$$\frac{R+P}{R+P+Q+X}=\frac{R}{R+X},$$

which readily gives the relation

$$X=R\frac{Q}{P}.$$

It is true this result appears in the same form as that deduced for the Wheatstone bridge, but beyond a superficial analogy there is nothing in common between the two methods. The Wheatstone's bridge method consists in dividing two parallel circuits in the same ratio. Mance's method, on the other hand, consists in subtracting from the two portions of a single circuit such resistances that the two portions shall still maintain the same ratio to each other.

In this connection it may be of interest to look at the results of a few measurements by this method. The resistance measured consisted of a medium-sized storage cell in series with a coil marked '2 ohms.' This gives a definite resistance with an E.M.F. not easily polarized. The results of thirty measurements are shown in the table below. R was varied from one ohm to forty ohms, and P was given such values that Q would be a little over 4,000 ohms. Each balance was sensitive to a change of 1 ohm in Q, and often the 0.5-ohm coil was used. The results are tabulated in the order obtained, reading across the table from left to right. As the room became warmer the resistance grew larger, each column showing the same increase of 0.002 ohm. It is seen from these results that the method is as sensitive as a post-office box, and by using a larger condenser the sensitiveness can be still further increased. From this limited data it is hardly safe to draw a general conclusion, but it may be noted that the smaller values of R, in other words, the larger currents in the storage cell, give smaller values of X, the same as with ordinary cells.

Temperature of Room.	Resistance of '2 Ohms' Plus Storage Cell.					
	$R=1.$	$R=2.$	$R=3.$	$R=4$	$R=10.$	$R=40.$
12.°0	2.0265	2.0280	2.0295	2.0295	2.0300	2.0300
12.°6	2.0265	2.0290	2.0305	2.0310	2.0315	2.0320
13.°0	2.0280	2.0297	2.0315	2.0312	2.0315	2.0320
13.°2	2.0282	2.0300	2.0315	2.0315	2.0317	2.0320
13.°5	2.0285	2.0302	2.0315	2.0315	2.0317	2.0320

The following results were obtained from a large 'Gonda' cell, a porous cup type of Leclanche cell. It had been in constant use in the laboratory for five months with no change of electrolyte. As it polarized rapidly for the first ten seconds after closing the circuit through one or two ohms, its resistance was measured with values of R of 40, 60 and 80 ohms. The values obtained were as follows:

Temperature of Cell.	Resistance of 'Gonda Cell.'		
	$R=40.$	$R=60.$	$R=80.$
13.°0	1.388	1.386	1.388
	1.392	1.392	1.388
	1.392	1.392	1.384
13.°2	1.389	1.392	1.388

The average of these twelve determinations is 1.389 ohms, and the mean variation from this value is 0.002 ohm, while the probable error of this result is 1 part in 2,600.

But it is not my present purpose to discuss experimental data except in so far as it shows that Mance's method is not without some merit. It has been shown that this method is fully as accurate as is required for laboratory use, whether the resistance to be measured be of the first or second class. The purpose of this paper will be fully attained if it has clearly shown the principle underlying this method, and pointed out the very obvious error which has crept into many of the text-books from Maxwell down to the present.

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ORGANISMS ON THE SURFACE OF GRAIN, WITH SPECIAL REFERENCE TO BACILLUS COLI.

THE recent note by Dr. Erastus G. Smith on the occurrence on grain of organisms resembling the *Bacillus coli communis*[1] appears to warrant preliminary publication of some of the results of my studies of the micro-organisms normally present on the flowers and fruit of certain plants in the Piedmont region and the rice belt of South Carolina. These studies, originally undertaken as a side issue

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in another problem, have proved intrinsically interesting.

In the fall of 1903 I determined the organisms present on the grain in twelve rice fields. In 1904 I studied both the flowers and grain in eight of the twelve fields examined the year before, and in four other fields. In 1904 I also studied, for comparison, the flowers and grain in eight wheat fields, and six oat fields; also the flowers and fruit in three peach orchards, flowers and fruit in two asparagus patches, and flowers and fruit in one patch of the wild *Iris verna* L. A few comparative studies of organisms on the fruit or flowers and the leaves of the same plant were also made. In every case exactly fifty grains or flowers or fruits, as the case might be, were taken at random from each field or patch, in the case of the cereals only one grain from any one spike. Each one was shaken in sterile water, allowed to stand for about an hour, shaken again, and the whole added to sterile agar-agar and plated; except in the case of peaches, when only a portion of the water was plated. The resulting organisms were studied in greater or less detail, according to their interest.

A part of the conclusions to date are as follows:

1. An immense but variable number and variety of micro-organisms were normally present on the surface of flowers, fruits and leaves. These were different in different localities, and different in successive years in the same locality, and showed no constant association with the host plants studied.

2. Without exception, the same organisms that occurred on the flower could later be found on the fruit, but not in the same quantity. But organisms commonly occurred on the fruit that were not found on the flower.

3. The most constantly present organisms were certain yeasts; in greatest number and variety on the peach, asparagus and iris; but yet characteristically present on the cereals.

