

SCIENCE NOTES AND NEWS

Tropical Pastures Research

The IX International Grasslands Congress, held at Sao Paulo, Brazil (January 7 to 21, 1965), passed at its final plenary session business meeting a resolution recommending that FAO establish an *International Tropical Grassland Commission* to co-ordinate research in Tropical Pastures, suggest appropriate priorities and promote promising activities and co-operate efforts among the Tropical countries in pasture research and development.

Any suggestions may please be sent to: (1) Professor G. S. Puri, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana and (2) Dr. R. A. Peterson, FAO, *via* della Terme di Caracales, Rome (Italy).

Inverse Raman Spectra: Induced Absorption at Optical Frequencies

According to theories of dispersion incoherent scattering of radiation manifests itself both in *emission* and in *absorption*. Up to the present time, all investigations of such processes, including Compton scattering, the normal Raman effect, or the recently discovered stimulated Raman scattering (SRS), have been concerned with the *emission* of the scattered radiation and its spectrum. B. P. Stoicheff and W. J. Jones have reported spectroscopic evidence for the *absorption* occurring during incoherent scattering at optical frequencies.

In the experiment the scattering medium (liquid benzene for example) was irradiated simultaneously with intense monochromatic light of frequency ν_0 (from a giant-pulse ruby maser) and with an intense 'continuum' of suitable frequency range (provided by a maser-irradiated toluene cell *q.v.*). Under this excitation the benzene molecules are stimulated to emit radiation at ν_0 and at the same time to absorb radiation at $\nu_0 + \nu_M$ (or $\nu_0 - \nu_M$) from the 'continuum', the net effect being to change their energy states by $+h\nu_M$ (or $-h\nu_M$). The spectrum of the 'continuum' after it traverses the medium shows very strong absorption lines at $\nu_0 + \nu_M$, the frequency displacements ν_M corresponding to known Raman shifts for the scattering medium.

The observed spectrum is similar to the well-known reversal of spectral lines in atomic spectra, but in the present case as the absorption spectra arise from the stimulated scattering

process they are called the "inverse Raman spectra" (IRS).

Spectroscopic studies of stimulated Raman radiation have shown that when the maser emission is a single sharp spectral line, all of the Raman lines are sharp. But if the maser emission contains additional components (even differing by $< 1 \text{ cm.}^{-1}$), the Raman emission lines get considerably broadened, sometimes up to several 100 cm.^{-1} . This fact was made use of to furnish the 'continuum' in the present experiment. Maser radiation was first incident on liquid toluene contained in a cell. This produced intense stimulated Raman emission at $\nu_0 + 1003 \text{ cm.}^{-1}$ of sufficient width that it (the toluene 'continuum') extended to the region of the benzene anti-Stokes line at $\nu_0 + 992 \text{ cm.}^{-1}$, which appeared as a sharp prominent absorption in the experiment.

Similar absorption spectra were observed with liquid pyridine ($\nu_0 + 990.2 \text{ cm.}^{-1}$) and liquid nitromethane ($\nu_0 + 917.8 \text{ cm.}^{-1}$).

Investigations of inverse Raman spectra are potentially of great importance in molecular spectroscopy. With improvements in techniques, it should be possible to investigate the IRS of gases, liquids, and solids, including rotational and electronic transitions in addition to the vibrational transitions. High speed Raman spectroscopy of interest in the study of free radicals and other short-lived species may be possible. Finally, since the inverse spectrum is so intimately related to the stimulated emission spectrum, its study may help in a quantitative understanding of the SRS which in emission is overlapped by higher order and parametric effects.—(*Phys. Rev. Letters*, November 30, 1964.)

Compton Effect on Moving Electrons

Until recently only the Compton effect on electrons at rest has been investigated. Modern giant accelerators make it possible to investigate the scattering of photons by electrons moving with speeds near to the speed of light. Radiation from powerful lasers can be used to study the Compton scattering of visible photons by moving electrons of a cyclic accelerator.

The interaction of laser photons with relativistic electrons has been theoretically studied. According to these studies a head-on collision of laser radiation ($\lambda = 6943 \text{ \AA}$) with relativistic electrons of energy 500 MeV, will cause the appearance of γ -quanta of energy $\sim 6.75 \text{ MeV}$,

moving in the direction of motion of the electrons.

