relating energy units to mass units is the famous Einstein and Lorentz equation $E = mc^2$ and if we extend this to the energy quantum equivalent of electro magnetic radiation

$$E = mc^2 = h\nu$$

Bound energy units —

proton	1.66×10^{-24} gms
electron	$\frac{1}{1845}$ approx.
positron	
[neutron]	

From these build up 92 elements.

Chem Soc. 1934 Nov 30

No. of atoms in Universe

Estimate from Einstein Cosmological equations [M = $\frac{\pi c^2}{2G} \cdot R$; $R = \frac{c}{4\pi G} \frac{1}{\rho}$]
by Hubble 1926 10^{81} atoms

Estimate from Lemaitre Expanding Universe
by Eddington 1930 10^{78} atoms
from 156-256 Theory " " 1942 2.36×10^{79}

No. of galaxies 10^{10}

" " " on plates now at Mt. W. 80,000 (1944) ^{4 10^{10} can be seen photographically, at Mt. W.}
" " " " H. Olney 150,000 (1935)

Average mass of a galaxy. $10^{10 \pm 1}$ suns 10^{55} ^{2×10^{10}}

Mass of an average star (sun) 2×10^{33} gms.

Average dist. between galaxies. 10^7 l. y. = 10^{20} km. ^{2×10^6 l. y.}

" " " stars in a galaxy 5 l. y.

Density of matter in Universe 10^{-30} ✓

" " radiant energy " 10^{-34}
i.e. $\frac{1}{10,000}$ total energy, 90-95% being soft radiation.

" " gases in stars. { 10^{-7} gm/cc for giant M.
1 for solar type.
50,000 for white dwarfs.

" " " in interstellar space 1 atom per cc.
cf air S.T.P. 10^{19} atoms per cc.
 2.70×10^{19} mols/cc see M-E-K p. 222

Temperature range - terrestrial -273° to $+3500^\circ$ crater Carr.

" " stellar surface 3000 to 25,000 ^{even 100,000 for O star in planetary nebula}

" " stellar interior 4×10^7 or greater ^{is. vel. 100 mi/sec. not comparable with rad. act. projectiles. see J.C.S. p. 371.}

" " interstellar space 3.18° Abs. (-270) from $E = at^4$
selective radiation may raise indiv. atoms to 15000° i.e. speeds give this "gas temp."
 $E =$ total radiation from stars = 7.67×10^{43} ergs

atomic vel.
at $20^\circ C$ 500 yds/sec.
at $40 \times 10^6^\circ$ 100 mi/sec

Chemical Society

1934 Nov. 30.

Stellan v. Interstellar Games

Int. Crit. Tables.

Heats of Dissociation

(in electron volts, calc. by Berge from spectroscopic data)

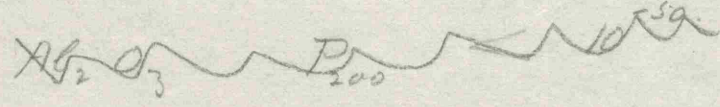
CN.	9.5
C ₂ [?]	7.0
CO	11.2
CO ⁺	9.8
N ₂	11.7
N ₂ ⁺	9.
O ₂	7.
H ₂	

CH should be near CN.
 none wd. expect both these higher than CO
 hence appears likely to be true

see Nature Nov. 16, 1935

J. Brown
 Dissoc. of CO 8.41 volts

Dissociated Pressure



1942 Oct Obsy.
 Ca Cl in N variable
 C H₂ (possibly) in const

- Ti O₂ see PDS p. 772 M.
- Zr O₂ class S.
- Sc₂ O₃ Baranid. l.p. variables
- Al₂ O₃ 0 Cete at 3^m-9^m minimum 370 dp±

Problem of Coronium
 argon No, O yes.

" " Nebulium
 " " Planetary Neb.

N H₃
 Mg H₂ ... SUN.

Ca H₂
 HO
 B₂ O₃

CO₂ in Venus
 (see Obsy 1942 Oct)
 of swings
 Lick
 508

N₂⁺
 CO⁺
 CN
 C₂
 CH (C₂H₂)
 H₂

CH₄ molecules
 14
 16 molecules

1939 hard app.
 27 mols.
 charted

O III lines
 + Wright
 + Bowen.

Ballou Fe, Ni, Ca, A
 D. highly ionized
 1941 Telescope obs.
 51
 51
 ionized

Interstellar Gases

Eddington 1 atom per cc.

all atoms probably represented, but detection is a question of relative abundance & likely formic lines.

Take radius of atom 10^{-8} cm.

mean free path $5.6 \cdot 10^9$ km. $T > 5^{\circ}W$.

If ionized m. f. p. atom⁺ $7 \cdot 10^8$ km.
time between collisions π 5 yrs.

m. f. p. electron $1.8 \cdot 10^8$ km.
 T $3\frac{1}{2}$ days.

Evidence of interstellar gases.

(1) Photographic

(2) Spectroscopic H, K, D lines

Nebulium - Bowen 8 neb. lines - NII OII OIII

→ ap 1935 (and)

Planetary Nebulae. W. H. Wright, Lick, aluminized Crossley mirror & obtained spectra in u.v. to 3100 A. OIII Bright lines appear but only one member of each multiplet system.

$3d^3P_2 - 3p^3S_1$ present but $3d^3P_1 - 3p^3S_1$ absent.

$3p^3D_3 - 3s^3P_2$ " $3p^3D_2 - 3s^3P_2$ absent

Only lines from state $3d^3P_2$ or from state connected with it by str. downward transition occur.

Bowen shows that $3d^3P_2$ gets loaded by absorption from $2p^3P_2$ of $\lambda 303.799$ made poss. by Helium⁺ emission HeII resonance line $\lambda 303.780$.