4. The bacteria on the flowers and fruit were not different in kind from those on the leaves of the same plant, nor, so far as studied, materially different in number, area for area. With the peach, asparagus and iris fungi, and especially yeasts, occurred in noticeably greater number on the flower and fruit than on the leaf.

5. Bacteria giving the standard reactions of the colon group were found in thirteen out of the sixteen rice fields examined, five of the eight wheat fields and all of the oat fields. All three peach orchards and both asparagus patches exhibited coli forms in both flower and fruit; but none were found on either flower or fruit of *Iris verna*. In the following tables are shown the proportion of flowers and fruits (each flower or grain in the cereals representing a spike) found to have coli forms on the surface:

Rice: No. of Field.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Per cent. of spikes with coli forms, 1903.	0	10*	2	16	20	0	26	32	0	30*	0	6	—	—	—	—
Ditto, flowers, 1904	0	—	22*	8	38	4	—	8*	6	—	0	—	10	48*	6	0
Ditto, grains, 1904.	0	—	48*	4	52	8	—	14*	2	—	0	—	28	30*	4	0

Wheat: No. of Field.	1	2	3	4	5	6	7	8
Per cent. of spikes with coli forms, flowers	6	4	0	14*	0	0	8	26*
Ditto, grains	2	6	0	22*	0	0	2	18

Peaches: No. of Orchards.	1	2	3
Per cent. of flowers with coli forms	16*	8*	20
Ditto, fruits	24*	12*	14

Oats: No. of Field	1	2	3	4	5	6
Per cent. of spikes with coli forms, flowers	6	8	2*	14*	34	4
Ditto. grains	2	0	4	10	28	2

Asparagus: No. of Patch.	1	2
Per cent. of flowers with coli forms	58*	26
Ditto, fruits	40	16

An asterisk indicates that there were in the field in question very obvious means of contamination by human or animal excrement at the time the plates were made. In the other fields the source of the coli forms was without doubt the excrement deposited by draft-animals in working the ground, to say nothing of that deposited on the banks and adjacent secluded spots by workmen. Indeed, the nonoccurrence of coli forms in certain fields seems most difficult to explain.

These studies are being continued, and when completed, will be published probably in the *Centralblatt für Bakteriologie.*

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THE INTERNATIONAL CATALOGUE OF SCIENTIFIC LITERATURE.[1]

IN 1903 I was appointed by the council of this society acting as the regional bureau for New South Wales, to represent this state at the council meetings held in London in May last. I duly attended the meetings and now have the honor to make the following report. The Royal Society of London commenced the work by compiling catalogues of scientific papers (printed between 1800 and 1883) in twelve large quarto volumes, the first volume of which was issued in 1867. In it the titles are arranged solely under the authors' names. A catalogue of the papers published since, *i. e.,* between 1884 and 1900, is now in hand, and a subject index is also nearly completed.

The possibility of preparing a complete catalogue of current scientific literature was considered by the Royal Society in 1893, but as it was apparent that the work was beyond the resources of the Royal Society, or indeed of any single body, the society sought the opinion of representative foreign bodies and individuals, and the replies being favorable, steps were taken to summon an international conference. This conference, at which I was present as a delegate, took place in London, on July 14 to 17, 1896, and was attended by delegates appointed by the governments of Canada, Cape Colony, Denmark, France, Greece, Hungary, India, Italy, Japan, Mexico, Natal, the Netherlands, New South Wales, New Zealand, Norway, Queensland, Sweden, Switzerland, the United Kingdom and the United States. It was then unanimously resolved to compile and publish a complete catalogue of current scientific literature, arranged according to both subject matter and authors' names. The Royal Society was requested to appoint a committee to further consider the system of classification to be adopted and other matters, and it was decided to establish the central bureau in London.

At the second international conference held in London on October 11 to 13, 1898, several questions were settled and a provisional international committee appointed which afterwards met in London, on August 1 to 5, 1899, when the work was still further expedited and the Royal Society requested to organize the central bureau and make all necessary arrangements so that the preparation of the catalogue might be commenced in 1901.

A third international conference was held in London, on June 12 and 13, 1900, at which all financial and other difficulties were removed by the Royal Society agreeing to act as publishers and to advance the funds necessary to start the enterprise. The supreme control over the catalogue is now vested in an international convention which is to meet in London in 1905, in 1910 and every tenth year afterwards, to consider and, if necessary, to revise the regulations for carrying out the work of the catalogue. In the interval between two successive meetings of the convention the administration of the catalogue is carried out by the international council, the members of which are appointed by the regional bureaus.

The total expenditure from July 1, 1900, to February 29, 1904, has been £10,153, and the total amount received from subscribing bodies was £6,755; eventually the publication will pay its way, but it may be some time before the debt to the Royal Society will be extinguished. The financial support given by the different countries is shown in the following list. New Zealand has not become a contracting body: Austria, £165; Canada, £119; Cape Colony,

[1] Report presented at the annual general meeting of the Royal Society of New South Wales, May 3, 1905.