The experiment to test the above theoretical deduction was carried out at the Lebedev Physical Institute, Moscow University, using the 600 MeV synchrotron facility. The results of preliminary experiments give positive evidence for Compton scattering of laser photons by relativistic electrons during a head-on collision of the beams resulting in the appearance of gamma radiation.

This effect can be of importance for diagnostics of electron clusters; also the scattered γ -quanta may be used in various aspects of nuclear research.—[*Physics Letters*, 1964, 13 (4), 344.]

Gamma-Ray Astronomy

During the past two decades conventional optical astronomy that has been with us for centuries has expanded to include radio and radar astronomy. But even these branches were unable to overcome the limitations imposed by the terrestrial atmosphere which absorbs most of the cosmic radiation.

Space probes and orbital satellites carrying instruments for investigations of gamma-rays and X-rays originating in the cosmos have set the beginning of two more branches of astronomy, namely, gamma-ray astronomy and X-ray astronomy. X-rays in cosmos are associated with the formation of a neutron star after a supernova explosion (see *Curr. Sci.*, 1964, 33, 510).

Interstellar gamma-rays may be thought of as produced by several mechanisms. One of them is the collision of two high-energy protons. Another mechanism is the annihilation process in which a particle and its "antipode" meet and convert spontaneously into gamma-ray photons. A third mechanism is by the action of relativistic electrons (*i.e.*, electrons moving with a speed close to that of light) on photons, *vide supra*. When a high energy electron runs into a photon of low energy, it imparts to the latter some of its energy and the photon becomes a hard photon of high energy, *i.e.*, a gamma quantum.

Currently astronomers are busy unravelling the mystery of a recently discovered supernova entered in astronomical catalogues as object 30273-B whose brightness is about a hundred times more than that of our galaxy. According to Soviet astronomer Vitaly Ginzburg this supernova besides being a powerful source of light

emission is also a strong source of gamma-rays.—(Courtesy: *USSR News*.)

Higher Yields by White Maize Hybrid Ganga Safed-2

Messrs. K. K. Mandloi, S. K. Dubey, S. K. Nigam and P. K. Tiwari, Maize Breeding Research Station, Chhindwara, M.P. write:

Results of field trials conducted during the past three years have shown that the white maize hybrid *Ganga Safed-2* produces higher yield than *Sumeri*—a white seeded local variety popular in certain districts of Indore. According to these trials the white hybrid *Ganga Safed-2* has given, on an average, extra yields of 379 and 952 kg./hectare under low (45 kg. N/hectare) and high (150 kg. N/hectare) fertility levels respectively. These trials were also given a common basal dose of 50 and 35 kg./hectare of P_2O_5 and K_2O respectively.

Arnebia hispidissima DC.—A New Record for Bihar State

K. Thothathri, Central National Herbarium, P.O. Botanic Garden, Howrah, writes:

Arnebia hispidissima DC. was collected in the Udaipur forest, Champaran District, Bihar, during a botanical exploration tour in April 1963. This species has not been recorded either in *The Botany of Bihar and Orissa* by Haines (1922) or its *Supplement* by Mooney (1950). A careful scrutiny of the various literature dealing with the flora of Bihar as well as specimens of the said species in the Calcutta Herbarium revealed that the occurrence of this plant in Udaipur forest, Champaran District, constitutes a new record for Bihar State.

Journal of Experimental Social Psychology

Researches in various areas of social psychology and group behaviourism are being carried on at scientific levels in different centres and the experimental results far from being empirical only can now be co-ordinated to give a theoretical orientation which will help further research. In this context we welcome this new quarterly published by Academic Press, Inc. The First issue Vol. I, No. 1, January 1965, contains the following articles: *The Roles of Information, Discussion, and Consensus in Group Risk-Taking*; *Collective Behaviour in a Simulated Panic Situation*; *Experiments on the Alteration of Group Structure*; *The Requirements and Design of a Standard Group Task*; *The Development of Contractual Norms in a Bargaining Situation under Two Types of Stress*.