SLIDES

1. V.V. Telescope.
2. Bessel Spectrograph.
3. V.C. B.S.
4. Line Coincidence.
5. Coloured H He Ne Ca Spectra.
6. Solar Sp.
7. Stellar Types.
8. " " " B-M.
9. " " " R-N.
10. Variation of CH CN in α Urs. Minor.
11. Dec. Sky. S. - Cetus region.
12. Diagram Oletu + mean orbit (141×10^6 mi)
12. Oletu Spectra Al_2O_3 .
13. Diagram Giants - Dwarfs.
14. Sunspots.
15. " in H α .
16. Planetary Spectra. Jup. NH_3 . + CH $_4$.
17. H. Comet spectra.
18. " " "
19. Elements absent.
20. Nova.
21. H Grotrian.
- 22-24. Merrill Balmer Paschen Series.
25. He Coloured slide.
26. He Grotrian.
27. Cyg. Veil neb. omitted due to rush for time
28. Orion Gb. neb.
29. neb. spectra.
30. Planetary neb. O III.
31. Dark neb. Orion.
32. " " p Oph.
33. Rel. abundance. CH Payne.
34. " " in Sun H.N.R.
35. F.Ross C. of Galaxy.

a mere handful of stars

omitted unnecessarily

Ap. J. Mar. 1942 P. Swings: Interstellar Molecules & Atoms
(Lick)

Interstellar atoms: $H O^+ O^{++} N^+ Na Ca Ca^+$
(10) $Ti^+ K Fe$

" " " " " " " " " " " "
mols. (3) $CN CH CH^+$

Unidentified ~~bands~~ sharp lines (abs.) at λ 3579.04
3934.29 (possibly NaH ?)

and 7 broad features from 3A to 40A wide.

[Cf. in cometary atmospheres 7 mols.
 $OH, NH, CN, CH, C_2, CO^+, N_2^+$
 CH^+
 CH_2
 CN_2 } 1943. ✓

Colloquium 1934 April 5.

Star Clusters

Their distribution and Spectra.

W.D.

Star Clusters

Classification

1. Galactic
- (a) Field irregularities - by star counts. partly perspective.
 - (b) Wide spread moving clusters - p.m. & rad. vel data (U. Ma. Orion, etc)
 - (c) Loose irreg. clusters (Hyades, Pleiades...)
 - (d) Somewhat loose.
 - (e) Compact clusters - more & more so.
 - (f)
 - (g)

- or classed according to spectrum — sides of spectrum
- (i) Pleiades type - main sequence stars only
B, A & cooler dwarfs.
 - (ii) Hyades " - yellow giants. also present
with app. mag as bright as the
average A's.

Examples of (i) are Perseus double cluster, M36, M34. Slide.

" " (ii) are M11, M37, Praesepe & Coma B.

95% galactic clusters fall in i or ii - but
a few are variants or aberrant clusters
i.e. M67 contains no B giants, otherwise
it is in ii.

Galactic Clusters

<u>Distance</u>	<u>Pleiades</u>	220 l.y.	or 70 psc.	No. of stars all lost of page
	Diam.	20 l.y.	6 psc.	
	<u>Hyades</u>	130 l.y.	40 psc.	
	Diam.	33 l.y.	10 psc.	

[aldebaram not of cluster, 60 l.y. distant but in perspective one of the cluster]

Præsepe - 580 l.y. - 180 psc.

Number of Gal. Cl. over 700 mostly indefinite
249 listed in Appendix by Shapley.

Determination of Distance

i. main clusters - apex.

$$\frac{4.74 \mu}{p} = R \tan \theta$$

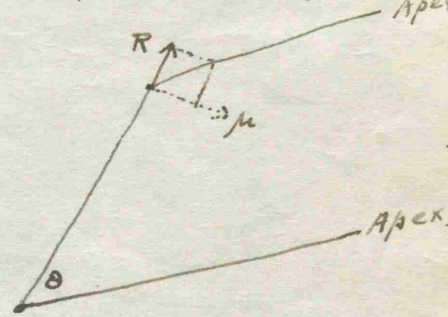
∴ calculate μ & p & hence $\frac{1}{p}$ the dist. in parsecs.

ii. Spectroscopic μ . (and used 30 G + 49 T)

iii. for closer clusters, trig μ of individual stars.
Period, Head & Stars: -1838, 39, 40

no variables of recognized type, in partic. no Cepheids
in gal. clusters.

Period of Variation $P = \frac{1}{\sqrt{p}}$



Præsepe
M44 -
1821 Vanderhulst
1933.

No. of Stars in Pleiades

Visual	7	
Herschel 1785	1540	11
Galileo	1610	3336
Hertzsprung 1926	2616	

Taurus (Hyades)
Lewis Boss 1910 - 39
1920. 80
Radiant beyond α Ori
see Merrill p. 492.

Urs. Maj
widely scattered
all around our Sun
Dipper δ + Sirius
+ γ ans. etc.

Scorpius - Centaur
very large group -

Etude de l'amas de Praesepe M44.

by H.L. Vanderlinden

Observatoire Royal de Belgique 1933.

No. of stars 1821.

Photographic magnitudes 6^m to 15^m .

Effective wavelengths. λ_e 4149 to λ 4579. ^{Slide}

Method by réseau : a, b a + b = c. dimensions
of réseau.

$$s = \frac{2f}{c} \lambda_e \quad s = \text{dist betw } 1^{st} \text{ order images}$$

If a = b odd orders have max^m intensity.
Even orders vanish.

Telescope Mt. W. 60-inch ≈ 152 cm.

$$f = 7.60 \text{ metres.}$$

Réseau a = 3 mm = b. across top of tube.

||||| \perp to diurnal movement.

Relation between λ_e + λ_{max} of Wien's law -
Diagrams p. 28 \rightarrow cluster.
p. 48. λ_e and Spectral Class.
p. 42. λ_e and photo. magnitude.

Distance (Shapley) 180 psc. (≈ 580 l.y.)

Vanderlinden

145 psc.

(≈ 470 l.y.)
(≈ 0.0069)

Globular Clusters

Classifications

- Slides P. Sh. Star Cl.*
- (a) typical M13 (Messier Cat. 1771)
- (b) open M4, NGC 3201 (J. Herschel Gen. Cat. 1864)
- (c) elongated M19. Sl. (Dreyer N.G.C. 18)
- or (i) variable-rich clusters
- (ii) variable-poor "
- or I - VIII according to central concentration.

