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The Radcliffe Observatory and its Proposed Removal.

THE British National Committee for Astronomy of the International Research Council has pronounced definitely in support of the proposal to transfer the Radcliffe Observatory, Oxford, to South Africa, rather than to another site in England. This was the view taken at a meeting of the Committee held on May 9, when it was also resolved "that the establishment in South Africa, under English control, of a new observatory equipped with a large reflector, and adequately endowed, would not only be in the best interests of astronomy, but is almost an imperative necessity in the interests of British scientific prestige". The resolution appears in full in our correspondence columns this week over the signatures of sixteen of the seventeen members of the Committee present. A glance at the list of names should be sufficient to convince anyone that leading astronomical opinion in Great Britain is decidedly in favour of carrying on the scientific work of the Radcliffe Observatory in South Africa instead of continuing it in England.

Dr. John Radcliffe, whose name the Observatory bears, was a successful Court physician who died in 1714 leaving a fortune estimated at £140,000. His will provided for the building of a library in Oxford and the salary of a librarian, for travelling fellowships, for rebuilding the front of University College, Oxford, and some other purposes. When the bequest of £40,000 allocated to the library became available upon the death of Radcliffe's sisters, the trustees built the Radcliffe Library and later the infirmary. The residue of the real and personal estate remaining after the payment of various legacies and bequests was to be used by the trustees for "such charitable [purposes] as they in their discretion shall think best". There is no mention of astronomy in Radcliffe's will, and it was not until more than fifty years after his death that the trustees decided that the practical study of this science might be regarded as a charitable purpose and that they could therefore make provision for it.

The Savilian professorship of astronomy was founded in 1619 by Sir Henry Savile, Provost of Eton. Shortly after Dr. Hornsby succeeded to the chair in 1762, he appealed through the Chancellor of the University to the Radcliffe trustees for funds for an observatory, and in 1771 they secured a lease (and in 1820 the freehold) of nearly nine acres for the building and grounds adjoining the Radcliffe Infirmary, which was opened a year earlier. Shortly afterwards the building was put in hand, the trustees

having previously agreed to purchase the instruments suggested by Hornsby. These were completed and delivered in 1773 and are still in the observatory. The building was not, however, finished and furnished until towards the end of the eighteenth century. Several additions have since been made, including a building for an equatorial telescope in 1903.

From the foundation of the Observatory until 1839 the Savilian professor and Radcliffe observer was a joint office, but the University then elected a successor to Dr. S. P. Rigaud without consulting the Radcliffe trustees, with the result that the trustees appointed an observer of their own, and the chair of astronomy has since then been separated from the post of Radcliffe observer.

The trustees then asserted their independence, as they can in their discretion with the sum which will be at their disposal if the Charity Commissioners consent to the proposed sale of the present site of the Radcliffe Observatory for the use of the Radcliffe Infirmary. As the Observatory has been in existence for more than 150 years, it is reasonable to assume that astronomy has a substantial vested interest in the sale of property which it has possessed for so long a period. It seems too late now to urge that as astronomy is not mentioned in Radcliffe's will, the sum available from the sale of the Observatory site should be used for other than astronomical purposes. Probably the trustees will give consideration to any such claims which may be advanced, but it scarcely seems possible now to dispute their legal right to continue to use for astronomy the benefaction which they have administered for so long for the promotion of that branch of science.

Assuming, therefore, that the trustees have a substantial sum at their disposal, there seem to be two points of view as to how this might be used—one that of Oxford itself and the other that of science, which knows no geographical limitations and welcomes facilities for increase of natural knowledge anywhere. It must be acknowledged, of course, that every scientific department at Oxford could make good use of the fund for the development of fields of inquiry which they are unable to explore because of lack of resources, but we wonder whether any department would be inclined to hand over to a separate branch of science an endowment which it had held for a century and a half. In comparison with other subjects, astronomy is very poorly endowed in Great Britain or the British Empire. The suggestion that it might now transfer to other departments of science one of its few endowments cannot, therefore, be seriously entertained.

The position at present is that the Charity Commissioners have the proposed sale of the Observatory site under consideration. Even if consent is given, the future site of the Observatory cannot be definitely settled for many months yet. The present intention of the Radcliffe trustees, for which they hope to obtain legal sanction, is to move the activities to a site on the high veld in South Africa, in view of the excellent observing conditions there and the pressing need of more work on the southern stars. Dr. Steavenson is at present testing the seeing at a site outside Pretoria, using the same method as is being employed in the search for a site for the 200-inch reflector in California. If the Observatory goes to South Africa, it is planned that it should be equipped with as large a reflector as the trust can afford, possibly a 72-inch, as there is an immense field of spectroscopic work, which such a telescope alone can do, awaiting to be done to complement similar work in the northern hemisphere.

From the point of view of progress of astronomical science, the advantages to be gained by the establishment of an observatory in South Africa are beyond dispute. Practically all the most important astrophysical work is now done with large reflectors, like the 72-inch telescope used by J. S. Plaskett at the Dominion Astrophysical Observatory, Canada. His work on the rotation of the galaxy and the interstellar cloud especially needs to be extended to the southern sky.

