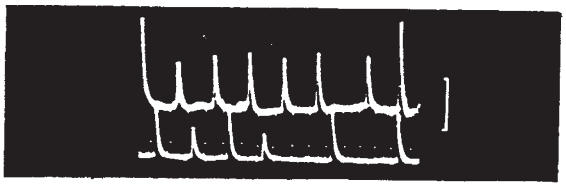

Fig. 1. Potentials recorded intracellularly from two separate end-plates during tetanic stimulation (64/sec.) of only one motor unit in a rat diaphragm, after dissecting a single motor fibre in the phrenic nerve. The end-plates show intermittent but asynchronous failure of transmission. The voltage calibration at right of figure indicates 5 mV. for upper trace and 15 mV. for lower trace

Fig. 2. Photographs of intracellular end-plate potentials from a fibre in a rat diaphragm illustrating the beneficial action of adrenaline on failing neuromuscular transmission. The photographs record about twenty superimposed oscilloscopic traces each; they should be read from left to right: (1) Intermittent failure of transmission during supramaximal stimulation at 20/sec. (2) Five seconds after the addition of 50 μgm. adrenaline hydrochloride to the bathing solution. At this time failure had become complete, but there was some activity in adjacent fibres. Partial recovery began 10 sec. later. Time scale: 1 msec. (3) Fifty-five seconds after the injection: there was complete recovery of transmission at 20/sec. (4) Five minutes after the injection. Stimulation at 50/sec. Vertical scale, 10 mV.

the end-plate was now being stimulated at a lower effective rate. The frequency at which failure began varied considerably with different fibres, with the condition of the muscle, and with the supply of oxygen. The partial block could usually be relieved by lowering the rate of stimulation. In some cases, however, this was not true, and complete, apparently irreversible block ensued. Recording of the activity in the nerve trunk showed that failure of conduction did not take place in the nerve trunk.

In preparations in which a single motor fibre was dissected in the phrenic nerve, the potentials at end-plates of two active muscle fibres did not fail synchronously (Fig. 1). This shows that the failure of transmission was occurring beyond the most distal point of branching of the motor axon, that is, close to or at the nerve ending. We found, both *in vitro* and *in vivo*, that adrenaline (hydrochloride or bitartrate) injected either into the muscle bath (50 μgm. in 30 ml.) or intra-arterially (1–2 μgm.) usually relieved such a partial block (Fig. 2).

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Role of Damaged Starch in the Evaluation of Wheat Quality

The introduction of test baking as a means of quality evaluation in the wheat-breeding programme of the Agricultural Research Institute, Wagga, has disclosed a characteristic which does not appear to have been reported in Australian wheats, namely, differential susceptibility of varieties to excessive starch damage during milling. This has been confirmed by microscopic examination with differential staining as used by Jones[1]. Trials by experienced technicians using different experimental mills showed that, with certain wheats, excessive starch damage could not be avoided. In the test-bake, this excessive proportion of damaged starch led to high water absorption, poor loaf volume and crumb texture on the basic test, and 'stickiness' in doughs containing diastatic malt.

The question arose as to why a high proportion of the wheat breeder's cross-breds and some commercial varieties—all of which had been regarded as having superior 'strength' but which did not always perform well under test-baking—should possess this characteristic.

The explanation appeared to lie in the choice of methods previously used for assessing quality. Early selection for quality was based in the first place on the wheat-meal fermentation-time test. With this test the higher water absorption caused by damaged starch leads to a 'tight' dough-ball and consequently a high figure which was interpreted as superior quality. (Incorporation of varying proportions of damaged starch in the dough-balls has confirmed this view.)

Subsequent testing at a more advanced stage in the breeding has been carried out on the farinograph. Trials with flour samples containing increasing proportions of damaged starch (artificially produced) showed that the farinograph revealed no effect due to the additions except an increase in water absorption—a characteristic ordinarily regarded as desirable.

Extensive trials with the Chopin alveograph have shown that a moderate amount of damaged starch manifests itself as enhanced strength and better balance. Only in cases of extreme 'toughness' due to high absorption by damaged starch would one regard the sample as having undesirable characteristics.

If such techniques are to be used in place of test-baking in assessing baking quality of wheats, then it appears imperative that they should be used in conjunction with supplementary tests to show whether the results are an indication of genuine strength, or just 'pseudo-strength' caused by some anomalous characteristic such as excessive starch damage.

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[1] Jones, C. R., *Cereal Chem.*, **17**, 133 (1940).

Silk Production in the Cheyletidae (Acarina: Arachnida)

While examining some grain infected with tyroglyphid mites, I found a specimen of *Cheletomorpha lepidoptorum* Shaw (=*venustissima* Berlese), which had just finished laying eggs. About six eggs were scattered on the ground, and the *Cheletomorpha* was moving backwards and forwards, covering them with a sparse network of silk. In this mite, the mouth is at the end of a gnathosoma, which is shaped like a cone and completely encircles the cheliceral stylets. The silk was coming from the mouth in the form of a very fine thread, which was stretched from side to side over the eggs, the pedipalpal claw being used for manipulating it at times. Unlike *Cheyletus eruditus*