Numbers

1908 Bailey recorded 66

1915 " " 76

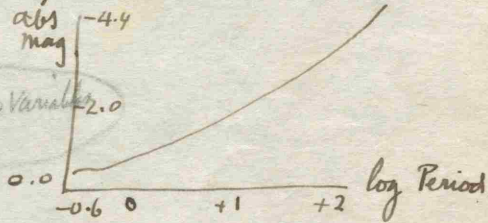
1930 Shapley " " 93 + 10 in Magellanic Clouds.

Distribution (a) Shapley's diagrams - p. 20, 174, 175, 176.

(b) Trumpler's " " Monton p. 507.

Detⁿ of Distance

- i Cepheid Variables. see curve p. 135 Shapley Star Cl.
- ii. ^{R.R. Lyrae Variables} Assume the median abs. mag. of variables with Periods < 1 d. Cluster variables to be the same for all Cl. cl. $0^{m.0}$
- iii. Assume mean abs. mag. of 25 brightest stars in Cl. to be constant (with 5 brightest as possibly foreground stars)
- iv. Compare integrated total brightness (mag. of Cl.) see curves p. 1624
- v. ... and avg. diam. of Cl. p. 163



$$\text{Dist. Modulus } M - m = 5 \left(1 + \log \frac{d}{d_0} \right)$$

$$= m - M = 5 (\log d - 1) \quad d = \text{dist. in p.c.}$$

Globular Clusters

Integrated Spectrum: *deajans p. 25*

A ₀	0
A ₅	1
F ₀	3
F ₅	1
F ₈	6
G ₀	11
G ₅	8
K ₀	8
K ₂	1
K ₅	1
M ₀	1
Total	41

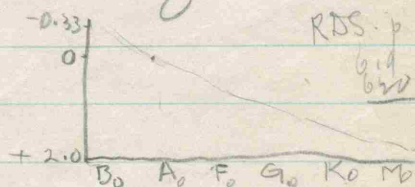
classified by Miss Cannon.

Spectral Range for individual stars in glob. Cl.

is got from Color Index

Range -0.3 to +1.6

∴ all classes B to M



50 indiv. stars in M13 + other bright glob. Cl. are classified by Pease & Sanford.

M13 - 39 stars

A ₀	3
A ₅	11
F ₀	11
F ₅	11
G ₀	3
<hr/>	
	39

Av. C.I. is +0.55

Most freq. C.I. +0.70

hence spectrum F4.

17% of stars brighter than *Pv. mag 15.5* have negative C.I. ∴ classes earlier than F

Comparison of near & far Glob. Cl.

MGC 7056	56.8	Kiloparses	38	brightest stars	av. CI +1.0
M 3	12.2	Kpc.	35	brightest stars	av. CI +1.15
M-13	10.3	Kpc.	36	" "	" " +1.02

Same av. CI & same progression of colour with magnitude

Apparently universal occurrence of red & yellow Supergiants -

∴ slow development & some sub-atomic sources of energy

Star Cl. Shapley

Dist. to Gal. Centre 1.6×10^4 psc - 16 Kpc.
(28,000 l.y. old early value)

Moulton gives 52,000 l.y. Moulton p 508
& Shapley - p 177.

Dist. of nearest Gl. Cl.

(Centauri 22,000 l.y. or 6 Kpc. see Baker p. 437)

" " farthest

230,000 l.y. or 70 Kpc.

M13 { Diam. of M13 100 l.y. Smart
250 l.y. Moulton
Here - { No of stars 10^6
Dist. 30,000 l.y. \approx 10 Kpc.

1947 Mar 5.

see Shapley, Star Clusters

pp. 43 } variables
46 }
49 }

157-161 Dist glob cl.

168 .. glob cl.

