DISCUSSION

VARIETIES OF TRITICUM VULGARE PRACTICALLY IMMUNE IN ALL STAGES OF GROWTH TO STEM RUST[1]

IN searching for wheats of value for breeding purposes one of the aims has been to secure a variety of *Triticum vulgare* with immunity at all stages of growth to all physiologic races of *Puccinia graminis Tritici*. Of the various varieties tested at the Dominion Rust Research Laboratory, at Winnipeg, six appear to meet these requirements.

Five of the wheats in question were received in 1934, from the Department of Agriculture at Nairobi, Kenya Colony, under the identifying numbers 122.D.I.T.(L), 117.E.16.B.1, 117.B.5.B.2, 117.K.16.A.(L) and 117.1.5.-F.(L). They were developed by Burton and his associates and have been described by Burton[2] as being rust-resistant. Macindoe[3,4] tested a number of Kenya wheats, and found the best of these to be either entirely immune or very resistant to stem rust under epidemic conditions in Australia.

The sixth variety was received, in 1935, from Mr. M. S. J. McMurachy, a farmer near Strathclair, Manitoba, Canada. Mr. McMurachy had discovered it about the year 1930 as a single rust-free plant in a field of Garnet wheat. He increased it, and when he found that it withstood the rust epidemic of 1935 he brought it to the attention of the staff of the Dominion Rust Research Laboratory. This variety is now known as McMurachy's Selection.

Every year, since these wheats were received, they have been subjected, at Winnipeg, to an artificially-induced epidemic of stem rust in which approximately 30 physiologic races collected in various parts of Canada were used as inoculum. In addition the plants were, of course, also exposed to any natural rust infestation that occurred. Apart from an occasional trace of rust, which will be discussed below, the six wheats in question appeared to be immune to all races occurring in the field.

The same varieties were tested in the seedling stage in the greenhouse with the following twenty physiologic races of stem rust: 9, 10, 11, 15, 17, 19, 21, 29, 32, 34, 36, 38, 39, 48, 50, 56, 113, 120, 139 and 162. The seedlings of all six varieties reacted alike. Except at abnormally high temperature where resistance was found to break down, no rust pustules were produced by any of the twenty above-mentioned races, but minute flecks scarcely visible to the naked eye were occasionally observed. In this connection it may be mentioned that according to Macindoe[3] some of the Kenya wheats have been found by Waterhouse to possess resistance in the seedling stage to the prevalent Australian races of stem rust.

It has been found that plants of the Kenya wheats and of McMurachy's Selection may be infected with stem rust by injecting urediospores within the leaf sheath where they come into contact with and infect the immature and as yet unexposed parts of the stem. As the stem grows the infected part emerges from the leaf sheath and the rust pustules become visible. Such infections may, however, be produced on most wheat varieties that show immunity under field conditions, and have even been produced on certain oat varieties injected with wheat stem rust, an organism to which they are immune in the field.[5] The rare stem-rust pustules that have been observed on plants of the Kenya wheats and McMurachy's Selection in the field have almost invariably been situated on the stem just above the leaf sheath, which suggests that they are due to spores falling within the leaf sheath and causing internal infections.

From the results obtained in the various rust tests there seems to be good reason to believe that the six wheat varieties in question are practically immune at all stages of growth to all physiologic races of stem rust occurring in Canada.

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[2] G. J. L. Burton, Ann. Rept. Dept. of Agric. Kenya for the year ended December 31, 1931. Pp. 176–201, 1932.

[3] S. L. Macindoe, *Agr. Gaz. N. S. W.* 42: 475–484, 1931.

[4] Ibid., *Jour. Austral. Inst. Agric. Sci.*, 3: 25–31, 1937.

[5] Margaret Newton and A. M. Brown, *Can. Jour. Research*, 11: 564–581, 1934.

FRESH-WATER JELLYFISH IN HAWAII

THE wide distribution of fresh-water jellyfish in the United States was emphasized by the report of Dr. Waldo L. Schmitt[1] early this year. Locality records now include at least twenty states in addition to the Canal Zone. More recently H. Z. Gaw and L. H. Kung[2] announced the finding of fresh-water jellyfish in Kiating, Szechuen, China.

The islands of the Central Pacific area should now be included in the range of fresh-water coelenterates by reason of their discovery on the island of Maui. As reported by Miss Miriam Sylvester, of Hamakuapoko, Maui, medusae were first observed during November, 1938, in a pond in Maliko Gulch, about eight

[1] *The American Naturalist*, 73: 83–89, January–February, 1939.

