monosomic and nullisomic plants are as shown in Table 1. The observed frequencies of the three types of plants are also shown in Table 1.

Table 1

Types	Disomic	Monosomic	Nullisomic	Total
Chromosome No.	2n	2n-1	2n-2	N
Observed frequency	a_1	a_2	a_3	
Expected frequency	pp'	$(p'q + pq')$	qq'	1

N male gametes are required to produce a population of N plants and the numbers of male gametes with n and $(n-1)$ chromosomes are $(a_1 + q'a_2)$ and $(a_2 + p'a_3)$ respectively. Thus, the relative frequencies of the functioning male gametes with n and $(n-1)$ chromosomes in the population are $p = a_1 + q'a_2/N$ and $q = a_2 + p'a_3/N$ respectively when p' and q' are known. The standard error (*S.E.*) of the estimate is $\sqrt{pq/N}$.

Illustration. In selfed monosomic plants of wheat, F_2 disomic, monosomic and nullisomic plants occur 13, 43 and 58, respectively, in summer. The relative frequencies of n and $n-1$ female gametes are found to be 0.24 and 0.76 respectively¹.

Estimates of the frequencies of functioning male gametes with n and $(n-1)$ chromosomes are:

$$p = \frac{13 + 0.76 \times 43}{114} = 0.4007 \text{ and } q = \frac{58 + 0.24 \times 43}{114} =$$

$$0.5993 \text{ S.E.} = \sqrt{\left(\frac{0.4007 \times 0.5993}{114}\right)} = 0.0459$$

The observed and expected frequencies of disomic, monosomic and nullisomic plants are shown in Table 2. It is found by χ^2 test that there exists a satisfactory agreement between observed and expected frequencies.

Table 2

	Disomic	Monosomic	Nullisomic	Total	χ^2
	(42)	(41)	(40)		(d.f. = 1)
Obs.	13	58	58	114	
Exp.	10.86	51.11	51.92	113.99	2.38

The estimated frequencies of functioning n and $n-1$ male gametes conform well with the experimental results¹ (39:61) obtained from summer progeny.

In wheat², where the frequency of $n-1$ female gametes is known to be 75 per cent on an average of different monosomics, the frequency of the n and $n-1$ male gametes can readily be determined by this method.

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VETERINARY SCIENCE

Cutaneous Actinomycosis Due to the Single Species *Dermatophilus congolensis*

SKIN infection with members of the genus *Dermatophilus* has been reported from several countries in a variety of animals including man^{1,2}. The initial isolate was named *D. congolensis* after the country of origin^{3,4}, but the first isolates in Australia and later ones in Great Britain were thought to be new, previously undescribed organisms, and were named *Actinomyces dermatonomus*⁵ and *Polyseptia pedis*^{6,7}. Small differences in the ability to digest protein and to ferment certain sugars supported the view that the isolates belonged to separate species^{1,7}. It was therefore concluded that 'cutaneous streptothricosis' of cattle was caused by *Dermatophilus congolensis*, 'mycotic dermatitis' of sheep by *D. dermatonomus*, and 'strawberry foot rot' of sheep by *D. pedis*¹.

Doubts about the biochemical basis of the speciation, expressed in a review of published descriptions of the various isolates⁸, were confirmed in a direct comparison of a number of strains which indicated that there were no consistent differences and that there was a single species, *D. congolensis*⁹.

A limited serological comparison of eight strains suggests a degree of antigenic homogeneity consistent with the conclusion that there is only one species. Zoospore suspensions, and aqueous extracts of acetone-dried cultures containing both zoospores and hyphae, were prepared from five Australian ovine strains, a strain from a horse in Canada, one from a cow in the Congo, and one from a sheep with strawberry foot rot in England. Antisera to two of the Australian strains were prepared in rabbits and guinea-pigs. The strains were compared by direct and cross reactions in agglutination and agglutinin-absorption tests with zoospores treated with formalin or boiled (flagellar or somatic agglutination), and in gel double diffusion precipitation plates.

Antigenic heterogeneity was evident only among flagellar agglutinins. The two immunizing strains cross-reacted and cross-absorbed only slightly, whereas each of the other six reacted strongly with, and absorbed most of the flagellar agglutinin from, at least one of the antisera. The English isolate (formerly *D. pedis*) was the only strain, apart from the immunizing one, to absorb all the flagellar agglutinin from either antiserum.

Each strain reacted fully with both antisera in the somatic agglutination and agglutinin-absorption tests. In the gel-diffusion plates both antisera formed identical lines of precipitation with the extracts of all eight strains.

Antigenic uniformity among strains was evident also in the haemolysis. Haemolysis in *D. congolensis* cultures on sheep red cell agar is due to the synergic action of two diffusible factors, *S* and *H* (ref. 10). Each strain produces an excess of one or other factor and the separate zones of activity of both can be demonstrated by growing strains producing excess factor *H* near strains producing excess factor *S* so that there is haemolysis in the region of overlap. The haemolysed zone has a sharp edge where *S* is the limiting factor, and a hazy edge where factor *H* is limiting. Factor *S* is not inhibited by antibody but the zone of activity of factor *H* was decreased to the same degree in each strain when a given sample of antiserum was added to the agar medium, compared with control media containing normal serum.

The use of antisera against all the strains might reveal additional antigens not present in the two strains that were employed, but it is unlikely that differences were missed that would justify a separation of species. Since *D. congolensis* is classified in the order Actinomycetales¹, and since it is not a *Streptothrix*, 'cutaneous actinomycosis' is suggested as a more suitable name for the disease it causes than any of those currently in use.

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