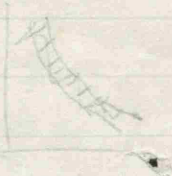
1954 Mar 3. Sci Am. Mar. 1953

Stellar Type I
Perseus

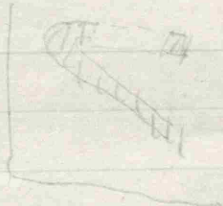
HR Diagram



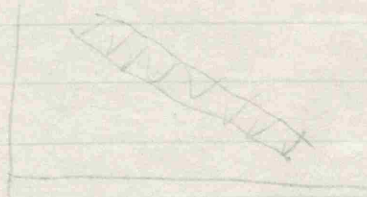
Pleiades



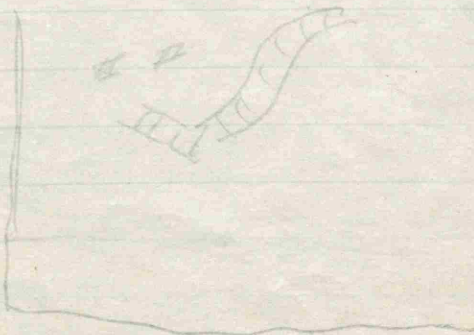
Hyades

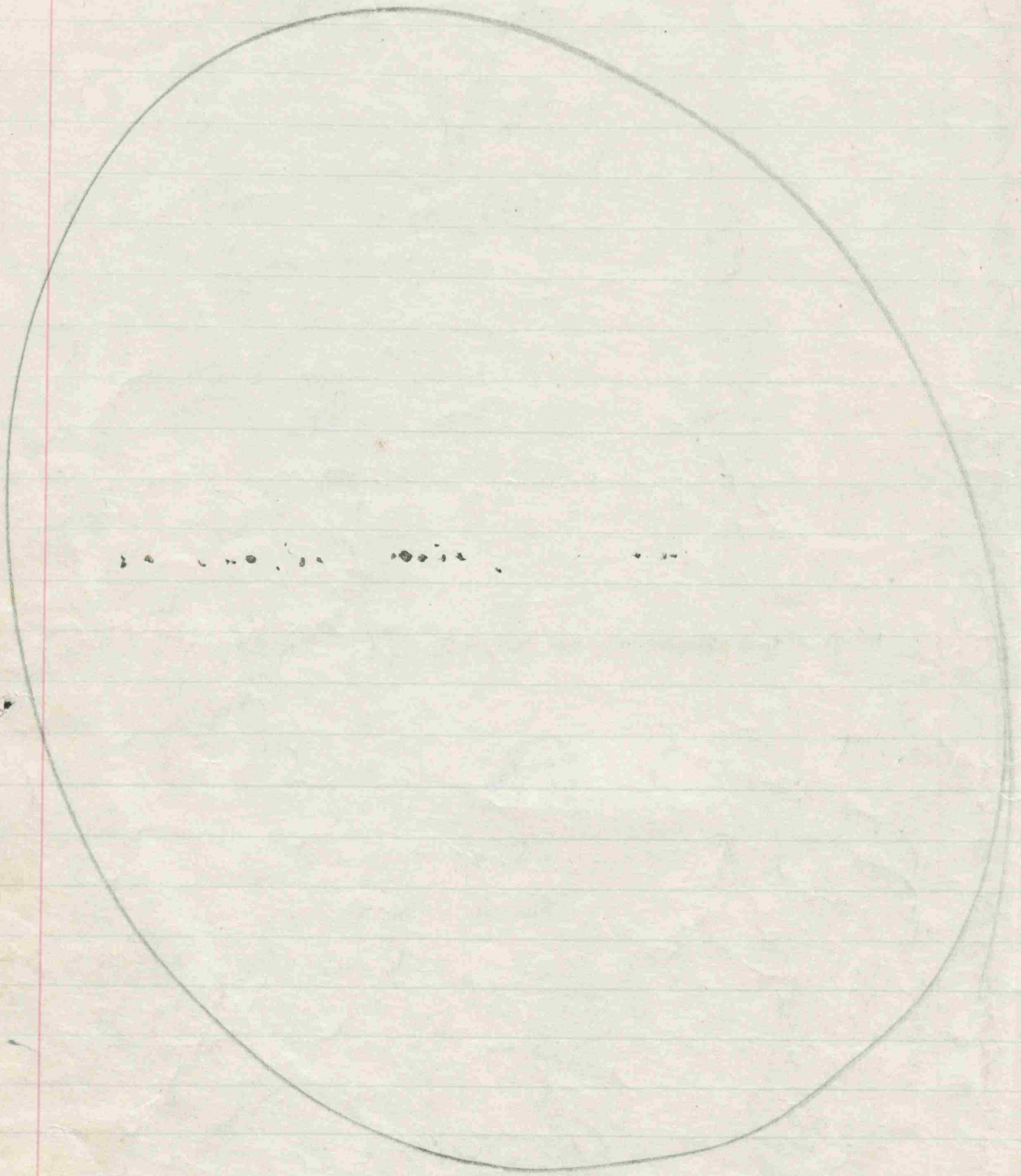


Stars near Sun



Glob. Clus. M3





Greek
Cosmological Speculations

1936 Sept.
from Sir Thos. Heath.

AWD.

Greek Cosmological Speculations
Sir Thos Heath.

The influence of astronomical discovery and speculation upon philosophy and upon religious thought is not a subject that can be adequately treated in any brief synoptic way. It is deserving of a treatise. But that such influence exists and has been extremely potent can be established in a few pages.

Let us take a hasty step and jump surfeited with the writings of the great philosophers and make something of this influence.

Almost six centuries B.C. Anaximander postulated as the basis principles of the universe the Infinite, an undefined primordial substance, and Eternal motion. In his scheme

of things, the inhabited portion of the earth is the flat top of a squat cylinder, the heavenly bodies moving in rings or hoops around the cylinder.

530 BC Pythagoras believed the earth to be spherical, as also the sun, moon, and stars, and the universe. Parmenides thought of the stars as compressed fire. The solid firmament surrounds the All, and is lined with fire. The solid earth forms the centre & is surrounded by an inner atmosphere, intermediate bands of light and of darkness, and outer fire. * Empedocles first introduced the idea of the finite velocity of light. He explained day and night

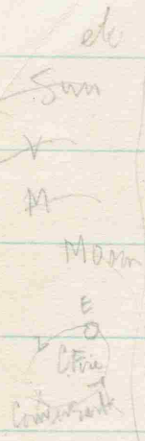
SLIDE

* Cartesian Doubt
 from to Goethe
 see Sermons p 36, 42.

as due to the rotation of the two hemispheres of the crystal sphere of heaven, the one being filled with fire, the other with a dark admixture of air and fire.

Anaxagoras was asked to state the chief object of being born into this world and his reply has come down to us -
 "To investigate the sun, moon, and heaven".
 The Athenians actively opposed his teaching that the sun was a red hot stone and the moon a mixture of earth and cold borrowing its light from the sun and being eclipsed by entering the shadow of the earth or eclipsing the sun by its passage between it and the earth.

Sept 28.



The later Pythagoreans rejected the geo-centric universe, giving central place to Fire, the Hearth of the Universe, the Throne of Zeus. Earth and the hypothetical counter-earth move round the all controlling centre and beyond them are the orbits of moon, sun, five planets and sphere of fixed stars. The speculations of Leucippus on the synthesis of innumerable worlds out in the void by the chance encounters of atoms, is so reminiscent of the speculations of a modern natural philosopher on the synthesis of heavy elements in interstellar space by chance encounters of electrons and protons that one might

26

be tempted to regard Dr Rob Mulliken
as the spiritual successor of these
early Greek thinkers.

Plato appears to have been dissatisfied
with the geocentric theory and unconvinced
by the central fire theory of the universe
and lays upon all students of earnest
purpose the task of finding "what are the
uniform and ordered movements by the
assumption of which the motions of the
planets can be explained". The true
astronomer, he says, must be the
wisest of men. He must dispense with
mere gazing at the starry heavens, and
pursue astronomy, like geometry, by means

of problems. Plato ridicules the vague speculations of Anaxagoras & others, who while they asserted that it is Mind which disposes and orders all things, nevertheless in their cosmological theories "made no use of Mind for the ordering of things, but assigned as their cause, air, aethers, waters, and any number of other absurdities."

