tigation and interpretation by modern colloid chemistry. Non-aqueous colloid systems present as yet an almost entirely new field.

Prof. Bancroft has presented in very readable form stimulating problems which should serve to emphasise the growing necessity for the research worker in all

branches of chemistry to keep in close touch with the future developments of a branch of his science underlying all industrial chemistry, but which, unfortunately, is not yet sufficiently recognised in the curricula of universities and other institutions possessing honours schools of chemistry.

Orientation in Egypt.¹

By COL. H. G. LYONS, F.R.S.

MR. RICHARDS'S short note of eleven pages, which has been published by the Survey of Egypt, deals with observations which were made in 1913 and 1914 to determine the azimuth of the axis of Karnak temple. In 1890 Sir Norman Lockyer took some preliminary observations, which suggested to him that the temple at the time of its foundation had been definitely oriented to the sun at sunset at the summer solstice, a conclusion which others made by Mr. Wakefield in 1891, and later by Mr. Howard Payn (*NATURE*, October 19, 1911) appeared to confirm.

On all these occasions, however, the line of the temple axis was much obstructed by fallen blocks of masonry, and not until 1913 was the clearing so far advanced that satisfactory observations could be made. The results then obtained differed considerably from the earlier ones. As a control the temple axis was carefully surveyed in 1914, and a new determination of the azimuth was then carried out, which fully confirmed that of the year before, namely, $26^{\circ} 54' 0''$ north of west. The declination of the sun for it to shine down the temple axis must, consequently, be $25^{\circ} 9' 55''$, instead of $24^{\circ} 18' 0''$, which the earlier observations had indicated, and the date of foundation deduced therefrom, instead of being 3700 B.C., would be carried back to a time far anterior to the earliest estimate of any Egyptian civilisation. Karnak temple cannot, therefore, be a solar temple having its axis directed to sunset at the summer solstice.

¹ "Note on the Age of the Great Temple of Ammon at Karnak as determined by the Orientation of its Axis." By F. S. Richards. (Cairo Government Press, 1921.)

It had seemed that much support was given to the hypothesis of orientation by inscriptions which definitely describe the foundation ceremony as including the stretching of the measuring cord and the alignment of a peg on a celestial body. But our knowledge of the foundation ceremonial is still incomplete, and it is doubtful if it described a practice which was carefully and accurately carried out at the founding of each new temple; more probably it was a very early rite, which had become purely ceremonial by the time when masonry temples were erected, and when other considerations often influenced the laying out of a site.

At Karnak the axis of the sanctuary, of which the azimuth was determined, was 35.5 metres long, but on account of weathering the centres of various doorways cannot be determined within a centimetre, and an error of 1' in the azimuth, which may be introduced by this, would alter the date by some 190 years.

Luxor temple has been quoted as a case of a temple in which successive additions were laid out with slightly different azimuths of their axes to compensate for the changing amplitude of the star, which could no longer be seen along the axis of the earlier portion. But Borchardt (*Zeitschrift für ägyptische Sprache*, vol. 34, 1896) has indicated conditions on the site which may equally have necessitated the slight displacements of the later additions, apart from any astronomical considerations. It seems, therefore, unlikely that the foundation dates of Egyptian temples can be determined more accurately from astronomical data than by archaeological methods.

Experiments on Plague Eradication in India.

IN "An Experiment in the Eradication of Plague Infection carried out in the Poona and Adjacent Districts: First Report (for the period 1914-16)," and "Further Experiments in Plague Prevention carried out at Poona: Second Report (for the period 1916-18)" (*Indian Journal of Medical Research*, vol. 8, No. 3, January, 1921), Major J. C. G. Kunhardt, I.M.S., and Assistant-Surgeon G. D. Chitre give their experiences as to the possibilities of eradicating plague by rat reduction during the non-epidemic season, and suggest improvements in the methods of rat-destruction.

The basis of the work is the finding of the Plague Research Commission that epidemics of bubonic plague in India may be regarded as entirely dependent on, and perpetuated by, epizootic plague in rats. Hence measures for increasing the immunity of man by inoculation, or for protecting him from infected fleas by evacuation, flea-destruction, etc., could, by themselves, in no way bring about the eradication of the disease from any area; and measures for the eradication of plague infection must depend entirely on the reduction of the rat population. This reduction can be effected indirectly, either by limiting the shelter and food-supply of rats, or by fostering their

natural enemies; or directly, by their destruction with traps, poison baits, etc. Practical considerations of several kinds, however, convinced the authors that active rat-destruction was the only available measure.

The method adopted depended on the fact that there is normally, in every year, a season when plague dies down. The new epidemic may be started either through the importation of infection from outside, or through the recrudescence of the disease harboured, though not manifest, in the area itself. In the area selected for experiment—the districts of Poona, Ahmednagar, Satara, and Sholapur—the "off-season" includes April, May and June.

It has been shown that in the great majority of places infection dies out completely before or during the off-season. It may not do so, however, in a large town or village, or one into which infection was first introduced comparatively late in the plague season, since here a number of rats would still be present at the beginning of the off-season, sufficient, sometimes, to enable a rat-epizootic to smoulder on during the unfavourable period. Under the opposite conditions—small town or village, and early introduction—the rat population becomes so reduced by the