

absorption in thorium was studied in relation to conversion factor, that is, breeding uranium-233 fuel from thorium. The technical physics section provided additional safety instrumentation for *Hifar* and designed and constructed a wide variety of instruments for nucleonic and physical measurements. Generally, more emphasis was placed on the high-temperature gas-cooled reactor project than on the liquid metal cooled reactor system since it was shown that this system would require a longer period of development. Work on liquid metals was largely restricted to sodium technology required for *Hifar* irradiations. Optimum conditions for the vacuum hot-pressing of reduced beryllium powder and electrolytic powder were established, and laboratory-scale extrusion processes for beryllium metal were developed. Research on the impregnation of graphite with furfuryl alcohol to produce graphite of very low gas permeability was carried out, and a number of sample fuel elements of uranium and thorium dispersed in a diluent were prepared.

The number of staff at the Establishment rose from 295 to 484 during the year, but there was difficulty in recruiting research officers of the required ability and experimental officers. The Commission was

represented at the inaugural meeting of the council of the Australian Institute of Nuclear Science and Engineering which was held on December 4, 1958, and at the Second International Conference on the Peaceful Uses of Atomic Energy in Geneva. The major publication during the year under review was "Australian Atomic Energy Symposium, 1958", the record of the proceedings of the symposium on the Peaceful Uses of Atomic Energy in Australia, held in Sydney during June 1958. Other publications included the booklet entitled "An Introduction to Nuclear Science", prepared at the request of the New South Wales Department of Education as a teaching aid in schools, and the quarterly journal *Atomic Energy*. A total of approximately £A.30,000 was provided for extramural research contracts to universities. Thirty-five separate research programmes were being undertaken in eight universities and two hospitals and except for a few which were held up by staffing difficulties they were making good progress. Several were nearing completion. No new undergraduate scholarships were awarded, but fifteen undergraduate students continued their training in addition to forty postgraduate research studenthip holders.

## PUBLIC OPINION POLLS IN JAPAN

**P**UBLIC opinion polls are an item of American culture which the Japanese have adopted since Hiroshima. "At the height of their popularity during 1946-50 polling agencies in Japan conducted surveys on everything from attitudes towards the Emperor, housing and daylight saving time, to telephone service, prostitution, school lunches and Typhoon 'Jane'". Dr. Matsumoto, who is chief of the Department of Medical Sociology of the Atomic Bomb Casualty Commission, is very well aware of the limitations of this kind of democratized publicity, but he has had the interesting idea of investigating how far this widely ranging material displays a consistent pattern which is in contrast to the ethos of traditional Japanese society\*. He considers four main fields of opinion: attitudes towards family and sex relationships, attitudes towards occupation and labour, attitudes towards village life, attitudes towards political leadership.

\* Contemporary Japan: the Individual and the Group. By Yoshiharu Scott Matsumoto. Transactions of the American Philosophical Society. New Series, Vol. 50, Part 1. Pp. 75. (Philadelphia: American Philosophical Society, 1960.) 2 dollars.

After a brief description of the orthodox values of the traditional society, Dr. Matsumoto gives the results of a large number of opinion surveys dealing with such questions as: Should an individual choose his own marriage partner or should the parents decide? Do you feel that abortion should generally be permitted? Is there a social necessity for organized prostitution? Do you think the labour unions are protecting the interests of the workers? How do you feel about the abdication of the present Emperor? The book ends with an "Interpretation and Summary" which is sensible but not profound. It scarcely needed a study of this scale to discover that "Japan has been under strong pressure to conform to Western ideology in her post-war situation. On one hand individualistic orientations are heralded; on the other communistic values are proclaimed". There is a good deal of such writing, but so long as Dr. Matsumoto evades the pressure to conform to the clichés of American sociology he is quite fascinating. The bibliography of Japanese sociological studies at the end of the book should be very useful to specialists.

EDMUND LEACH

## MASS DENSITY NEAR THE SUN

**I**T has been known for many years that there is a close relation between the gravitational force of our Galaxy near, and perpendicular to, its plane, the distribution of stellar velocities and the density distribution of matter. The classical investigation of this subject was made by J. H. Oort in 1932, and a number of other investigations have been made since that time.

