are small, and the photoelectric technique seems preferable in such a case. Detailed developments in the apparatus are needed before trying to correlate experimental and theoretical results with the precision desired. At present the reproducibility of results is only 5 per cent, largely because of source fluctuations, the apparatus is inflexible and the taking of readings is tedious. The work, nevertheless, shows that a useful technique for direct intensity distribution measurements may be developed on this principle, and it is hoped that the specification of lens performance may be freed from the restrictions imposed by the present need to depend on photographic recording. A particular application lies in the determination of the significance of the width of the central part of the image.

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Oxygen Uptake and Carbon Dioxide Evolution of Heat-sterilized Soil

In a study of the respiration of soils at temperatures ranging from 10° to 70° C., it was found that oxygen uptake and carbon dioxide evolution increased with increasing temperature above 50° C.[1]. The decline in plate counts at the higher temperatures indicated a gas exchange due to heat-stable enzymes or chemical oxidation and decarboxylation.

An investigation was then made on the gas exchange of soils subjected to various heat-sterilization treatments (Table 1).

These results show that the oxygen uptake increases with increasing severity of heat treatment. This suggests that the effect of heating is to expose oxidizable groups in the soil either by direct reduction or by the disruption of some fractions of the organic matter. The evolution of carbon dioxide from heated soils at 30° C. was low in comparison with oxygen uptake, but other work[1] has shown that the ratio of carbon dioxide to oxygen in autoclaved soils increases as the temperature at which respiration is being studied is increased.

Table 1. Effect of Heat Treatment on Gas Exchange of Soil. (μl./gm. oven-dry soil/hr. at 30° C.)

	Untreated soil	Heated to 85° C. for 2 days	Steamed for 1 hr. on 3 successive days	Autoclaved at 15 lb./sq. in. 1 hr.	2 hr.	3 hr.
O_2	19	1·4	5·9	7·0	8·5	9·0
CO_2	18	0·7	1·7	1·2	1·3	1·2
Ratio CO_2/O_2	0·9	0·5	0·29	0·17	0·16	0·14

Table 2. Gas Exchange of Unheated and Autoclaved Soil at 30° C. in the Presence of Biological Inhibitors (μl./gm./hr.)

	Unautoclaved soil				Autoclaved soil			
	No inhibitor	Sodium azide	Sodium chloride	Mercuric chloride	No inhibitor	Sodium azide	Sodium chloride	Mercuric chloride
O_2	18	2·0	0·9	3·0	18	15	21	20
CO_2	17	3·0	1·3	2·5	2·9	0·7	1·7	1·9

The narrow carbon dioxide/oxygen ratio, the non-inhibition by microbial and respiratory inhibitors (Table 2) and the temporary nature of the gas exchange (Table 3) in the heat-sterilized soils are further evidence that the gas exchange is due to chemical oxidation.

Table 3. Gas Exchange at 30° C. of Autoclaved Soil at Various Periods after Heating (μl./gm./hr.)

	Time after autoclaving (15 lb./sq. in. for 1 hr.)			
	1 hr.	5 hr.	6·5 hr.	9 days
O_2	25	13	12	0·8
CO_2	8·6	4·3	3·9	0·6

The gas exchange of soil nine days after autoclaving is probably indicative of the chemical oxidation which occurs in soils at normal temperatures. This oxidation, while not significant in comparison with microbial respiration at normal temperatures, increases with increasing temperature. In exposed inland Australian soils, where temperatures of 47°–50° C. occur at one inch depth for several hours per day during summer months[2], the chemical oxidation could be a significant factor in the decline in organic matter.

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Rosette Disease of Groundnuts

Rosette disease of groundnuts annually causes great losses in many parts of Africa, and the degree of loss varies considerably. The disease is present in the three areas farmed by the Overseas Food Corporation in Tanganyika. At Kongwa in the Central Province losses are negligible, at Nachingwea in the Southern Province serious, while at Urambo in the Western Province they have been so great that groundnuts are no longer grown.

The vector of the disease is *Aphis craccivora* Koch. In natural bush the vector has been found on about twenty plant species, mostly Leguminosae, at