important in agriculture and invoked the aid of botany, physics, microbiology, organic chemistry, entomology and plant pathology, in the study of problems concerned with soil conditions and plant growth. The development of biological research required mathematical methods for the sifting and evaluation of experimental data, and this need has been met by the addition of a section of statistics.

Since the time of director Hall and during the time of director Russell the Rothamsted Experimental Station marched from progress to progress and to-day the Station is well equipped for research on all problems in soil management and crop production. The work is carried out in a number of sections and subsections dealing with botany, soil physics, soil chemistry, microbiology, field experiments, statistics, crop physiology, insect pests, and plant diseases. The contributions of these different sections to the science and practice of agriculture are great and enduring.

The fields of work initiated at Rothamsted a hundred years ago by Lawes and Gilbert and subsequently developed by those that followed them are still yielding rich harvests. The founders started their programme of work on fundamental scientific problems. They did not base their programme of work to deal with the then problems of immediate practical importance even though that would have been justifiable in those difficult days called "the hungry forties" when more and cheap food was in great demand. Had they done so we would not have to-day the results which are so widely beneficial and permanent in value. Lawes and Gilbert laid emphasis on gaining knowledge as they had the vision and insight to realise that knowledge is essential for advance. The world to-day cannot be too grateful to these pioneers. Rothamsted celebrated its Centenary by extending the laboratories and facilities for scientific work and that is a fitting and enduring expression of gratitude to the great founders of the Rothamsted Experimental Station a hundred years ago.

B. VISWA NATH.

STUDIES ON THE PRESERVATION OF GLANDS

II. Preservation of Pituitary Glands

BY
B. B. DEY, P. S. KRISHNAN AND M. GIRIRAJ
(*Presidency College, Madras*)

ADRENALINE AND THYROXINE are typical examples of hormones which can be isolated in pure crystalline condition and which can, therefore, be correctly dosed in the preparation of injectules. The posterior pituitary, on the other hand, is very often administered as a crude extract ('Pituitrin'), which is prepared by extracting the desiccated powder with 0·25 per cent. acetic acid and then distributed into ampoules after bioassay, such that each c.c. contains ten international units. Any decrease in the potency of the powder would necessitate more of powder to be extracted to give the same volume of solution: this would naturally involve the presence of more of extraneous protein in the final extract—which is highly undesirable. The study of the conditions for the proper collection and preservation of the pituitary glands is, therefore, of great significance.

Vitamin C is an important constituent of the pituitary glands (where it is present in greater concentration than in the adrenal glands) and a study of the changes in the vitamin content during collection and storage of the glands should give an insight into the stability of the glands. A detailed study was, therefore, undertaken of the vitamin C content of the glands collected and stored under different conditions: the methods used were firstly the titration method with the oxidation reduction indicator 2 : 6 dibromophenol-indophenol, and secondly, titration with standard iodine solution. As in the case of a previous study[1] on the preservation of adrenal glands, the iodine titration method was found to give consistently higher values than the indicator method, indicating the presence of extraneous reducing agents.

Tables 1 to 6 represent the figures for vitamin C (expressed as mg. of vitamin per g. of whole gland) obtained for the pituitary glands of cattle and sheep collected (1) in 'dry ice' (— 80°), (2) in freezing mixture (— 18°) and (3) melting ice (0°), soon after the animals were slaughtered and analysed within two to three hours (the time taken for transport of the glands from the abattoir to the laboratory).

Cattle Glands

TABLE 1 — *Collected in 'dry ice'*

Indicator	Iodine
1·43	1·68
1·41	1·67
1·45	1·72
Average 1·43	1·69

TABLE 2 — *Collected in freezing mixture*

Indicator	Iodine
1·38	1·71
1·36	1·78
1·31	1·68
Average 1·35	1·72

Cattle Glands

TABLE 3 — *Collected in ice*

Indicator	Iodine
1·29	1·55
1·30	1·60
1·31	1·59
Average 1·30	1·58

Sheep Glands

TABLE 4 — *Collected in 'dry ice'*

Indicator	Iodine
1·72	2·04
1·70	2·01
1·84	2·18
Average 1·75	2·08

Sheep Glands

TABLE 5
Collected in freezing mixture

Indicator	Iodine
1·72	2·12
1·68	2·05
—	—
Average 1·70	2·09

TABLE 6
Collected in ice

Indicator	Iodine
1·65	1·95
1·66	2·06
1·58	1·85
Average 1·63	1·95

Tables 7 to 10 represent the vitamin C contents of cattle glands which were transported to the laboratory in melting ice and subsequently stored for varying periods at the Frigidaire temperature of 0 to 5°, with the addition of toluene as preservative.

TABLE 7
Glands stored overnight at 0°

Indicator	Iodine
1·16	1·37
1·19	1·43
1·14	1·41
Average 1·16	1·40

TABLE 8
Glands stored for two days at 0°

Indicator	Iodine
0·90	1·08
0·91	1·11
0·91	1·04
Average 0·91	1·08

TABLE 9
Glands stored for three days at 0°

Indicator	Iodine
0·70	0·86
0·71	0·87
0·69	0·86
Average 0·70	0·86

TABLE 10
Glands stored for four days at 0° (putrefaction sets in)

Indicator	Iodine
0·43	0·59
0·39	0·47
0·34	0·50
Average 0·39	0·52

Tables 11 to 16 represent the changes in the ascorbic acid content of cattle glands, which were brought to the laboratory packed in ice and stored frozen for varying periods at — 7° C. (in the freezing chamber of a frigidaire) with the addition of a few drops of toluene as preservative (except Table 11, where the glands were transported to the laboratory in dry ice).