It would be easy to mention many other profitable lines of work for which a large reflector is required in the southern hemisphere, and also where observing conditions are more favourable than in England. All observing work requiring long exposures, and all photometric work, is carried on here with difficulty and disappointment on account of uncertainties of weather; and this is harder on large telescopes than on small. It is indeed unnecessary to labour the point that a big reflector is urgently needed for line of sight and other spectroscopic work, and that from many points of view the most appropriate site for such an instrument is on the high veld in South Africa, where the American universities of Harvard, Yale, and Michigan, as well as the Smithsonian Institution, have already established observing stations, and where the University of Leyden is also to have an observatory through a grant of £20,000 from the Rockefeller Institute.

There should be no difficulty in arranging for a close relationship between the University of Oxford

and the Radcliffe Observatory wherever it may be. The University has an observatory of its own, and the professor of astronomy, Prof. H. H. Turner, strongly advocates the proposed removal of the Radcliffe Observatory to South Africa. Such an outpost where young English astronomers could go for experience, and to which the professors at Oxford might send students, would be most useful; and friendly co-operation of this kind between the University and the Radcliffe Observatory would be easy to establish. A good deal of the measurement of spectroscopic and other photographs could no doubt be carried on at Oxford, leaving the astronomers at the Observatory in South Africa free for observational work. Oxford has received so much from South Africa that it might now appropriately welcome the transfer to that country of an observatory which cannot usefully extend its work under present conditions, either of site or of instruments. Existing work would, of course, be continued before the removal took place. We understand that if and when the sale of this site is completed, the Radcliffe trustees will take a lease for five years of the observatory buildings and part of the grounds to enable the completion of the programme of work on the proper motions of faint stars in the Kapteyn selected areas (about 30,000 stars are involved) started by Rambaut twenty years ago. The actual observatory buildings would remain as a brilliant example of classical architecture; it is Sir William Morris's wish that they should be used for post-graduate work in connexion with the University School of Medicine.

Theoretical and Applied Colloid Chemistry.

(1) *Elektrochemie der Kolloide.* Von Prof. Dr. Wolfgang Pauli und Dr. Emerich Valkó. Pp. xii + 647. (Wien: Julius Springer, 1929.) 66 gold marks.

(2) *Die Kolloide in Biologie und Medizin.* Von Prof. Dr. H. Bechhold. Fünfte völlig umgearbeitete Auflage. Pp. xii + 586 + 7 Tafeln. (Dresden und Leipzig: Theodor Steinkopff, 1929.) 32 gold marks.

(3) *Équilibres superficiels des solutions colloïdales: études de biophysique moléculaire.* Par Dr. P. Lecomte du Noüy. (Monographies de l'Institut Pasteur.) Pp. 228. (Paris: Masson et Cie, 1929.) 32 francs.

(1) THIS imposing volume attempts, as the preface states, to base an electro-chemistry of colloids on the modern theories of electrolyte solutions. It is the outcome of careful investigations continued for many years, beginning with proteins and gradually extended to many inorganic sols.

The book falls into three main sections: an introduction, which is a concise summary of the relevant chapters of modern physical chemistry, a general and a special electro-chemistry of colloids. The second section, after describing the preparation and purification of sols as well as their coagulation by electrolytes, proceeds to develop the principal theses of Pauli's theory. Suspensions and colloid particles behave like electrolytes of very high molecular weight. The particle consists of a neutral portion forming its main bulk, composed of insoluble and non-dissociating molecules, and a small 'ionogenic' portion which is, generally speaking, a true complex compound in Werner's sense. The ionogenic complex dissociates into two sets of ions, one of which is held to the neutral portion by chemical forces and imparts the charge to it, while the other forms what Pauli calls the 'counter ions'. The particles may be 'isomolecular' when the neutral and the ionogenic part have the same composition, for example, in silicic acid:

$$[x(SiO_2 + nH_2O) \cdot yHSiO_3] + yH^+$$

or 'heteromolecular', when the two parts differ in composition, as in ferric hydroxide sol:

$$[x(Fe_2O_3 + nH_2O) + yFeOCl \cdot FeO^+] + Cl^-.$$

Pauli does full justice to the earlier work of J. Duclaux, who arrived at a somewhat similar 'chemical' theory by combining conductivity measurements with determinations of osmotic pressure. Pauli considers the latter liable to many errors and substituted for them electrometric measurements; he also investigated sols much more highly purified by prolonged dialysis, and especially by electrodialysis, than those studied by earlier workers. The record of this large mass of minutely careful quantitative work deserves the most careful study. To obtain complete insight into the constitution of the ionogenic complex, it is necessary to combine with the electrical methods chemical analysis, which also calls for a highly developed technique.

Even this complete armoury, however, fails in some cases. It is a little disappointing that it should do so with the gold sols which at first sight might seem ideal for testing the claims of Pauli's theory and its chief rival, the adsorption theory. The constitution of the ionogenic complex is not definitely known, but Pauli assumes it to be an aurate or auric acid, the anion of which gives the particle its negative charge. Zsigmondy and his school, on the other hand, consider that it is due