HENRY RISHBETH
(1931 – 2010)

--- A Remembrance ---

25th CEDAR Meeting
June 2010
Boulder, CO

M. Mendillo
Boston University

Photo by Joei Wroten, Boston University
Рис. 36. Силы, действующие на отдельный электрон или ион в условиях диффузионного равновесия. Сила тяжести для электронов не учтывается. Предполагается горизонтальная стратификация атмосферы, так что градиенты парциальных давлений $p_i = N_k T_i$ и $p_e = N_k T_e$ направлены вертикально. Возникает вертикальное поляризационное поле $E$, уравновешивающее другие силы. Принято отношение температур $T_e/T_i = 2$, что типично для дневных условий. Справа показаны относительные длины векторов.
Rishbethian Tutorials

- “Circuit Analogue”
- “Servo Model”
- “F-Layer Dynamo”
Henry Rishbeth was a Cambridge Man

- B.A. 1954
- M.A. 1958
- Ph.D. 1960
- Sc.D. 1972

Bill Wright punts, Henry rides.

Bob Knecht rides, Henry punts.

Photos courtesy of Bill Wright
But...between B.A. and M.A.

- CSIRO Radiophysics Laboratory
  Sydney Australia
  1955 - 1957

- First papers on Galactic Radio Astronomy
Aeronomy of the Planets

SHORT COMMUNICATIONS
THE IONOSPHERE OF JUPITER*

By H. Rishbeth†

It has been suggested that the radio-frequency emissions from Jupiter are due to plasma oscillations in the planet's ionosphere (e.g. Gardner and Shain 1968). This note shows that, according to standard theory, sufficient ionization is produced by solar radiation; but it does not attempt to explain the actual cause of the disturbances.

Evidence so far available suggests that the radiation from Jupiter is strongest at frequencies near 20 Mc/s (Gardner and Shain 1968). If this is taken as the fundamental frequency of a plasma oscillation, then the corresponding electron density is \( n = 3 \times 10^8 \text{ cm}^{-3} \), a value which is seldom approached in the terrestrial ionosphere. Since the intensity of the ionizing radiation is presumably much less than at the Earth, the required electron density will only be attained if the recombination coefficient \( z \) is very low. It is suggested that this may be so.

The relevant theory is that of Chapman (1931), who considers the absorption of monochromatic radiation in an isothermal atmosphere. The theory may be expected to give rough quantitative results even if its assumptions are not strictly true.

Let \( I \) be the intensity of ionizing radiation incident vertically at the top of the atmosphere and \( g \) the rate of production of ionization. Let \( n \) be the number density of the ionizable constituent, \( H \) its scale height, and \( A \) its ionization cross section. Then, at the level of maximum production, under conditions of equilibrium:

\[
\begin{align*}
g &= aN^2, & (1) \\
g &= \eta e^{-t/H}, & (2) \\
1 &= n/AH. & (3) \\
& \text{Also} \\
H &= kT/mg, & (4)
\end{align*}
\]

where \( k \) is Boltzmann's constant, \( T \) the temperature, \( g \) the acceleration due to gravity, and \( m \) the mean molecular mass, which may be written as \( \mu \times (\text{mass of hydrogen atom}) \).
Henry Rishbeth was a Family Man

- Wife Priscilla ("Pril")
- Daughters Clare and Tessa
- 3 Grandchildren

String Figures by the Rishbeth Family
Left to Right: Clare, Henry, Tessa.
Photo by Pril Rishbeth, 09/24/96
An Academic Family

• Father a classicist & Professor of Geography in Southampton

• Mother an Anthropologist

Oswald and Kathleen Rishbeth on their wedding day, 1917
Native girls doing string figures on Yam Island.
Photographed by Kathleen Haddon, 1914.

Kathleen Haddon in Australia, 14 June, 1956

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Give me courage for the day, for there is much to bear;
Give me the capacity to rise above despair;
Give me patience for whatever task may come to hand;
Give me strength to carry through the things that I have planned.

Give me understanding and a sympathetic heart;
Give me grace to struggle on and play my humble part;
May I face my trials and troubles with a cheerful face;
Help me Lord, to see Your beauty in the commonplace.

(From Methodist Book of Remembrance, Johannesburg, adapted)