Table 1. Intracellular Activities of Sodium and Potassium of Muscle Cells

No. of Cells	Range of Membrane potential	Activity ± S.E.
	(*Carcinus mœnus*)	
20	30–55 mV.	$a_{Na} = 0{\cdot}0135 \pm 0{\cdot}0008$
	(*Homaris vulgaris*)	
10	30–46 mV.	$a_{Na} = 0{\cdot}016 \pm 0{\cdot}001$
10	31–39 mV.	$a_{Na} = 0{\cdot}012 \pm 0{\cdot}0004$
12	31–52 mV.	$a_K = 0{\cdot}084 \pm 0{\cdot}0015$; $a_{Na} = 0{\cdot}015$

Table 2. Total Concentrations of Sodium and Potassium of Muscle under similar conditions as in Table 1

No. of muscles	$[Na^+] \pm S.E.$ moles/kgm. H_2O	$[K^+] \pm S.E.$ moles/kgm. H_2O
	(*Carcinus mœnus*)	
12	$0{\cdot}0516 \pm 0{\cdot}0033$	$0{\cdot}169 \pm 0{\cdot}0025$
	(*Homaris vulgaris*)	
6	$0{\cdot}055 \pm 0{\cdot}0043$	$0{\cdot}153 \pm 0{\cdot}0026$

Values were accepted from cells if the membrane potential was higher than 30 mV. The standard errors are given to indicate the small variation from cell to cell despite the wide range of membrane potentials. The sodium activity is virtually the same in crab and lobster muscle. Comparison with the concentrations per litre of tissue water (Table 2) shows that concentration of sodium is at least three times greater than the measured activity of sodium, and concentration of potassium is twice as great as activity of potassium.

The experiments are of a preliminary kind and will have to be repeated under different experimental conditions and on other material. Nevertheless, they show the practicability of using these glass electrodes on a micro scale and of measuring activities of sodium and potassium in the interior of the cell.

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Production of a Perfect Stage in a Nutritionally Deficient Mutant of Pathogenic *Fusarium oxysporum* after Ultra-violet Irradiation

The genus *Fusarium* has 16 sections, many of which have a sexual stage, belonging to such Ascomycete genera as *Nectria*, *Calonectria*, *Hypomyces* and *Gibberella*. *Fusarium oxysporum*, the form species of the section *Elegans*, is a widely distributed soil-borne fungus that causes wilt in many economically important crops. It has no known perfect analogue, although it can achieve genetic variation through asexual methods of recombination[1,2].

During experimental production by ultra-violet irradiation of nutritionally deficient mutants in the pea wilt fungus, *Fusarium oxysporum* f. *pisi*, many different wild-type isolates of its physiological races have been genetically marked in this laboratory. Many such mutants retain their wild-type morphology, but others are considerably altered, usually producing more spores per amount of mycelium and, less frequently, spores of different shape from the wild-type.

One of many isolates that have been repeatedly used for artificial inoculation tests was irradiated in October 1954 and found to be deficient in its methionine and arginine synthesis. In June 1955, further irradiation of this mutant resulted in additional deficiencies in cystine and vitamin B_1 synthesis. It can grow only slowly on non-supplemented agar media.

This isolate, together with many other mutant strains, was used extensively in genetical work, which entailed repeated sub-culturing from single spores, both on a 'minimal' and 'complete' agar medium[2]. It retained its capacity to wilt peas throughout several experiments and readily formed heterokaryons with other marked strains of *F. oxysporum* f. *pisi*. It would not, however, form stable heterokaryons with isolates of *Fusarium solani* f. *pisi*, a soil-borne fungus that causes foot-rot in peas. Since March 1956, all the mutant strains have been retained by sub-culturing every 3 months on 'complete' medium.

In late 1956 the mutant strain produced a few bright red very small perithecia, which remained immature and blind, with no discernible asci. In the summer of 1957 the perithecia were again examined but still showed no sign of ascus development. After repeated examinations of the cultures, mature perithecia were finally seen in February 1959, when ascospores were observed in the abundant extruded asci.

After tentatively identifying the isolate as a *Hypomyces* sp., it was sent to the Commonwealth Mycological Institute, Kew, where Mr. C. Booth kindly identified it as *Nectria* (*Hypomyces*) *haematococca* Berk. and Br. This fungus, well known in the tropics, where it can damage citrus, cocoa and other crops, has not previously been recorded in this country. The perithecial wall is coarsely cellular and the asci are extruded from a short ostiolar neck. Each ascus contains eight two-celled hyaline ascospores which have longitudinal striæ. A fuller account of the taxonomic features will be published elsewhere.

Both micro-manipulated single ascospores and single *Fusarium*-stage conidia readily produce cultures with perithecia and *Fusarium* conidia. The *Fusarium*, which is morphologically indistinguishable from *Fusarium oxysporum* f. *pisi* and from the parent un-irradiated colonies, causes typical wilt of pea, with symptoms indistinguishable from those caused by all previous parent colonies during the past 5 years. Perithecia occur on the fungus that has been re-isolated from the reddened vascular tracts of the wilted plants. There can, therefore, be little doubt that this homothallic *Nectria* is the perfect stage of this particular wilt-inducing *Fusarium* isolate. Because of its peculiar mode of origin, it cannot yet be considered the perfect analogue of other members of the *Fusarium* section *Elegans*. Whether it arose as a direct result of ultra-violet irradiation or came indirectly from the altered nutritional needs of the mutant is an open question, but it may be that the genetic mechanism governing perithecial formation in this particular isolate was unmasked by irradiation damage to nuclear material that previously suppressed the formation of perithecia. Further work on the ability of this particular isolate to hybridize with wild-type isolates of pathogenic *F. oxysporum* should show whether it represents a more general perfect analogue of the wilt-causing *Fusaria*.

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