

kinds of glass in the construction of telescope objectives and microscope objectives.

"Regarding the latter aim, a series of objectives adjusted for the short continental tube is nearly finished; another series for your English microscopes—which requires different formulas—has been begun; and you and Mr. — have at hand the first specimens of that series.

"The optical features of the new constructions, which are represented by this $1/8$ th of 1.4 ap., may be defined in that way; the various corrections are of a higher order than could be obtained formerly (or, more strictly spoken, the residuals of the various corrections, i.e. the defects of collection of the rays, are of a higher order according to mathematical terminology. (1) With the old kinds of crown and flint glass two different colours only could be collected to one focus, a secondary spectre remaining uncorrected. With the new glass those different colours unite at one point, a tertiary deviation being left only. (2) Formerly the spherical correction was confined to the rays of one colour; this correction being made for the middle part of the spectrum, the systems remained uncorrected, spherically, for the red rays, and overcorrected for the blue rays. Now the correction of sph. aberr. is obtained for two different rays of the spectrum at the same time, and the objective shows the same degree of chromatical correction for the central as for the marginal part of the aperture. (Of course, this higher degree of correction is not given by the glass from itself—it requires a very careful utilisation of the optical properties of the various kinds of glass at disposal, in order to fulfil all those conditions, and this was not even possible except by means of a greater complication of the constructions; I was obliged to introduce five separate lenses (for the aperture 1.4) instead of the four applied hitherto).

"The objective at hand is constructed on the single-front-type. It contains ten single lenses in five separate parts. Two only of these ten lenses contain silicic acid; the glasses of the other eight are phosphates and borates—the Crown and Flint glass which has been used by the opticians hitherto, does not contain, as essential constituents, more than six chemical elements, O, Si, K, Na, Ca, Pb; the lenses of the $1/8$ th contain, as essential components of the glass, not less than fourteen elements."

"I did not introduce a greater aperture than 1.40 in order to preserve a convenient working distance—which, in fact, is $=0.25$ mm. $=1/100$ in. The two oculars sent with the objective are constructed with the aim to compensate certain aberrations outside the axis, which cannot be got rid of in the objectives (of wide aperture). The whole series of objectives, high and low powers, shall be so arranged, that this compensation is always obtained by the same series of oculars."

This last letter, I think, will be accepted as setting out *inter alia* in a remarkably lucid way the optical advantages obtained by the introduction and employment of the Jena glass in optical constructions.

F. J. CHESHIRE.

Hamilton and the "Quantification of the Predicate."

IN NATURE for March 23, p. 78, in a review of De Morgan's "Budget of Paradoxes," re-issued by the Open Court Publishing Co., there is an allusion to Sir William Hamilton's "famous theory of the quantification of the predicate."

This theory was first set out by George Bentham, a nephew of Jeremy Bentham, in 1827, in his "Outlines of Logic," reviewed by Hamilton in the *Edinburgh Review* in 1833, and again raised by Mr. War-

low in the *Athenaeum* at the end of 1850, as may be read in the *Contemporary Review*, May, 1873, pp. 821-24.

Although Bentham never pushed his theory, it is clear that it came into Hamilton's mind from Bentham's book, and, as so often happens, the actual originator has been overlooked. B. D. J.

THE ARCHÆOLOGICAL SURVEY OF NUBIA.¹

IN the accounts of the preceding reports which have been published in NATURE attention has been directed to the exceptional thoroughness of the work, both of excavation and surveying, and the completeness of the presentment of the new information brought to light in this important archæological survey, which has been carried out by the Egyptian Survey Department.

In the present report Mr. Firth has fully maintained the high standard of excellence; and the complete and lucid statement of the facts, the liberal supply of text-figures, and especially the admirable collotypes, enable the reader almost to see and fully to understand the whole of the work, without the discomfort of living in a Nubian camp.

It is a matter for congratulation that this important and difficult investigation was carried out with such insight and thoroughness, for the flooding of the country makes it impossible ever to survey Lower Nubia again for archæological information. Without the knowledge so acquired the door would have been shut for ever upon a proper understanding of the early history of the Sudan, which is now being revealed by Prof. Reisner's excavations in the Kerma basin. Moreover, many of the difficulties in interpreting the story of Egypt would have been quite insurmountable without this information to make clear what was happening south of the First Cataract.

Most of the volume is devoted to the primary object of such a report, viz., the detailed and impartial statement of all the facts brought to light. It includes a brief account of the town site of Pselchis, and a full account of the mode of construction and contents of every grave.

The special importance of this report, however, depends upon the fact that it deals so largely with the remains of the distinctively Nubian culture, of which, from the circumstances of the case, it must represent for all time the chief source of information. In the introductory twenty-four pages Mr. Firth gives a well-balanced and illuminating survey of the early movements of people in the Nile valley, in which he clearly defines the position and the distinctive cultural relations of the Middle Nubian people (the "C-group"). The only criticism that I have to make of his account of this interesting people is the wholly unwarrantable suggestion of "the possibility that the C-group represents an immigration from the south-west of a mixed Negro and Libyan stock from

¹ "The Archæological Survey of Nubia." Report for 1909-10. By C. M. Firth. (Cairo: Government Press, 1915.) Price L.E. 2.

Darfur (or Kordofan) at the close of the Old Kingdom" (p. 20).

There is no reason whatsoever for labelling

Predynastic Egyptians formed one of these groups and the Middle Nubians another; but there was a buffer-population, the "B-group" of the archæolo-



FIG. 1.—Pottery deposit near Canteen or Customs House, Romano-Nubian period. From "The Archæological Survey of Nubia."

these people "Libyan." In prehistoric times there were groups of kindred peoples scattered along



FIG. 2.—Later C-group period. Large jar of black polished ware with incised and coloured patterns in imitation of basket-work. Cemetery 101, grave 38. Scale 1:6. From "The Archæological Survey of Nubia."

the Nile valley like beads upon a string, which reached from the Mediterranean to Abyssinia. The

gists, between them to hinder free admixture either of blood or culture, but which itself was affected most intimately—in other words, was virtually enslaved—by the more powerful Egyptian people. The Egyptians themselves were subjected to the stimulating influence of contact with more virile races in the north, and advanced rapidly along the paths of material progress. The Middle Nubians were affected by the retarding influence of Negro admixture, and incidentally retained for many centuries and with relatively slight changes the arts and crafts which originally were the common heritage of both Egyptians and Nubians.

The archæological evidence relating to this instructive history has been set forth in a most lucid way by Mr. Firth.

The excellence of the way in which the Survey Department has carried out this work of archæological research and of the publication of its results makes one wish that the newly-established British Protectorate of Egypt may use the knowledge to put in order its Antiquities Department, which is not only intimately related in a variety of ways to the proper financial administration of the country, but also has responsibilities for the proper care of monuments by which posterity will judge of the success or otherwise of British rule in Egypt.

G. ELLIOT SMITH.