[2] SCIENCE, 90: 299, September 29, 1939.

miles from the sea at an elevation of between 1,500 and 2,000 feet. After winter rains set in the medusae disappeared but were again observed in the same pond in May, 1939; they were still present in September of this year, but disappeared about the middle of October.

Some specimens were sent to me for determination. The likeness of the Maui medusa to *Craspedacusta sowerbii* was at once suggested and later verified by comparison with specimens of that species received through the kindness of Dr. A. E. Woodhead, of Ann Arbor, Mich. The only apparent difference between the Michigan and Hawaiian specimens is a larger number of tentacles in the latter. This, however, is probably a difference in size of individuals. Maui specimens 17 mm in diameter of bell bear approximately 500 tentacles, arranged in several series, varying in length and in level of separation from the surface of the bell.

Difficulty is expressed by Miss Sylvester in keeping the medusae alive under laboratory conditions. In tap water they lived only a day and but four or five days when pond water was used.

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REAPPEARANCE OF AN ANCIENT ABSURDITY REGARDING MAGNETS

IN the *Science News Letter* for February 3, 1940, there appears in a prominent position[1] a story which reverts to a way of comparing magnets that became obsolete two hundred and ten years ago. The anonymous author of this story is only the latest of a long line of careless writers who make it hard to justify the popularization of science by its uncritical friends.

The mistake, repeated five times in a total of less than 150 words, consists in setting as a figure of merit for a magnet the ratio of the weight it can lift to its own weight. This was outmoded in 1730, when James Hamilton (Lord Paisley) put the facts in this connection into the following statement:[2]

> The principle upon which these tables are formed is this: That if two loadstones are perfectly homogeneous, that is if their matter be of the same specific parity, and of the same virtue in all parts of one stone, as in the other; and that like parts of their surfaces are cap'd or arm'd with iron; then the weights they sustain will be as the squares of the cube roots of the weights of the loadstones; that is, as their surfaces.

Hamilton's rule teaches that any ratio of weight lifted to weight of lifting magnet can be reached with any magnet material simply by making the magnet small enough, and this interpretation was very well and widely known fifty years ago.[3] It therefore is complete nonsense to say that one material or method of construction is superior to another because a certain little magnet of the newer sort can lift a more impressive multiple of its own weight than can some indefinitely larger magnet of the older sort.

This note is not intended to deny that new materials and new methods of using them have vastly increased the usefulness of permanent magnets wherever magnetic adhesion is wanted. All that is objected to is the fallacy of emphasizing weight ratios in this connection.

Those who should have known better, but didn't, may derive cold comfort from the fact that this particular absurdity has been repeated at frequent intervals ever since 1730, sometimes by reputable physicists, and even after Hamilton's rule had been rediscovered twice.[4] All but the simplest truths about static electricity and permanent magnets seem, indeed, to have been forgotten very generally during the century, 1820–1920, in which electromagnetic phenomena were so much more novel and interesting.

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Since the photograph caption to which Professor McKeehan refers was based on information supplied by the General Electric Company, when the editor of SCIENCE gave opportunity for adding an explanation to Professor McKeehan's comment, we referred the matter to that company with the result that the following explanation by Mr. W. E. Ruder, head of the metallurgical section of the General Electric Research Laboratory, was received with permission to quote:

> Professor McKeehan's note to SCIENCE borders on the redundant. No comparison or rating of *magnets* is made or intended. In the "500X", "1500X" and "4500X" holding powers mentioned the same magnet material, Alnico, of essentially the same size was used. The whole point to these experiments is to bring out the fact that the design of a magnet is of the utmost importance in its application. With the newer types of higher coercive force and lower residual magnet alloys it is most important to reduce leakage to a minimum if the maximum available energy of the magnet is to be utilized in *holding*. In this case we reduced leakage to a minimum with soft iron pole pieces and introduced multiple gaps so designed as to take the greatest advantage of the high coercive

[1] The upper right-hand corner of the page facing the front cover, or, more precisely: Vol. 37, p. 67.

[2] Royal Society of London, *Phil. Trans.*, 36: 245–250, 1730.

[3] For example, it was discussed at length by Silvanus P. Thompson in the second of his Cantor Lectures on the electromagnet, delivered in London on January 27, 1890: *Journal of the Society of Arts*, 38: 889–905, 909–926, 1890, especially pp. 895–896.

[4] First by Daniel Bernoulli: *Acta helvetica, physico-mathematico-botanico-medica*, 3: 233–249, 1758; again by P. W. Haecker: *Annalen der Physik . . . Poggendorff*, 57: 321–345, 1842.