see if the present low incidence of homothallic giant spores increases in the future generations of selection. In any event, it seems possible that further investigation of these strains may afford some evidence concerning the usually accepted origin of *N. tetrasperma* from an eight-spored form[2].

These strains may prove of experimental value in that they permit the study of a polygenic character in an organism in which ordered tetrads may be isolated. A further advantage is that all generations of a selection experiment may be preserved, since the ascospores remain viable for several years.

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Widespread Distribution of Mutant Alleles (*t*-Alleles) in Populations of Wild House Mice

FOLLOWING the proof that mutant changes at one locus (t) occur rather frequently in laboratory stocks of mice kept in the balanced lethal condition[1] T/t^n, we turned our attention to the problem whether such mutations are to be found also in wild populations. In the laboratory we had detected such mutations only in stocks which already contained a t-allele at this locus; stocks containing T (brachyury = short tail) had been under continuous observation in the laboratory since 1932, but no occurrence of mutation to a t-allele (revealed by the tailless condition T/t^n) had been detected. Seven different t-alleles were detected and isolated[1] by testing the rare normal-tailed exceptions which were found after inbreeding the balanced-lethal tailless stock T/t^1. All such exceptions proved to be t^1/t^x, t^x being a new allele at this locus. This suggested that t^x had arisen either by recombination or rearrangement at the complex locus t (Dunn, 1954) or that t^1 had induced mutation to a new allele. The fact that the new mutants were different from t^1 and from each other and that no recombination gametes containing the normal allele (+) were found was taken as evidence against the recombination hypothesis. The locus thus appeared to be unstable in the balanced lethal laboratory stocks. A question of interest was whether there was any evidence of this in wild populations remote from the few laboratories at which t-alleles were maintained.

The first tests of this point[2] showed decisively that t-alleles are normal components of some wild populations in the United States. Samples of mice caught in the wild were tested by mating them in the laboratory to a standard testing stock $T/+$ (brachy). Some wild mice when so tested produced, in addition to the expected brachy ($T/+$) and normal offspring, tailless offspring which, on further testing, proved to be T/t^n and gave rise to new tailless balanced lines T/t^{w1}, T/t^{w2}, T/t^{w3} and T/t^{w4}. The first three of these alleles were different from each other and from previously known t-alleles; the fourth was indistinguishable from a previously known allele t^0. Thus these first wild populations to be tested revealed a variety of alleles, as had the laboratory stocks.

Such tests have now been extended to include samples, usually small ones, from seventeen American populations. In addition, one Japanese population has been tested at the National Institute of Genetics of Japan by crossing with brachy testers ($T/+$) sent from our laboratory and a t^w allele found in three animals. Of these eighteen populations, twelve contained animals heterozygous for a t-allele. Each occurrence of tailless offspring from a new population is given a number in the order of discovery. This does not necessarily indicate that the t-allele thus revealed is new and different from the others; this can be proved only by crossing balanced lethal lines, each derived from a different population, and such tests have been only partially completed. Of the newer alleles t^{w5} (N.Y. 2) is lethal and different from t^0, t^1, t^9, t^{w1} and t^{w3}; t^{w6} (Florida 1) is lethal and different from t^0, t^1, t^{12}, t^{w1}; and t^{w3}, t^{w5} and t^{w6} cannot be distinguished by the usual test of viability at birth of the compound t^{w5}/t^{w6}. The hypothesis is being tested that this compound, which if found should have a normal tail, dies during embryogeny. t^{w7} (Texas 1) is viable, hence different from t^{w5}, t^{w6} and all previously known lethals, although its difference from other viables (t^3, t^7, t^8, t^{11}, t^{13} and t^{w2}) cannot be directly tested. t^{w8} (Virginia 1) is viable, hence different from any of the lethals. Occurrences $t^{w9}-t^{w13}$ have not yet been tested. These are as follows: t^{w9} (Radford, Virginia) viable; t^{w10} (Misima-sen, Japan); t^{w11} (Storrs, Connecticut); t^{w12} (Oakland, California); t^{w13} (El Paso, Texas); t^{w14} (Norwich, Vermont). It is already clear that not all alleles found in the wild are the same, and that many wild populations are polymorphic for this locus.

No single population has been proved not to carry a t-allele, since all the negative samples are quite small.

In the populations shown to contain a t-allele, the frequency of heterozygotes is very high. Of forty-seven animals tested from such populations, twenty-seven have proved to be heterozygous $+/t^w$. This does not include an extensive sample of ninety-two mice from one such population ($R3$), tested after eight years of inbreeding in the laboratory, in which fifty-two mice were heterozygous; their retention in such high frequency shows that evolutionary forces of some magnitude must oppose their extinction. One of these forces is the altered segregation ratio $t^w : +$ in males, in which the t^w gamete is regularly favoured[3] by ratios of 0·8–0·9. The other may be selection in favour of $+/t^w$, and this is being tested experimentally. A preliminary experiment[4] suggests that $+/t^w$ males may be more fertile than $+/+$.