Passing on to Aristotle, we ~~find the same~~ ^{read of the} simple straight line motion and the perfect motion in a circle; of the simple elements, earth, water, air, fire, whose motions are respectively down, up and intermediate; and of the logical necessity of a fifth perfect substance partaking of the perfect circular motion, of which element "are formed the stars, spherical, eternal, intelligent, divine".

Cf. Gk philosophers preoccupation with heavens.
e.g. Anaxagoras - chief object of being born
into the world - "to investigate the sun, moon
and heaven"

Greek

Thos. à Kempis 1379 - 1471 (Cologne)

"All men naturally desire knowledge, but
what availeth knowledge without the fear of God.
Surely, an humble husbandman that serveth God,
is better than a proud philosopher who, reflecting
himself, is occupied in studying the course of
the heavens." Imitation... Ch. 2.

Medieval

Tennyson

"Let knowledge grow from more to more
But more of reverence in us dwell..."

Modern

19th Oct. 4

to St James Lit Soc.
1938 Oct. 25

Ashburn
1938 July 29

The Poetry of Heaven

In deference to the long literary tradition of your Society, I determined that though my lecture might lack all other literary merit it should certainly not lack the dignity of a literary title. And so I have called it The Poetry of Heaven — and those among you who know their Byron will recognize my strategy — "Ye stars! which are the poetry of heaven".

Ye stars! which are the poetry of heaven
If in your bright leaves we would read the fate
Of men and empires — 'tis to be forgiven
That in our aspirations to be great
Our destinies o'erleap their mortal state
And claim a kindred with you; for ye are
A beauty and a mystery, and create
In us such love and reverence from afar
That fortune, fame, power, life, have named
Themselves a star.

Yet they see not "the wonder of the beauty that is manifest
 in the world". They have eyes but they hear not the music of
 the spheres. And of the vast numbers who have
 both the eyes and the ears, on whom Nature can
 and does cast her magic spell, how few there
 be that are not utterly tongue-tied in the presence
 of great beauty or solemn grandeur. We may have
 a glorious, a compelling
 an ~~unutterable~~ experience, and can only speak a
 platitude - and immediately ^{to} ~~repel~~ it; for is not
 silence more expressive than any platitude?

To very few is given that great gift of the gods,
 the ability to capture the intangible things of ^{the spirit} experience,
 to feel the poetry of earth & heaven and to crystallize that
experience in musical words. It is a glorious gift and
 the poets throughout the centuries have enriched the treasure house

of literature with passages of exquisite beauty, with rich
 luminous metaphors and scintillating simile, whose subject
 object and inspiration were a star, ^{a galaxy of stars,} ~~or ten thousand times~~
~~ten thousand stars,~~ or sun, or moon, planet, comet,
 meteor, sunrise or sunset. Quicquid nitet

notandum is the motto of ^{a respectable astronomical society} the Royal Astronomical Society
 of London — Whatever shines is to be noted. It
 is a good motto for astronomers, but might it not
 have been the motto of Dante, of Shakespeare, of
 Byron and of Shelley? see p. 5.^a

omit
~~In the realm of poetic prose it is not easy to~~
~~comprehend some passages of Francis Thompson's essay on~~
 Shelley and from this essay I quote a relevant
 passage or two :- "The universe is his box of toys. He
 dabbles his fingers in the day-fall. He is gold-dusty

To p. 5 - 2004
 Francis Thompson

Dante erects his Paradiso upon the revolving spheres
 of the Ptolemaic universe and the light of planets,
 meteors and stars irradiate his ^{cantos} ~~thoughts~~. Shakespeare
 harnesses his imagination to everything that shines from
little candle and smallest orb to glorious sun and
inlaid floor of heaven, and ~~upon~~ ^{to} our quickened ear
 he, like Milton, (brings) the quivering of the stars, the silver
 chime, the nine-fold harmony. To Keats there is no
 state of mind and spirit but finds its best expression
 its most perfect image in the light of a star, ~~and~~ Shelley
~~revolve in the companionship of stars~~; ~~leaps~~, rolls and
 foibles in the starlight ~~spiles~~ orb on orb and world on
 world till soaring fancy staggers in its daring task to
 build a fitting temple to the Spirit of Nature.

Take from
 L.P.T.O.

~~Non est in se ipso~~ ps. ↗

with tumbling amidst the stars. He makes bright mischief with the moon. The meteors nuzzle their noses in his hand. He teases into growling the kennelled thunder, and laughs at the shaking of its fiery chains. He dances in and out of the gates of heaven: its floor is littered with his broken fancies. He runs wild over the fields of ether. He chases the rolling world. He gets between the feet of the horses of the sun... all the elemental spirits of Nature take from his verse perpetual incarnation... the very grass is all a-rustle with lovely spirit-things and a weeping mist of music fills the air."

Francis Thompson

Frank

I have asked a class of physics & astronomy students

→ Take from literature every reference to the stars and their ^{celestial} train, and what devastation, what irreparable havoc you would have wrought! Truly the poet's debt

and through them, our debt to the stars is very great.

If we would enquire what is poetry, perhaps

the answer of the old astronomer John Kepler, is as
sathyrical as any other, ~~to me~~ at least to those of us who have not
entirely forgotten the accident of having been born Victorians!

~~Good for us~~ as any. It has been rendered into English
verse by Alfred Hoze but the underlying idea
is ^{said to be} Kepler's:

" - - - - Thought in passionate times
With those great rhythms that steer the moon and sun;
Thought in such concord with the soul of things
That it can only move, like tides and stars
And man's own beating heart, and the wings of birds,
In law, whose service only sets them free."

Extra Space



Poetry, beauty, mystery, wrote Byron, ~~and he~~
~~thought of the reflection of the stars in Lake Lemana.~~

- It is the third of these, the mystery, that gives rise to
and the greatest of these is mystery if we are peering
for the cause of ^{another} the ~~thing~~ peachment of mankind to the stars -
the awakening of scientific curiosity.