TABLE 11
Glands brought in 'dry ice' and stored overnight in 'dry ice'

Indicator	Iodine
1·33	1·62
1·36	1·63
1·35	1·58
Average 1·35	1·61

TABLE 12
Glands stored overnight at — 7°

Indicator	Iodine
1·30	1·62
1·26	1·62
1·24	1·58
Average 1·27	1·61

TABLE 13
Glands stored for three days at — 7°

Indicator	Iodine
1·27	1·60
1·26	1·58
Average 1·27	1·59

TABLE 14
Glands stored for one week at — 7°

Indicator	Iodine
1·18	1·49
1·15	1·39
1·13	1·48
Average 1·15	1·45

TABLE 15
Glands stored for two weeks at — 7°

Indicator	Iodine
1·12	1·43
1·11	1·41
1·16	1·46
Average 1·13	1·43

TABLE 16
Glands stored for four weeks at — 7°

Indicator	Iodine
1·02	1·23
1·00	1·21
0·99	1·19
Average 1·00	1·21

It will be clear from the above tables that the ideal way of collection of the glands would be to freeze them immediately after removal from the carcass, either with freezing mixture or preferably with solid carbon-dioxide. As regards the storage of glands, rapid decomposition of the vitamin is observed when the glands are stored at 0-5°: at the end of two days over 25 per cent. of the vitamin is lost and on the fourth day the vitamin content is only a third of the original amount. The glands can, however, be kept frozen for several weeks, without any physical deterioration, in which state it can be conveniently transported to distant places. At the end of three days the decomposition of vitamin C in the frozen glands is only 10 per cent. and even after two weeks the loss in the vitamin is only about 20 per cent.

It has often been pointed out that freezing of glands and subsequent thawing is accompanied by rapid destruction of the active principles due to the mechanical rupture of the cell structure (*cf.* Mills).[2] In the course of our analyses of frozen pituitary glands it was repeatedly observed that thawing of frozen glands (which was effected by contact with cooled water) was accompanied with rapid destruction of the vitamin, unless the glands were immediately assayed for the vitamin content. The following tables (17, 18 and 19) represent three typical sets of results obtained on analysis of the vitamin content of frozen glands (the freezing being effected with dry ice, freezing mixture and keeping in freezing chamber at — 7), the entire batch of glands being thawed in one lot and the extraction being spread over 30 to 60 minutes.

TABLE 17

Thawing of glands frozen with dry ice

Indicator	Iodine
1·43	1·68
1·28	1·55
1·23	1·45

TABLE 18

Thawing of glands frozen in freezing mixture

Indicator	Iodine
1·26	1·75
1·08	1·47
1·00	1·27

TABLE 19

Thawing of glands kept in freezing chamber

Indicator	Iodine
1·03	1·35
0·87	1·21
0·72	1·04

It is advisable, therefore, to process the thawed glands without undue delay for the isolation of the active principles.

The following tables (Nos. 20 and 21) represent the distribution of vitamin C in the anterior and the posterior lobes of the pituitary glands of cattle and sheep, the analyses being carried out on fresh glands transported to the laboratory, packed in dry ice.

TABLE 20

The distribution of vitamin C in the cattle pituitary

Anterior lobe		Posterior lobe	
Indicator	Iodine	Indicator	Iodine
1·47	1·90	0·82	1·23
1·49	1·95	0·79	1·30

TABLE 21

The distribution of vitamin C in the sheep pituitary

Anterior lobe		Posterior lobe	
Indicator	Iodine	Indicator	Iodine
1·50	1·82	0·56	1·12
1·56	1·83	0·54	1·05

Vitamin C is thus present in higher concentration in the anterior lobe than in the posterior—an observation in conformity with the findings of Phillips and Stare.[3]

The expenses of this investigation were met entirely by the Board of Scientific and Industrial Research, to whom our grateful thanks are due.

1. Dey, Krishnan and Srinivasan, *Curr. Sci.*, 1943, **12**, 244. 2. Mills, *Biochem. J.*, 1932, **26**, 704. 3. Phillips and Stare, *J. Biol. Chem.*, 1934, **104**, 351.

DR. C. W. B. NORMAND, M.A., D.Sc., C.I.E.

WE learn with great pleasure of the award of the Symons Gold Medal of the Royal Meteorological Society to Dr. C. W. B. Normand, Director-General of Observatories, India.

Awarded for outstanding work in meteorology, the Symons Medal is among the highest honours that a worker in meteorology in Great Britain or abroad can aspire to. The honour is conferred upon distinguished meteorologists of world-wide reputation every two years, alternately for work in Great Britain and abroad. Dr. Normand has received the medal for his work in India; but, nevertheless, his most outstanding work, *viz.*, on the thermodynamics of the wet-bulb thermometer, has universal application to the atmosphere over all regions.

Dr. Normand, a distinguished student of physical chemistry of the Edinburgh University, has been a member of the Indian Meteorological Service since 1913, and for the last sixteen years the Head of the Indian Meteoroloical Department. Ever since he joined the Department his work has been in meteorology, and his deep understanding of thermodynamics has been of particular service to him in tackling some of the complicated problems of stability and instability of the atmosphere. He has devoted considerable thought and hard work for years to his favourite problems. He has not yet made public all the results of his investigations, but the quality of the work he has so far published has already earned international recognition and also the high honour that the Royal Meteoroloical Society has now conferred on him for which we offer him our congratulations.

We may here recall the names of some of the renowned meteorologists of the world who have been the previous recipients of the Symons Medal: Among others they have been Sir Napier Shaw, Hann, Hildebrandsson, Bjerknes, Hergessel, Schmidt, W. H. Dines Sir G. C. Simpson, Sir G. T. Walker and Lt.-Col. Ernest Gold.