Many problems remain to be studied with this material. The ubiquity of t-alleles in wild populations is taken as proof of their evolutionary significance and justification for further study. Experiments now in progress are designed to test: (1) whether new alleles arise by mutation directly from the normal allele of wild $+/+$ mice (this event has never been detected in laboratory stocks); (2) whether the adaptive value of $+/t^w$ heterozygotes in wild populations differs from that of $+/+$; (3) whether any single wild population contains more than one variety of t-allele (no such instance has yet been noted); (4) whether the presence of a particular allele, or the absence of any such allele, bears any relation to the geographical or ecological situation of the population.

This work was carried out at Nevis Biological Station, Irvington-on-Hudson, New York, and since June 1, 1955, under contract AT(30–1–1804) U.S. Atomic Energy Commission. Many persons were concerned with collecting mice in the wild and others

with testing them in the laboratory. The co-operation of the former will be acknowledged in more extensive reports. The work depended very much on the skill in handling wild populations in the laboratory of Prof. W. C. Morgan, jun. (now at South Dakota Agricultural College), at the initiation of the experiment, of Mrs. Joan Suckling and Mary Anne Dann during its continuation, and most recently of Dr. Louis Levine, Andrew D. Beasley, Frank Burnett and Robert E. Stephenson, of the Nevis Laboratory.

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An Instrument for measuring Soil-Moisture Deficit

THE estimation of residual available soil moisture should be an essential part of irrigation practice. Penman's method[1], based on meteorological observations, gives excellent results ; but in its present form it is somewhat cumbersome for use by commercial growers. Various alternative methods are available ; for example, measured evaporation from an open water surface may be expressed as potential evapotranspiration by means of a suitable conversion factor[1]. Garnier has measured evapo-transpiration directly using a standard grass surface[2]. There is, however, a need for a simple device which will integrate rainfall and evaporation measurements and give a reading expressed as soil-moisture deficit.

We have devised a combined rain-gauge and evaporimeter which ultimately may prove suitable for use by growers for day-to-day control of irrigation. It would also provide valuable data if installed in meteorological stations. The instrument is intended to be placed in a growing crop, so that it collects rain and irrigation water in a common receiver ; an evaporation surface, consisting of an unglazed ceramic disk, draws its water supply by capillarity from this receiver. Successful operation of the instrument depends upon correct adjustment of the ratio between the area of the collecting surface and the area of the evaporating surface. The total effective area of the evaporating surface is therefore determined by comparison with a free water surface. This is expressed in terms of area of soil completely covered by plants, using Penman's conversion factor (0·8 for south-east England, March–August). The instrument is then constructed so that the area of its collecting surface equals the area of its evaporating surface thus expressed in terms of plant-covered soil. It is necessary to provide means of adjusting the effective area of evaporating surface to compensate for differences in rate of water-loss between wet soils and dry soils, and between soils completely covered by plants and those only partially covered. An overflow is provided in the receiver at a level corresponding to field capacity, so that any rain which falls when the instrument is indicating field capacity is collected separately and gives a measure of the amount of drainage which has taken place through the soil. The water supply to the evaporating surface is so arranged that when the instrument is indicating wilting point, the water-level in the receiver is just below the level of the outlet, thus cutting off the supply and preventing further evaporation.

When the instrument is correctly adjusted, the amount of water in the receiver at any time corresponds to the amount of water remaining in the soil, so indicating directly the current soil-moisture deficit.

Many workers are carrying out experiments to determine the maximum permissible deficit at various growth stages of the major crop plants. The results of such experiments will enable this instrument to be used for deciding when to irrigate, in addition to indicating how much water is required to restore the soil to field capacity.

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Index of Translations of Foreign Scientific Material

THE editorial article in *Nature* of November 19 raises once more the problem of how to ensure that foreign scientific material is economically translated and made available. The index of unpublished scientific translations maintained by Aslib, and covering the principal countries of the Commonwealth, is, I believe, one step in the right direction. May I appeal to readers of *Nature* to help make the index more effective by arranging, whenever possible, for details of partial or complete translation, made or about to be made by their organizations, to be notified systematically to Aslib ? The details required are : author, name of periodical, volume, issue number, inclusive pagination, date and translated title, as well as the form of translation (for example, typescript, microfilm, etc.), whether it is complete, partial or a summary, whether it can be bought or borrowed, and the name and address of the holding organization.

Many inquirers now systematically check with Aslib before starting a translation. Their intention to undertake the translation, if one is not known to exist, is recorded at once, so that it is sometimes possible to suggest a joint task with expenses shared to a subsequent inquirer. Last year (the third year of operation) the cost of 137 translations, representing perhaps some £3,000 and possibly unwelcome delays as well, was saved by the index ; the figure will doubtless be increased considerably as more firms and institutions collaborate.

The language barrier, however, is only one of many problems in the dissemination of knowledge. Paradoxically, Great Britain spends substantial sums (something like £300 million a year) on research to produce new knowledge, but only trifling amounts on research into ways of putting it where it can be of the widest practical use. Perhaps the time is ripe for the principal organizations representing scientists and information workers to consider jointly how the country's needs in this respect can best be met.

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