two, four and six) of *Bs*. Conversely, the ratio of histone to DNA was higher in nuclei with odd numbers of *Bs* than in those with even numbers.

At present there is no indication of the meaning of these changes in terms of nuclear function and their relation to the phenotype of the plants. There are some clues, however. There is a negative correlation between histone and both RNA and total protein content within a nucleus, and so *B* chromosomes seem to cause more nuclear histone to be accumulated, and this may in turn depress or repress the nuclear RNA and protein content. And last year Jones and Rees (*Heredity*, **24**, 265; 1969) showed that plants with odd numbers of *B* chromosomes, besides being less frequent in the population, had a weaker phenotype—lower weight and fewer tillers—than plants with an even number of *Bs*. These results suggest that *B* chromosomes cause changes in nuclear chemistry and that these changes ultimately find expression at the level of the phenotype.

Jones and Rees also showed that the presence of *B* chromosomes influenced chiasma formation and inferred that *Bs* increased the genetic variability of the gametes and consequently the offspring—a conclusion that is borne out by other recent studies (Barlow and Vosa, *Chromosoma*, **30**, 344; 1970; Hanson, *Genetics*, **63**, 601; 1969; Malik and Tripathi, *Z. Biol.*, **116**, 321; 1970) of the influence of *B* chromosomes on meiotic behaviour in three monocotyledonous species. In this way *B* chromosomes can compensate, through benefits to the population, for any deleterious effects on an individual.

ECOLOGY

Energetics in the Tropics

from a Correspondent

ENERGY requirements, conversion and utilization provided the central theme of a symposium held from September 16 to 19 at Makerere University, Kampala, Uganda. The proceedings, under the auspices of the International Biological Programme (IBP), embraced the physical and biochemical aspects of energy fixation, the roles and efficiencies of primary producers, herbivores and carnivores and even the energy efficiency of man.

The units in which energy and performance were expressed caused some difficulty. For some delegates, the contribution from Professor J. L. Monteith (University of Nottingham) provided the first experience of applying joules and watts to biological systems, but, at least in his derivation of a light energy conversion efficiency in green plants of 0.01 per cent (taking as 100 per cent the total measurable radiation above the Earth's atmosphere), the choice of units was amply justified. Dr R. Hill (University of Cambridge) then laid the biochemical foundations for a discussion of alternative pathways for carbon dioxide fixation in certain tropical plants.

The importance of production measurements in understanding community structure and interaction was illustrated by the work of the IBP Lake George team and the Nuffield Unit for Tropical Animal Ecology, both based in Queen Elizabeth National Park, Western Uganda. The aim of the former is to construct a complete energy balance sheet for a tropical freshwater ecosystem. Professor C. D. Pigott (University of Lancaster), using data collected in Queen Elizabeth

Park, suggested that a knowledge of the primary production of savanna grassland can be used to estimate fairly accurately the site capacity for large herbivores. But he and other speakers stressed that such estimates could be misleading, if expressed solely in total energy equivalents, without taking into account the nutrient content of food, plants in relation to grazing preferences and conversion efficiencies at the second trophic level.

Food energy conversions in animals were discussed in detail by Professor A. T. Phillipson (University of Cambridge), and other speakers dealt with the ecological implications of water use, temperature stress and the inverse relationship between basic metabolic rate and body size. Many animals have obvious adaptations to their environment: the Thomson's gazelle, for example, seems to be highly efficient in its water conservation. Mr. D. Hopcraft (Athi River, Kenya) showed that, under rangeland management, this small ungulate can, at lower production cost, perform better than cattle in terms of lean meat production and yet, even at very high stocking rates, have a less damaging effect on the vegetation than cattle.

Discussing crop production, Professor R. Holliday (Makerere University, Kampala) and others used tea, sorghum, coffee, maize, cotton and legumes to illustrate the concept of economic yield and discussed techniques for manipulating it. Professor M. Dagg (Ahmadu Bello University, Nigeria) emphasized the limiting effects of the availability of water in crop production in the tropics. Another contribution concerned with productivity in East African forests, demonstrated how natural ecosystems can be managed to give economic yield.

A discussion led by Dr D. S. Miller (Queen Elizabeth College, London) brought recommendations that agricultural efficiency could be improved in two ways: by replacing traditional hand tools by more efficient instruments and by improving on the efficiency of man himself. Advances in the latter direction must await a better understanding of the effects of diet, disease and temperature.

The scope of the symposium was enormous, but ecosystems, and especially the less well documented tropical types, cannot be treated narrowly. Although some estimates of community bioproduction were given, many delegates expressed strong opinions that understanding and/or management of ecosystems was only likely to be achieved by intensive studies at the level of the species, some of which were discussed at the symposium.

SELENOLOGY

Source of the Lunar Field

from our Geomagnetism Correspondent

If the Moon possesses a global magnetic field today it must be a very small field. A few years ago, magnetometers on Explorer 35, for example, showed that there was no measurable field at the altitude of the satellite. Taking into account the limitations of the apparatus used, this can be interpreted as setting an upper limit of 10^{20} gauss cm³ on the moment of a possible dipole at the centre of the Moon. In other words, the lunar dipole moment is at least six orders of mag-