E. R. Hill has recently published (*Bull. Astron. Inst. Netherlands*, 15, No. 494, 1; 1960) a comprehensive discussion and a new analysis of the available data. His work is based on stars of type *K*; this

type was chosen because *K*-type stars occur in relatively large numbers at high galactic latitudes and statistical data on their brightness and motions are much more complete than for other kinds of stars. The velocity distribution of the stars perpendicular to the galactic plane has been represented as the sum of three components, two of low velocity and one of high velocity. The distribution of velocities parallel to the plane was studied as a function of height above the galactic plane. The distribution of giant *K*-stars was derived from the observed distribution of all stars of type *K* by using the observed

total proper-motion distributions of *K* stars to assess the proportions of giants at various apparent magnitudes.

All this information was then combined to yield the force of attraction of the Galaxy perpendicular to its plane, in the solar neighbourhood, as a function of distance from the plane. Finally, the total density of matter in the plane of the Galaxy near the Sun was calculated. The result is  $9.2 \times 10^{-24}$  gm./cm.<sup>3</sup>, or 0.13 solar mass per cubic parsec. This is somewhat larger than obtained by Oort in 1932.

Hill's work suffers from the disadvantage that for distances of more than 500 parsecs from the galactic plane the force obtained conflicts with the requirements of Poisson's law.

In another paper, J. H. Oort (*Bull. Astron. Inst Netherlands*, 15, No. 494, 45; 1960) re-determines the force so that it is consistent both with the observational data assembled by Hill and with Poisson's law. He obtains 0.15 solar mass per cubic parsec for the density of matter in the solar neighbourhood, in excellent agreement with the result of Hill.

## DWARF MISTLETOES

A COMPREHENSIVE account of morphological aspects of the parasitism of dwarf mistletoes (*Arceuthobium* spp., Loranthaceae) on North American conifer species has been given by J. Knight (*Univ. California Pub. Bot.*, 30, No. 5, 337; 1960). Some of the literature, terminology and main features of the development of these parasitic plants are critically reviewed and new observations submitted relating to *A. americana* and other species. At the time of penetration into the host the radicular apex loses its histological organization and becomes resolved into simple uniseriate filaments. Such filaments eventually become vascularized endophytic strands. It is possible that all radial sinkers and some aerial shoots may take their origin directly from uniseriate filaments.

All species of *Arceuthobium* may at maturity show a localized distribution pattern of the endophytic system and shoot emergence from the host. Such infections are in some cases associated with brooming phenomena of the tree. In addition, some species when infecting certain hosts induce a remarkable brooming response where the endophytic system keeps up with longitudinal host extension and where a great regularity of shoot emergence prevails. This is described as 'isophasic' parasitism.

There are recognizable differences in isophasic behaviour among species in which it occurs. These differences involve the position of mistletoe shoots in relation to host organs, dominance and precociousness of mistletoe shoots at the girdles, duration of reproductive activity, and so on. A mistletoe species causing an isophasic response on one host species may not do so on another; similarly, a tree when infected by one mistletoe may form an isophasic broom, whereas infection by a second species may result in an entirely different type of parasitism. The isophasic capacity does not therefore reside solely in either host or parasite, but is the result of mutual interaction. The endophytic system is most extensively developed in isophasic brooms. In those of *A. americana* on *Pinus contorta* and of *A. douglasii* on *Pseudotsuga menziesii*, the ultimate filaments are present in the apical meristems of the host branches and probably remain there throughout the yearly growth-cycle. In the latter broom, an actual emergence of endophytic filaments takes place just above the youngest bud scales. The author suggests that the endophyte may be present in the apical meristem of the host branches of all isophasic brooms, and that such presence in the host apex is a corollary of regularity in shoot emergence.

## FACT AND FICTION ON THE BREEDING OF THE WANDERING ALBATROSS

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THE reputation of the wandering albatross (*Diomedea exulans*) as a parent has suffered on occasion at the hands of the ornithologist, professional and amateur alike. The starvation theory held that the young albatross was fed from hatching in March until about June, and then deserted throughout the Antarctic winter while it subsisted on reserves of stored fat. Some writers state or imply that there is no resumption of parental feeding before the fledgling takes wing about December; others cite observations of feeding, or of fresh food in the nestling's stomach, in spring. The relevant evidence and opinions of successive writers are:

1865. Hutton<sup>1</sup> stated that Harris at Kerguelen saw no adults between June and October, and no feeding from October onwards.

1866. Andersson<sup>2</sup> quoted the opinion of a sealer that young albatrosses live on their own fat after being abandoned by the parents.

1891. Chapman<sup>3</sup> stated that Fairchild observed albatrosses, nearly all young, on the islands below New Zealand in October, 1890, and concluded that the large full-grown chicks are abandoned and live on their own fat until they fly.

1905. Buller<sup>4</sup> quoted Buckland, who visited islands to the south of New Zealand, to the effect that the