2
What are the stars? The Greek philosophers speculated widely and often wildly on this question. Anaxagoras taught that the sun was a red-hot stone. ~~Democritus~~ ^{Democritus} that the stars were compressed fire. Aristotle imagined a perfect immutable non-terrestrial element capable only of perfect circular motion - ~~this~~ ^{this} the essence of which the stars were formed, the stars being spherical, eternal, intelligent, divine!

It was not until Galileo had ~~been~~ liberated the minds of men from the enslavement imposed upon them by this dogma of the changelessness of the stellar substance that a physics of the stars became a possibility. The practical application of the prism in the analysis of light, begun by Sir Isaac Newton, brought to birth the science of astrophysics which has resolved so many of the mysteries and revealed a far vaster universe than the unaided eye can see and is leading on to

types of variability; or ^{we can classify them} as giants ~~or~~ supergiants, ~~or~~ white dwarfs, or as quite normal blue white, yellow orange, or red members of the great family of heaven. It is a picture of vast diversity that is set before us, but a diversity of phenomena within the embrace of ~~great~~ fundamental physical laws whose operations are expressible in the symbolism of mathematical physics. To p. 10

P. 10.

SLIDES.

- 1 Ptolemaic System
- 2 G.S.P. Model
- 3 C. of S. Sun & Sec.
- 4 Perseus & Arct.
- 5 Veiled stars
- 6 Cygnus Neb. 7th.
- 7 25 magnitudes
- 8 Sirius & Sirius
- 9 Dec. 9th 9.
- 10 Bet. & Alt. diagram
- 12 E. Amegian " 27 yr Period 1860 °C partial eclipse
- 13 " Bayer.
- 13 m. 31
- 14 16th Cent woodcut
- 15 M.S.I.
- 16 2 nycs.
- 17 HV 24 coma
- 18 M 81. Un maj.

1844 Bessel P. 49 yrs. Alvan Clarke

*

of law the harmony & order of the physical world and in the spirit of Voltaire to satirize the folly of mankind disobedient to the highest laws of his being smacking of this earth a shambles & a hell - But I must not talk thus - we all in these days have our own Solomon thoughts - I shall just close by suggesting that this photographic is the embodiment of the three ideas of Byron ~ The poetry of heaven, beauty, mystery.

The challenge of the mystery of motion has challenged natural philosophers in all the centuries. It led the Greeks to almost superhuman efforts to make a geocentric universe meet the facts of observation; it led Copernicus to postulate a Solar System; it drove Kepler to elliptic orbits; it brought to Halley the realization that the stars themselves are in no sense fixed in space and it ^{led} ~~led~~ Herschel to determine the motion of the sun towards the constellation of Hercules. In recent years it has led successively to the investigations of star streaming, rotation of the galaxy, recession of distant spiral galaxies and even to the hypothesis of expanding space.

slides -
*

~~Imagination goes forth, (said Blake), in its uncurbed glory. It is to just such adventure of mind and spirit that astronomers throughout the centuries have led the way. ~~And~~ ~~facts~~ ~~have~~ ~~followed~~ ~~them~~ ~~into~~ ~~these~~ ~~new~~ ~~realms~~ ~~of~~ ~~thought~~~~

Astronomy

Northern Electric Engineering Soc.
Engineering Dist. of Can.
1935 Jan 28

Presented with Waterman pen
on Feb. 1. in appreciation

Specialized Agencies
Introduction of U.N.

1. Tor. in Can. Cent. 1957 Jan
2. K. UN Seminar for HS. 1957 June 26
3. K. " 1958 June 26
4. K. " 1957 June 25
5. K. " 1960 June 23
6. K. Chairman of Committee 1963 May 12

Just over 400 years ago

Rabalais Sci without conscience
is damnation

Tone but not the whole truth

All knowledge - - - - -

Conscience

1958
Beam
here

→ All knowledge used conscientiously
can be for the benefit of mankind.

"The conscience of mankind" - Dec of Human Rts

Science used constructively + unselfishly
can promote and procure more
human welfare than the world
has ever known

But it cannot be done overnight

It needs organization.

- the will to pool research findings
- expert skill
- technical development
- money -
- education of the recipients
- Cooperation of governments

International Cooperation in Scientific Research

After the first Great War ^{many of us in this hall} ~~we~~ thought we were entering a new era with the League of Nations ^{which was} to settle all disputes without recourse to war; but nationalism proved so strong that the good things achieved ^{by the League} were not enough to prevent the events which the autumn of 1939 ushered in.

After the second Great War we placed our highest hopes in the United Nations. But in it too we have been disappointed in the political field — Distrust and hatred are widespread and deep; ^{some} wars have not been averted; arms races are going on in deadly seriousness.

But the UN operates in fields other than the political and in these — the realm of human welfare, of cultural progress, of scientific advances, both pure & applied — there can be no two opinions: the specialized agencies of the UN are doing a magnificent job; the achievements of the UN Technical Assistance Programme now under the direction of a Canadian, Dr. Hugh Keenleyside is an epic story; the Colombo Plan

6. Lady Lusa Stuart

7. The Freedom of the Garden

5. The Sword of State

9. Funeral March of a Marionette

8. The Vision at the Inn.

an historic dramatization
played in Oct 1936.

1. The Wife of Hammers.

2. Christmas Time

3. Fortune

4. The Little House

Lady Susan Charlotte Tweedsmuir
Daughter of Bruce Ogden, St. J. of Jan.

Response to Toast to
The Alma Mater.

Senior Dinner 1937
May 11.

To Our Alma Mater

We have just drunk this toast and sung
a hymn of praise to our Alma Mater
let us pause to consider what she means
in our lives.

While we are yet afar off she
beckons us - we look at her with the
awe of ignorance - she is shrouded
in mystery, crowned with glory, robed
in majesty - and carries in her hand
the orb - symbol of sovereignty in
the realm of knowledge. We are
half blind and yet we draw near -

We come to her and she receives us
with open arms and for four years or so
she encompasses us with opportunities to
grow, to learn, to expand - new experiences
come to us, new ideas, new visions, new
friends, new responsibilities - Thus
consciously and unconsciously, directly
and indirectly are we disciplined,
moulded, matured, enriched in
mind and spirit and not least of

The gifts which Alma Mater bestows upon us is the privilege of knowing and feeling the influence of strong noble devoted servants of our Alma Mater like our beloved Warden.

