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Furunculosis in Salmon Kelts

Investigations into the occurrence of furunculosis among spawning or spawned salmon were undertaken in Scotland during the spawning seasons of 1958–59 and 1959–60[1]. In the former season 96 salmon kelts were examined and 85 of these had furunculosis; in the latter season, up to the time of going to press, 9 out of 24 kelts examined had furunculosis. In the same season 14 kelts were examined in England and Wales and 11 of these gave a positive reaction.

In order to determine to what extent furunculosis occurred among kelts in Ireland it was decided to collect dead and dying kelts from four Irish rivers during the 1960–61 spawning season. In all, between December 15, 1960, and May 17, 1961, a total of 159 kelts were examined from the following rivers:

River	No. of kelts examined	Hatchery or naturally spawned
River Owenea (Co. Donegal)	121	Majority hatchery stripped
River Erne (Co. Donegal)	17	Majority naturally spawned
River Shannon (Co. Limerick)	12	All hatchery stripped
River Boyne (Co. Meath)	9	All naturally spawned

With the exception of one fish from the Owenea River all were negative for furunculosis. It is hoped to continue these investigations during the next spawning season 1961–62.

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Differences in the *p*H Optimum of the Photosynthetic Fixation of Carbon Dioxide in Isolated Whole and Broken Chloroplasts[1]

Recently, Gibbs *et al.*[1–4] emphasized the differences between whole and broken chloroplasts regarding their sensitivity against inhibitors during fixation of carbon dioxide and the distribution of carbon-14 in the sugars so formed. In our experiments an additional difference, the markedly lower *p*H optimum of fixation of carbon dioxide in whole chloroplasts, as compared with broken chloroplasts, was observed.

Chloroplasts were isolated from spinach leaves by the method of Arnon *et al.*[5] and Gibbs *et al.*[1,2], using 0·35 *M* sodium chloride solution with 0·015 *M* *tris*-hydrochloride *p*H 7·5 and 0·01 *M* sodium ascorbate. In order to obtain broken chloroplasts, washed whole chloroplasts were resuspended in 0·01 *M* sodium ascorbate solution. All experiments were carried out at light saturation (25,000 lux).

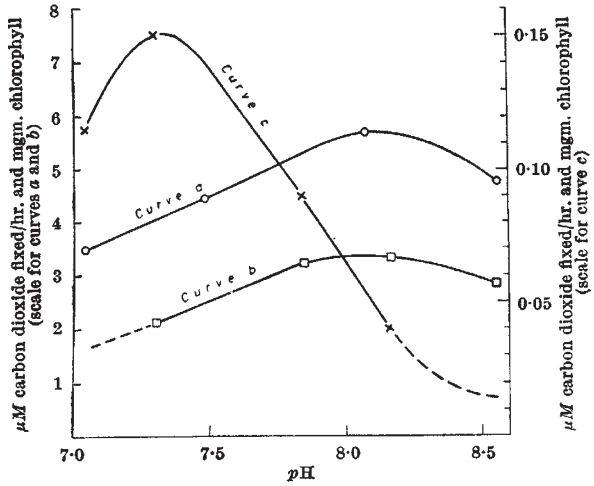

Fig. 1. *p*H optimum of the photosynthetic fixation of carbon dioxide by whole chloroplasts without (curve *c*), and with co-factors (curve *b*), and by broken chloroplasts (curve *a*). $t = 20°$ C.; gas phase nitrogen. 1 ml. of the reaction mixture contained: curve *c*, 200 μgm. chlorophyll; in μ*M*, sodium chloride 350; *tris* 35; manganese chloride 0·8; magnesium chloride 2·0; sodium ascorbate 10; $Na^{14}HCO_3$ 2, specific activity 24·47 μc./μ*M*. Curve *b*: like curve *c* plus ADP 2·0; TPN 0·12; FMN 4×10^{-4}; R-5-P 1·0; GSH 3·0; $Na^{14}HCO_3$ 10, specific activity 0·28 μc./μ*M*. Curve *a*: broken chloroplasts, conditions like curve *b*, plus chloroplast extract equivalent to 400 μgm. chlorophyll minus sodium chloride

The results of a typical experiment are shown in Fig. 1. The curve for broken chloroplasts (*a*) shows a flat maximum at 8·1, whereas the curve for whole chloroplasts (*c*) has a marked optimum around 7·3. When the co-factors are given to whole chloroplasts, the total fixation is increased by more than 10-fold, thus reaching the level of broken chloroplasts. In this case the *p*H optimum is identical with that of the broken chloroplasts (curve *b*).

This behaviour probably results from the presence of only a small portion of physiologically intact chloroplasts compared with a big portion of physiologically defect and broken chloroplasts in the preparations of the so-called 'whole' chloroplasts. Jacobi and Perner[6], as well as Erikson *et al.*[7], came to the same conclusion in their morphological work. Then, after the addition of co-factors, the fixation by broken chloroplasts exceeds that of the whole chloroplasts to such an extent that practically only the *p*H optimum of the first is measured. Also the strong variation of the rate of fixation of carbon dioxide of the whole chloroplasts expressed in Table 1 may best be explained by the assumption that the percentage of really intact chloroplasts varies greatly, depending on the condition of the leaf material.

Furthermore, it can be seen from Table 1 that the *p*H optimum of the fixation of carbon dioxide in whole and broken chloroplasts is not shifted by a variation of the absolute level of fixation. For whole chloroplasts it is between 7·0 and 7·5, whereas for broken chloroplasts between 8·0 and 8·5. So far as whole chloroplasts are concerned, our results are in agreement with Gibbs and Calo[1]. In the case of broken chloroplasts, however, their results[3] differ from ours, since they obtained the same *p*H optimum as with whole chloroplasts. While measuring light phosphorylation, Allen *et al.*[8] found a *p*H optimum around 8·3 for broken chloroplasts.

The difference between whole and broken chloroplasts, in the *p*H optimum of their photosynthetic fixation of carbon dioxide, may be explained in three ways: (1) the *p*H dependent permeability for the