Then comes the day when our Alma Mater sends us forth as her daughters and what does she demand of us? She demands our LOVE - and is that all? You ask, and Alma Mater replies I ask only your love, but in asking for that am I not asking for all? For great love inevitably implies great loyalty, and service - even if need be self-sacrifice.

There is an old 13th Century prayer of the Magician mystic philosopher, Ramon Lull: Oh Thou that fillest the Sun with splendour, fill my heart with LOVE.

Let that be our prayer now and
whenever we renew our pledge to our
Alma Mater. For if our hearts
are filled with love for all the
high ideals which she symbolizes,
2. her influence will be at work
wherever a McLeod graduate is found
1. and her influence will remain potent
in our lives.

What this sorely perplexed and
fear-distracted world of ours needs
above all else is more unselfish
honest love - and so I think I hear
our Alma Mater bid us go forward
with the simple fundamental
admonition Little children,
Love one another.

Down Douglas Ladies' list - 1937 Oct 23

Introducing Lady Tweedsmuir

It is given to all of us to be able to sit down & read
but to very few is it given + write

To this select Company our guest & speaker
belongs

Susan Charlotte Graham Lady Tweedsmuir has
written 8 or 9 books at least + 1 dramatic skt

→ In ^{1st} Macaulay's Essays there is this sentence -
This is the miracle of genius that things
that are not and do not be as though they were
that the imagination of one mind should become
the personal realities of another

Our lecturer is fired with some of that divine
spark for she has produced creative fiction.

She is also endowed with those qualities of scholarship
so essential in a writer of biography, & honesty
of thought, patience to searching, wisdom in selection
of material, sympathy & understanding without which
it is impossible to recreate for the reader the
personality & character of someone long since
gone from the earthly stage.

→ In the preface to one of her books Lady T. reminds
us that not long ago a woman who ventured to
write a book was regarded by many people as
having "drowned her gentility" in her ink pot.
We are "glad that age has passed!"

→ I ask you to show our lecturer how tremendously
sincere & warm is the welcome wh. we
extend to her this afternoon - Lady Tweedsmuir

We are proud to have her fellowship with us

Motion of Thanks.

We have been carried away into a world of things so very different from this world which faces us every morning when we open our newspapers. It has been a privilege & a very great pleasure to listen to this delightful lecture.

I feel that I must vindicate my self & my introductory remarks - I think Lady T. must write books so rapidly that she forgets some of them. I must confess that when asked to introduce her, I went to the Redpath Library & copied out the titles of the entire list following her name & I am quite certain that the number is 9.

We have all enjoyed this charming address and we offer to Her Ex our very sincerest & warmest thanks.

Dinner to Mrs Vaughan.

Dinner

*in honor
of*

Mrs. Walter Vaughan



Cercle Universitaire de Montréal

Thursday, May 20th, 1937

Coasts



The King

o

Mrs. Walter Vaughan

o

Hon. Justice A. Rives Hall

Dr. A. V. Douglas

Mr. E. H. Matthews

Menu



Consommé royal

Céleri - Olives

Sole bonne femme

Filet de boeuf rôti

Pommes duchesse

Asperges nouvelles Sauce au beurre

Tèche Melba - Mignardises

Moka

Vins

Mr Chairman.

Francis Bacon: desire to seek, patience to d.
fondness to meditate, slowness to assert, readiness
to reconsider, carefulness to dispose well in order,
a man that hates every kind of imposture.

mea opes. no monopoly
person - Privy Council

In reign of Q Elizabeth or Q Victoria, some ecclesiastic
coined a v. stately phrase Within her
dominions supreme.

Supreme as a teacher
as an interpreter of literature. supreme

In R.V.C.
Sir Christopher Wren. Si monumentum
quaeris, Circumspice.

Monuments not made with grey stone
lives.

fine spirit in R.V.C. in that her
dominion she reigns supreme.

we are all so glad that our Univ. is... 110

In gathering here... we are not placing a wreath
at the foot of an accomplished achievement
rather acclaiming a life...

str to str.

When Lord Balfour was 80 or 90
Thank the stars

Dinner to Mrs Vaughan.

Francis Bacon - characteristics of
man of Sci.

one person, + have Privy Council
authority. & use that word, to whom
these words apply - not a man and
a scientist

In the reign of Q. Vic of Q. Eliz or then some celebrated
or statesman frame the words Within her dominions Supreme
these words were ... argued a hundred

To be like much as in N.Y. News

Rep. to 24. D.

Last para. N.Y. News tributi:

When Lord Balfour was 80 or 90
yrs old Whom God love
die young. Thank the Stars
Mrs V is not 80 or 90 but she
is beloved of the gods . . .

+ it is just this ^{genius} youthfulness of mind
& spirit that will continue to make her
an inspiration to us all.

"Within Her Dominions Supreme"

Copy
A Tribute to Mrs. Walter Vaughan - Warden of the
Royal Victoria College.

by

A. Vibert Douglas

With the class of 1895 there entered the portals of McGill University a student, Susan E. Cameron, who made so distinguished a record that after graduation with the Gold Medal for English Language and Literature and after obtaining the M.A. degree, she was appointed to the staff of the University in the Department of English. She became a resident member of the Royal Victoria College staff under its first Warden, Miss Oakley. From then onwards into the war years, as class after class entered the College, we all sat at the feet of Miss Cameron.

She taught us many things. She *shewed* us the essential elements of a well balanced sentence. She *expounded* the art of expressing our thoughts in good, straight-forward, flowing prose. She taught us the importance of having thoughts worthy to be so expressed! We respected her judgment, we profited by her criticism - and what a wonderfully painstaking teacher she was! Writing an essay for Miss Cameron was indeed a discipline - and recalling the great Third Law of Sir Isaac Newton, that every action has its equal and opposite reaction, I pause to *consider* ~~think~~ of the enormous amount of discipline that Miss Cameron had to endure in reading our hundreds upon hundreds of immature essays. To many students, both at that time and in recent years, she has opened the treasuries of literature. Gifted with rare insight and keen discrimination, she has pointed out many a pearl of great price which lay half hidden in poetry or prose. Within this domain of

the mind, in the exposition and interpretation of literature, she reigns supreme in our midst.

The war years came, and many McGill people, staff and students, scattered far and wide - three of them to meet again under the roof of the old Hotel Windsor on Victoria Street,

commandeered for the Ministry of National Service. One of these was Sir Auckland Geddes, another was the writer, and in the autumn of 1918 came the third, Mr. Walter Vaughan. To London that winter came Miss Cameron and they were married. I well remember how,

shortly afterwards, Mrs. Vaughan came into our anxiety-worn home and how she seemed to bring with her a sense of cheer and calm courage. Was it then, perchance, that she quoted from Keats, "The poetry of earth is never dead"?

The years after the war brought changes everywhere and into many lives.... There were changes in the Royal Victoria College - the warden's ill health led to her resignation; and Principal Sir Arthur Currie, made no mistake when he appointed Mrs. Vaughan to succeed Miss Hurlbatt.

No one can express in words what this college owes to Mrs. Vaughan. The beautiful new wing of the college is largely

what it is because of her wisdom, foresight and energy. In the lovely reception rooms where we gather from time to time, her taste, her thought, her judgment are evident everywhere - "si monumentum quaeris, circumspice."

But there is a monument to Mrs. Vaughan intrinsically more enduring than one built of grey stone. It is in the lives of all those who have passed under her influence and gone out richer, truer and more courageous. They have drunk of the richness of her

early spring
Autumn

mind, they have felt the impress of her character. Looking at the portrait that now adorns the College walls the first thought that ^{comes} ~~came~~ into my mind is in the words which head this brief tribute. Mrs. Vaughan has created a splendid spirit and a fine atmosphere that pervade the College and in this her dominion she reigns supreme.

We are not placing, ~~it~~ ^{Editor cuts out}, a laurel wreath at the base of a finished achievement, rather are we acclaiming a life that is being lived amongst us - a life that is going from strength to strength, from beauty to beauty, from richness to richness - a life that speaks to us of nobility, of loyalty, of devotion to the duty that lies at hand, of understanding and sympathy, of sincerity, of truth, and of great courage.

Mrs. Vaughan has won and holds our admiration and our respect, and she is enshrined in our affections.

Editor asks that this be omitted.

*sent to Editor Michael News
via Gordon (Lansco)*

*1957 Mar. 11
Edited by Dr. H. S. Woodworth
1957 May 3*

University Women's Club
of Toronto

1929 Nov. 24.

(1)

International Debts in the Realm
of Knowledge.

Last summer I stood in Uppsala Cathedral by the monuments to some of the great men of Sweden - Linné, Berzelius, Swedenborg - one of them of thinkers - whom they honour not bec. of the visionary religious writings of his later life but bec. in his early life he was a powerful thinker with a grasp of the widening horizons of science & an intuition as to the significance of the movements of scientific thought in his day. As I stood by Swedenborg's grave I thought of some words of his written 200 years ago

To be able to discern that what is true is true, and that what is false is false - this is the mark & character of intelligence.

sep 2 & 3 of Stockholm adven
& Kidinn to Saha.

6

So we come down the ages viewing an international pageant leading to the present ideas of the unity of the physical universe.

This has been the work of the minds of men of many nations and the international debt of ourselves & of every other nation is immense, not in this field only, for this record could be paralleled in art, music, literature, medicine, philosophy, law, craftsmanship.

~~A great Swedish thinker said To be able to discern that what is true is true, and that what is false is false - this is the mark & character of intelligence.~~

~~There is so much falsehood in the world today masquerading under the guise of truth, that the task of education is of paramount importance for the aim of education is to teach boys & girls, men & women to love truth, to seek truth, to recognize truth, and to apply truth courageously to the problems of life. Truth~~

Conclusion

→ We must pursue every avenue of thought which gives promise of leading to better international understanding

(7)

International Debts in the Realm of Knowledge.

We are living in a time which calls for much earnest honest thinking.

That ~~we~~^{we} ~~should~~ have had to resort once more to the frightful instrument of war, the cruel the diabolical instrument of war is an appalling admission of failure and a condemnation of mankind that includes ourselves. Does a good end ever justify a bad and cruelly unfair means? The majority of us are answering yes because ^{we} they see no other means which promises success.

But some among us answer that question with an unequivocal No. And then we rise in indignation — the press and individuals on every side — and denounce these people in the name of patriotism and loyalty and expediency. Intolerance boils & seethes in our midst and points the finger of scorn, contempt and denunciation upon those honest God-fearing people who dare to differ from the crowd.

You remember the battle cry of Voltaire

Écrasez l'infâme : crush the infamous thing — in justice in his day so rampant in church and state, in justice in our day so ^{obviously} rampant in the dictator countries, so insidiously present in some of the social structure of our own country, and so appallingly ~~present~~ ^{evident} in this spirit of intolerance in our midst.

Écrasez l'infâme - fight against intolerance for it is an infamous thing subtly undermining sincere honest thought, discouraging the careful examination of basic principles & ideals, drowning the voice of conscience & self criticism under the thunder of invective against the shortcomings and evil deeds of others.

This hideous thing, this infamous thing — intolerance — shows itself in many forms, and it is a challenge to each of us to take the pen or raise our voice against it in all its forms.

One cause of the failure of mankind to achieve a harmony & unity in the world today is because most of us both consciously & subconsciously are far too nationalistic.

It is my belief that this lack of international outlook & sympathy & understanding lies very deep at the heart of the world's troubles & Prejudice, ignorance, intolerance, hatred — these are the results and in a right early education lies the remedy.

(9)

Let us all work for a
better international understanding,
for an education so broad
& honest that men will
recognize their indebtedness
to other nations, let us
remember that

ignorance breeds prejudice
& prejudice, intolerance
and intolerance hatred

and there can be no
Kingdom of God upon
earth while hatred
& fear reign in the
hearts & minds of men.